

ERIA Discussion Paper Series**No. 324****Policies and Financing Strategies for
Low-Carbon Energy Transition:
Overcoming Barriers to Private Financial Institutions**

Venkatachalam ANBUMOZHI

Economic Research Institute for ASEAN and East Asia

Peter WOLFF

German Development Institute

Xianbin YAO

Asian Development Bank

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Abstract: *Placing Asian economies on a low-carbon path requires an unprecedented shift in private investment and new financing models. A growing community of investors is seeking new climate- and environment-friendly opportunities, which financial institutions can use to diversify their funding base and reduce their funding costs. But this requires commitment from all actors across the financing chain. It is simply not enough to allocate money to low-carbon causes – achieving the necessary scale requires a fundamental redesign of risk mitigants and investment enhancers. Banks should join forces with regulators and stakeholders to develop common standards and implement capacity as soon as possible. This paper identifies the current trends, analyses the constraints, and makes recommendations aimed at banks, banking regulators, and institutional investors in emerging economies of the Association of Southeast Asian Nations (ASEAN) and East Asia, to help them improve the level of low-carbon financing, both in individual institutions and across the wider industry.*

Keywords: Capital markets, banking sector, financial regulations, Paris Agreement

JEL Classification: G21, G23, Q54, P48

1. Current Low-Carbon Transition Outlook and Commitment of Banks and Institutional Investors

The Paris Agreement aims to mitigate climate change by transforming the energy system into a low-carbon system and providing financial support to developing countries that need to achieve their mitigation targets. Most countries in the Association of Southeast Asian Nations (ASEAN) and East Asia have submitted their nationally determined contributions (NDCs). Some have submitted two targets within their NDCs: a conditional target which they propose to achieve if they obtain financial support, and a lower unconditional target they will meet in the absence of support (Table 1). Emissions reductions under the unconditional and conditional NDCs were estimated at a minimum of about 750 and 770 gigatons of carbon dioxide (Gt CO₂) respectively, highlighting the high levels of ambition between NDCs and current policy. The Paris Agreement established a process to review the countries' overall progress, with the first evaluation in 2023.

Table 1: Nationally Determined Contributions and Low-Carbon Energy Transitions Targets

Country	NDC targets	Current renewable energy targets	Scope of NDC targets
Australia	Reduce emissions by 26%–28% by 2030 (reference: 2005)	- 33,000 GWh by 2020 - 23.5% of electricity generation in 2020	Targets include energy, industrial processes and product use, waste, agriculture, and LULUCF sector
Brunei Darussalam	Reduce energy consumption by 63% by 2030 (reference: BAU)	- 10% of power generation by 2035 - Total power generation mix: 954,000 MWh by 2035	- Reduce CO ₂ emissions from morning peak-hour vehicle use by 40% by 2035 - Increase total forest reserves to 55% of total land area
Cambodia	Reduce emissions by 27% by 2030 (conditional) (reference: BAU) - reduction of 3,100 Gt CO ₂ from baseline of 11,600 Gt	Hydropower 32,500 MW by 2020	Emissions reduction by 2030: - Energy industries 16% - Manufacturing industries 7% - Transport 3% - Other 1%

	CO ₂ by 2030		- Total savings 27%
China	Reduce emissions intensity by 60%–65% by 2030 (reference: 2005)	Increase the share of non-fossil fuels in primary energy consumption to around 20%	Increase forest stock volume by around 4.5 billion cubic meters from the 2005 level
India	Reduce emissions intensity by 33%–35% by 2030, conditional (reference: 2005)	40% electric power installed capacity from non-fossil fuels by 2030	Additional carbon sink of 2.5–3.0 billion tCO ₂ e through additional forest and tree cover by 2030
Indonesia	Reduce emissions by 29% and 41% (conditional on international support) by 2030, respectively. (reference: BAU)	23% of energy from new and renewable energy (including nuclear) by 2025; at least 31% by 2050	12.7 million hectares of forest area has been designated for forest conservation
Japan	Reduction of emissions by 26% by 2030 (reference: 2013)	Increase in renewables by 22%–24% by 2030	Removals target by LULUCF is 37 million tCO ₂ e
Lao PDR	Increase share of small-scale renewable energy to 30% of energy consumption by 2030, estimated to reduce emissions by 1,468,000 kt CO ₂ by 2025	Increase the share of renewable energy to 30%	Increase forest cover to 70% of land area by 2020
Malaysia	Reduce emissions intensity by 35% (45% conditional) by 2030 (reference: 2005)	Cumulative total renewable energy (MW): - 2020: 2,065 (9%) - 2030: 3,484 (10%) - 2050: 11,544 (13%)	Targets include energy, industrial processes, waste, agriculture, and LULUCF sector
Myanmar	- By 2030, boost hydropower capacity by 9.4 GW to achieve rural electrification using at least 30% renewable energy sources - Expand forest area to 30% by 2030	Increase the share of hydroelectric generation to 9.4 GW by 2030	- Reserved forest and protected public forest: 30% of total national land area - Protected area systems: 10% of total national land area
New Zealand	Reduce emissions by 30% by 2030 (reference: 2005)	Increase renewable generation to 90% by 2025	Continue to achieve a rate of energy intensity improvement of 1.3% per

			annum
Philippines	Reduce emissions by up to 70% (conditional) by 2030 (reference: BAU)	Capacity installation targets from 2012 to 2030: 8,902 MW	Targets cover all sectors, including LULUCF
Republic of Korea	Reduce emissions by 37% by 2030 (reference: BAU)	22%–29% of electricity generation from nuclear by 2035	Reduce energy intensity by 46% from 2007 to 2030
Singapore	Reduce emissions intensity by 36% by 2030 (reference: 2005)	Raise solar power in the energy system up to 350 MW by 2020	Improve energy intensity (from 2005 levels) by 35% by 2030
Thailand	Reduce emissions by 20% (conditional 25%) by 2030 (reference: BAU)	Targeted renewable generation: 13,927 MW by 2021	Reduce energy intensity by 25% in 2030
Viet Nam	Reduce emissions by 8% (conditional 30%) by 2030 (reference: BAU)	Targeted capacity by 2030 - Wind power: 6,200 MW - Biomass power: 2,000 MW - Other renewables: 5,600 MW	Increase forest cover to 45% by 2030

BAU = business as usual; CO₂ = carbon dioxide; Gt = gigaton; GW = gigawatt; GWh = gigawatt-hour; kt = kiloton; Lao PDR = Lao People's Democratic Republic; LULUCF = land use, land-use change, and forestry; MW = megawatt; MWh = megawatt-hour; NDC = nationally determined contribution; tCO₂e = ton of carbon dioxide equivalent.

Note: 'Conditional' targets aim to be more ambitious and include international technical and financial support.

Source: Compiled by the authors from several sources.

An Asian Development Bank (ADB) study estimated that annual investment of at least \$321 billion is required – totalling \$4.8 trillion from 2016 to 2030 – for the energy sector in developing countries in Asia to meet the power demand set out in the NDCs (Zhai, Mo, and Rawlins, 2018). Thus, the financing needs are enormous and most of the required additional funding can only be mobilised through targeted collaboration between the public and private sectors.

2. Policy Responses Related to the Low-Carbon Transition and their Implications for the Financial Industry

2.1. Market-Based and Regulatory Approaches to the Low-Carbon Transition

The policy response to the Paris Agreement necessitates significant transformation of the energy and energy-consuming sectors towards a low-carbon economy. Two primary policy paths are emerging in the region in support of the low-carbon transition: market-based approaches and regulatory approaches. Market-based approaches are generally broader and involve the pricing of carbon in some way, while regulatory approaches tend to be more sector-specific. Governments use both approaches in their efforts to address the energy transition. Economists generally favour carbon pricing as the most efficient way to shift to low-carbon energy resources. There are two main types of carbon pricing systems: a carbon tax and an emissions trading system (ETS). In an ETS, the price of carbon is established indirectly, whereby the quantity of total energy-related emissions is restricted and the scarcity causes a rise in price. A carbon tax sets a carbon price directly by defining a tax rate on greenhouse gas (GHG) emissions, typically on the carbon content of the energy source. Although different fuels and fuel uses may be taxed at different rates, the resulting tax is still generally referred to as a carbon tax. In contrast to an ETS, here the price of carbon is set explicitly, while the amount of emissions reduction is not predetermined. According to the World Bank (2018), 47 carbon pricing initiatives were being implemented or were scheduled for implementation as of 2017, covering 42 countries and 25 cities, states, and provinces. The active initiatives covered 8 Gt CO₂, representing 14.6% of global GHG emissions, at a monetary value of \$52.21 billion.

Table 2 shows the growth of market-based carbon pricing initiatives. In ASEAN and East Asia, 14 such initiatives are in operation, covering four countries and 10 cities and provinces. These cover 3.2 Gt CO₂e, or 5.8% of global GHG emissions, at a value of \$17.1 billion. Eight of these initiatives are pilot ETSs in China at the city or provincial level. These are scheduled to be merged into China's forthcoming national ETS, which was launched in late 2017 but is not yet operational. While Japan has already implemented a carbon tax, it is also considering a national ETS, as are India, Taiwan, Thailand, and Viet Nam (Zhai, Mo, and Rawlins, 2018).

Table 2: Growth of Market-Based Carbon Pricing Initiatives

Year	2000	2005	2010	2015	2020
Share of global annual GHG emissions covered (%)	0.25	4.16	4.82	12.32	20.19
Number of initiatives implemented	7	9	19	38	51
Major entrants		EU (ETS)	Japan	India	China

ETS = Emission Trading Scheme, EU = European Union, GHG = greenhouse gas.

Source: Compiled by the authors from various reports.

On the other hand, regulatory approaches to a low-carbon energy transition have tended to focus on the energy used in power generation, transport, manufacturing, building, and other resources. Selected regulatory policies for addressing the low-carbon transition are summarised in Table 3.

Table 3: Emerging Stimulant Regulatory Standards and Practices

Sector	Regulatory standards	Investment opportunities
Power generation	Feed-in tariff and premium for renewable energy Renewable portfolio standard Tax rate adjustment Cogeneration Emissions standards Carbon capture and storage Large-scale hydropower	Market and regulatory blend Frequently paired with tradable renewable energy certificates Differential taxation based on carbon content Combined power generation Phasing out low efficiency power plants Large potential, but cost-effectiveness unproven Limited site options without several social and environmental costs
Buildings	Energy efficiency standards for buildings Grants to promote energy saving	Obligations for efficiency and prohibitions for inefficient technologies Especially for reducing energy consumption by combining technology and finance
Transport	Financial incentives for electric vehicles Biofuel mandate Fuel economy standard	Zero value-added tax, no registration tax, toll-free roads Carbon neutrality Straightforward adjustments and innovations
Industrial process	Incentives to promote energy efficiency Emissions standards Financial incentives for retrofit	Including the deployment of technologies, auditing, and data collection systems May include new models, e.g. carbon capture and storage Refurbishing and modernisation of old plants

Source: Authors.

3. Implications of Policy Responses and Climate Change Risks in the Financial Sector

3.1. Climate Risks and Regulatory Policies

The investment community faces several kinds of risks as a result of such market-based and regulatory actions. Regulatory risk is most relevant to the financial sector, followed by liability or litigation risk, and finally, reputational risk. These risks are interlinked and interdependent and may encompass the physical risk derived from the adverse impacts of climate change such as natural disasters. HSBC (2019) identified three risk categories:

- (i) **Physical risks** include the impacts on insurance liabilities and financial assets that result from climate- and weather-related events such as floods and storms which damage property or disrupt trade. The consequences are greatest for the insurance sector, but also extend more broadly.
- (ii) **Liability risks** occur when parties that have suffered loss or damage from the effects of climate change seek compensation from parties they hold responsible. Such claims could come decades in the future, creating liabilities for fossil fuel extractors and emitters and their insurers.
- (iii) **Transition risks** are the financial risks that could result from the process of adjustment towards a lower-carbon economy. Changes in policy, technology, and physical risks could prompt a reassessment of the value of a large range of assets as costs and opportunities become apparent. Particularly rapid repricing could threaten financial stability.

When financial institutions are unprepared to assess or respond to the low-carbon risks described above, they may face additional legal risks from inaction. Further, transition risks in the financial sector are closely linked to adjustments in real sectors and can be triggered by:

- mandatory or voluntary changes in emission control policies that companies need to comply with, possibly entailing additional costs;
- declining profitability and cash flows of projects underwritten by financial institutions, resulting from higher capital and operating expenditures required to mitigate and adapt to climate change;

- low-carbon technologies and innovations that render previous technologies or products financed by financial institutions obsolete; and
- a shift by consumers away from high carbon-emitting products.

The Financial Stability Board Task Force on Climate-Related Financial Disclosures (FSB TFCD, 2017a) highlighted that, for equity investments, climate-driven deviations from expected results that affect an investment's valuation are relevant for projecting returns on equity and planning exit strategies. Climate risks are also material to a company's earnings and expenses, and so can lead to a deterioration of its financial position and its ability to service its debt. Broadly speaking, the financial performance of banks and non-bank financial institutions alike can be weakened by:

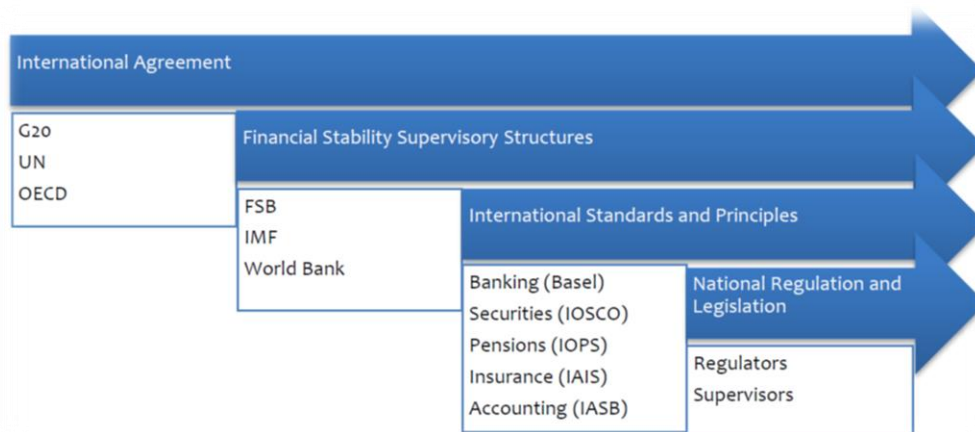
- supply and demand changes caused by climate factors (e.g. weather conditions that affect productivity and logistics regionally or globally);
- the efficiency, output, and performance of assets and equipment affected by changing climate conditions, with an impact on revenues (e.g. hydropower plants are affected by precipitation patterns);
- operating expenses that increase because of changes in the price, availability, or quality of inputs;
- increases in insurance premiums in regions that are prone to climate change;
- capital expenditure increases that result from asset damage, decreased asset performance, or compliance costs associated with emission control regulations;
- accelerated asset depreciation due to climate change conditions, and its impact on projected cash flows;
- loss contingency projections – or the reserves required to deal with potential disasters or other known risks – which may increase as the risks of climate change become greater and better quantified.

Due to the rising perception of risks in fossil-fuel-based energy generation, a growing number of financial institutions – insurance companies, banks, and investors – are ceasing to engage in this sub-sector, which will impede the financing of investments in this area in the medium term.

3.2 International Financial Standards as they Relate to a Low-Carbon Transition

A range of regulatory reforms, policies, standards, and processes is being developed internationally to promote a more sustainable and low-carbon economic system. Financial standards are the bedrock of the regulatory framework of the financial system that guides regulators on how they can best achieve low-carbon goals and provide a stable, resilient, and fair financial system. It can be expected that the emerging set of sustainability standards will foster the transition of national financial systems towards sustainability and thus the conditions for low-carbon finance. As Figure 1 sets out, financial standards impact the regulations and supervisory standards at the national level, and help to inform and achieve the priorities at the international level.

Figure 1: Global Financial Regulation Process



FSB = Financial Stability Board, G20 = Group of Twenty, IAIS = International Association of Insurance Supervisors, IASB = International Accounting Standards Board, IMF = International Monetary Fund, IOPS = International Organisation of Pension Supervisors, IOSCO = International Organization of Securities Commissions, OECD = Organisation for Economic Co-operation and Development, UN = United Nations.

Source: UN Environment Inquiry (2017).

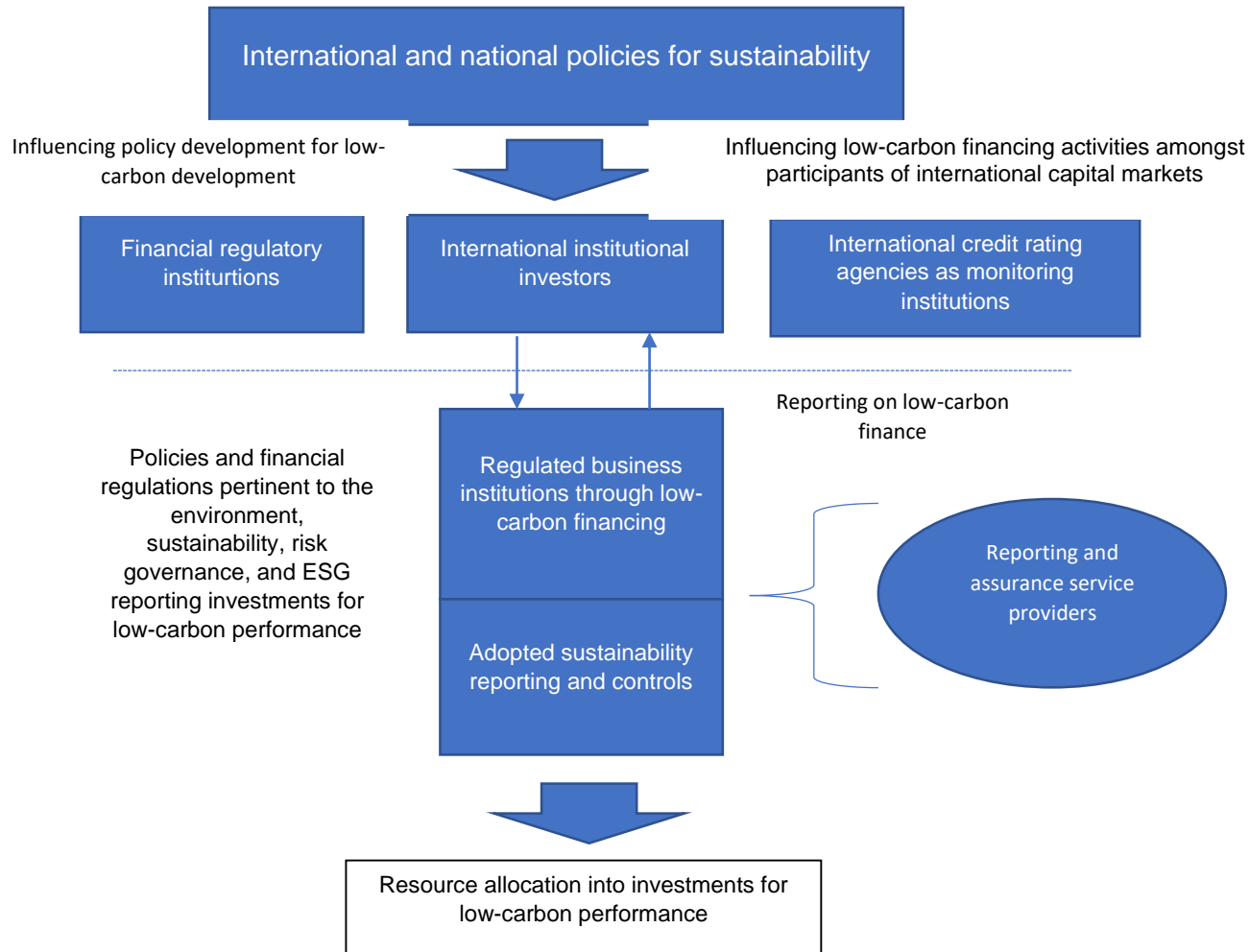
The standards are also widely adopted and referenced by the major standard-setting bodies, including the Financial Stability Board (FSB) and the International Monetary Fund (IMF), and regulators across the developed and developing world. The 15 international standards in a review conducted by the United Nations (UN) Environment Inquiry (2017) include the following:

1. Financial stability supervisory structures
 - FSB
 - IMF/World Bank Financial System Stability Assessment
 - IMF Reports on the Observance of Standards and Codes
2. Banking regulation and standards
 - Basel III – international regulatory framework for banks
 - Basel Committee on Banking Supervision – corporate governance principles for banks
 - Basel Committee on Banking Supervision – core principles for effective banking supervision
3. Corporate governance standards
 - Group of Twenty (G20)/Organisation for Economic Co-operation and Development (OECD) – Principles of Corporate Governance
4. Securities regulation and standards
 - International Organization of Securities Commissions – Objectives and Principles of Securities Regulation
 - International Organization of Securities Commissions – Code of Conduct Fundamentals for Credit Rating Agencies
5. Insurance regulation and standards
 - International Association of Insurance Supervisors – Insurance Core Principles, Standards, Guidance and Assessment Methodology
6. Institutional investment regulation and standards
 - International law – fiduciary duty and prudent person rule
 - International Organisation of Pension Supervisors – Principles of Private Pension Supervision
 - OECD – Core Principles of Private Pension Regulation
7. Accounting and financial reporting standards
 - International Accounting Standards Board – International Financial Reporting Standards
 - International Auditing and Assurance Standards Board – International Standards on Auditing

UN Environment Inquiry (2017) applied a set of categories and a sustainability assessment framework to evaluate the global financial standards with respect to sustainable development and low-carbon financing. These are summarised in Figure 2 and the detailed criteria are described below.

Environment. To what extent does the standard reflect climate change and environmental protection in its definitions, metrics, and guidance material?

Figure 2: Framework of a Low-Carbon Finance System for Adapted Sustainability Reporting



ESG = environmental, social, and governance.
Source: Authors.

Inclusion. To what extent does the standard consider inequality and foster social inclusion as part of supporting the stability of the financial system and the allocation of resources that will be most beneficial to society in the long run?

Culture. To what extent does the standard contribute to facilitating a shift in industry culture and behaviour that is longer-term and embeds values that will support sustainable development?

The framework suggests a top-down approach of institutional legitimacy for a low-carbon transition, influenced by national policy and enhanced through a market-based reporting framework (UN Environment Inquiry, 2017). The objective is to consider the extent to which financial standards are related to sustainable development in general and a low-carbon transition in particular. The evaluation led to the conclusion that financial standards can have a significant impact on achieving low-carbon energy targets.

3.3 Policy and Voluntary Actions Driving Low-Carbon Disclosure – FSB TCFD

For owners and managers of assets, the quality and availability of relevant information is one of the key barriers to incorporating climate issues in their investment processes. In part to address this deficiency, the FSB TCFD issued its final report on 29 June 2017, providing recommendations on low-carbon project-related financial disclosures that are applicable to organisations across sectors and jurisdictions. If adopted widely, the recommendations will normalise and improve the standards of corporate low-carbon risk disclosures, allowing investors to better assess their own climate-related portfolio risk and provide this information to their clients and beneficiaries. The FSB TCFD report knitted existing frameworks into a single framework for disclosure on the assessment and management of climate-related risks and opportunities, and encouraged board-level engagement with the issue. It strongly recommended using scenario analysis techniques as part of the process. The framework contains the following key elements (FSB TCFD 2017a):

- adoptable by all organisations;
- included in financial filings;

- designed to solicit decision-useful, forward-looking information on financial impacts; and
- strong focus on risks and opportunities related to the transition to a lower-carbon economy.

The recommendations focus on four key themes that are aligned with how organisations operate: governance, strategy, risk management, and metrics and targets. The themes are fleshed out with recommended disclosures that organisations should include in their financial filings in each of the four areas to provide investors and other stakeholders with information that helps them understand the reporting organisation’s assessment of its climate-related risks and opportunities. The disclosing organisations will also benefit from the process, gaining a better understanding of the real financial implications of climate-related risks and their potential impacts on business models, strategy, and cash flows.

The TCFD highlights scenario analysis as its preferred tool for producing forward-looking information with respect to assessing climate risks and opportunities in a way that enhances the robustness and flexibility of strategic plans. It also believes such information is important for investors and other stakeholders in understanding how vulnerable individual organisations are to climate-related risks, and how such vulnerabilities might be addressed (Table 4).

Table 4: TCFD Recommendations and Supporting Recommended Disclosures

Governance	Strategy	Risk management	Metrics and targets
Disclose the organisation’s governance around climate-related risks and opportunities	Disclose the actual and potential impacts of climate-related risks and opportunities on the organisation’s businesses, strategy, and financial planning where such information is material	Disclose how the organisation identifies, assesses, and manages climate-related risks	Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material

Recommended disclosures

<p>(i) Describe the board’s oversight of climate-related risks and opportunities</p> <p>(ii) Describe management’s role in assessing and managing climate-related risks and opportunities</p>	<p>(i) Describe the climate-related risks and opportunities the organisation has identified over the short, medium, and long term</p> <p>(ii) Describe the impact of climate-related risks and opportunities on the organisation’s businesses, strategy, and financial planning</p> <p>(iii) Describe the resilience of the organisation’s strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario</p>	<p>(i) Describe the organisation’s processes for identifying and assessing climate-related risks</p> <p>(ii) Describe the organisation’s processes for identifying and assessing climate-related risks</p> <p>(iii) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organisation’s overall risk management</p>	<p>(i) Disclose the metrics used by the organisation to assess climate-related risks and opportunities in line with its strategy and risk management process</p> <p>(ii) Disclose Scope 1, Scope 2, and if appropriate, Scope 3 greenhouse gas emissions, and the related risks.</p> <p>(iii) Describe the targets used by the organisation to manage climate-related risks and opportunities and performance against targets</p>
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TCFD = Task Force on Climate-Related Financial Disclosures.

Source: FSB TCFD (2017b).

3.4 Role of Central Banks in Catalysing Private Finance

Dikau and Volz (2018) distinguished between central banks’ responses to environmental externalities affecting their traditional core responsibility of safeguarding macroeconomic and financial stability, and an activist role for central banks in supporting the development of a low-carbon economy (Dikau and Volz, 2018). Dikau and Volz (2018) took climate risk into account in the design of monetary policy and financial regulation in the pursuit of the traditional goals of price and

financial stability. This can be described as the passive aspect of green central banking because, in pursuing their established goals, central banks may need to incorporate environmental factors into existing frameworks, e.g. into macro-prudential frameworks, without pursuing a low-carbon agenda. On the other hand, central banks may be mandated to actively use the tools at their disposal to promote green investment or discourage brown investment and play a developmental role.

Central banks in developing and emerging economies in Asia have been at the forefront of using a broad range of instruments to address environmental risk and encourage low-carbon investment. Since 2015, central banks in advanced economies have started to address the implications of low-carbon investment for monetary and financial stability. The Bank of England has played a central role in raising awareness of the implications of low-carbon transition risks amongst central banks. The pioneering central banks apply the following policy instruments (Dikau and Volz, 2018).

Disclosure requirements. Effective disclosure requirements for banks and other financial institutions of low-carbon project-related risks can play a central role in ensuring that financial institutions correctly price in the impact of low-carbon policies. TCFD disclosure requirements are a central element of forming a response to climate and environmental risk, since a lack of information on the risk exposure of financial institutions has consequences for financial stability because the misallocation or mispricing of assets may cause abrupt price corrections in financial markets later.

Environmental and social risk management standards. Similar to disclosure requirements, financial regulation that endorses mandatory environmental and social (E&S) risk management standards requires financial institutions to incorporate E&S risk factors into their governance frameworks. To enforce climate-related risk management beyond disclosure, green E&S risk management standards may also establish E&S rules for banks' lending practices by requiring the assessment of these risks, as well as considering the potentially harmful environmental effects of new financial services and products. Furthermore, mandatory green risk management standards could oblige banks to include an assessment of E&S risks in the loan origination process as a criterion based on which loans are extended. This would likely

also have allocative consequences by reducing the flow of finance to polluting and energy-intensive firms and enhancing the financing of greener projects.

Reserve requirements. Reserve requirements determine the minimum amount of reserves that commercial banks must hold. They could be calibrated to create incentives, leading to the promotion of green assets, or make brown lending less attractive. Differential reserve requirements that are linked to the composition of banks' portfolios, allowing lower (higher) required reserve rates for portfolios skewed towards greener, less carbon-intensive assets (brown, carbon-intensive assets) could influence the allocation of credit and promote green investments.

Climate-related stress testing. Climate-related stress tests can fulfil the task of assessing the potential impact that natural hazards may have on the economy, the health of individual financial institutions, and the financial system as a whole. Apart from enabling the evaluation of the resilience of the financial system to adverse shocks, climate-related stress tests would also be necessary to calibrate green macro-prudential policy instruments and to allow for the incorporation of the identified vulnerabilities into capital buffers, risk weights, and caps.

Countercyclical capital buffers. Countercyclical capital buffers are used to mitigate the financial cycle and can be calibrated with regard to environmental risks to ease the potential effect of pricing in a 'carbon bubble' – the expected sudden repricing of carbon-intensive assets due to stricter emission targets and environmental policy.

Differentiated capital requirements. Through capital requirements, financial regulators require financial institutions to hold a certain percentage of capital for risk-weighted assets, which is usually expressed in the capital to risk (weighted) assets ratio. Capital requirements could theoretically differentiate asset classes based on sustainability criteria and assign higher risk weights to carbon-intensive assets in anticipation of future negative and sudden price developments.

3.5 Climate Risk and Credit Ratings

The growing effects of climate change, including rising global temperatures and sea levels, are forecast to have an increasing economic impact on sovereign and commercial debt issuers. This will be a growing negative credit factor for issuers without sufficient adaptation and mitigation strategies. Since 2010, the major credit

rating agencies have included climate risks in their risk models. This will impact the allocation of capital between high- and low-carbon assets, since their credit advice to individual and institutional investors carries enormous weight in the lending and capital markets.

The rating agencies differentiate between climate trends (a longer-term shift in the climate over several decades) and climate shocks (extreme weather events such as natural disasters, floods, and droughts, which are exacerbated by climate trends). Their credit analysis considers the effects of climate change when they believe a meaningful credit impact is highly likely to occur and not be mitigated by issuer actions, even if this is a number of years in the future. Sovereigns will probably be unevenly affected by climate change, with poorer and lower rated sovereigns typically hit hardest, which could contribute to rising global rating inequality (S&P, 2017).

Efforts to mitigate and adapt to climate change also produce opportunities for organisations, e.g. through resource efficiency and cost savings, the adoption of low-emission energy sources, the development of new products and services, access to new markets, and building resilience along the supply chain. The trends towards decentralised clean energy sources, rapidly declining costs, improved storage capabilities, and subsequent global adoption of these technologies are significant. Organisations that shift their energy usage towards low-emission energy sources could save on annual energy costs. A shift towards low-carbon energy sources by sovereigns and enterprises will consequently be reflected in the rating agencies' models and lead to more favourable credit ratings in the medium to long term.

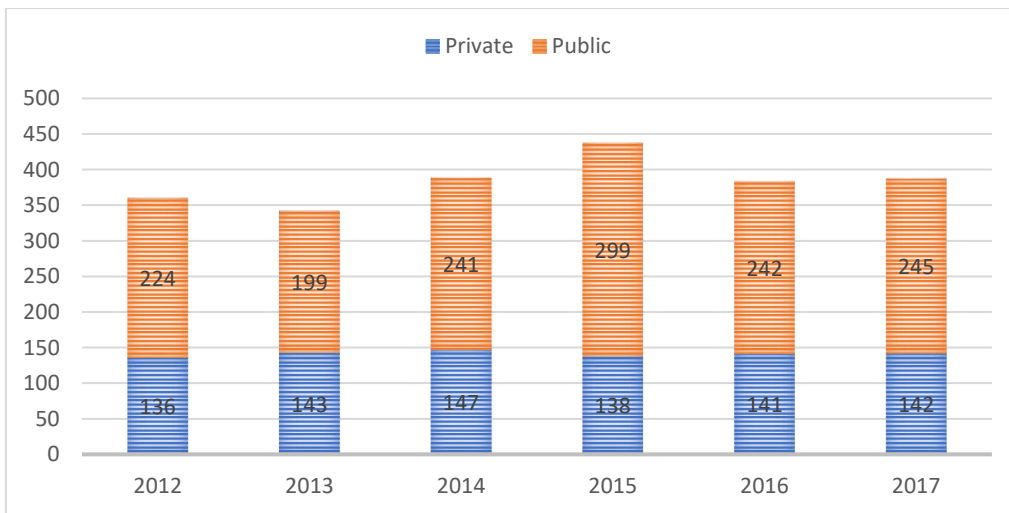
4. Public and Private Financing of Low-Carbon Energy Transition

4.1 Financial Flows that Support Low-Carbon Energy Transition

Low-carbon finance flows originate ultimately from both public and private sources. On the public side are governments and various public financial intermediaries, while the private side includes corporates, households, project developers, and private financial intermediaries. The annual Global Landscape of Climate Finance of the Climate Policy Initiative (Oliver et al., 2018) provides a valuable overview of both public and private finance flows across the life cycle of

activities, from sources and intermediaries to instruments, recipients, and uses. It shows that low-carbon activities receive the vast majority of climate investment dollars: an annual average over 2015–2016 of \$382 billion out of \$410 billion. Private sector project developers were the largest single source of finance, providing more than one-third of the total. In 2015–2016, low-carbon finance (renewable energy, energy efficiency, transportation, and waste to energy) flows from all these parties averaged \$410 billion per year, 12% more than the annual average of the previous 2 years (Figure 3).

Figure 3: Global Low-Carbon Finance by Public and Private Actors
(\$ billion)



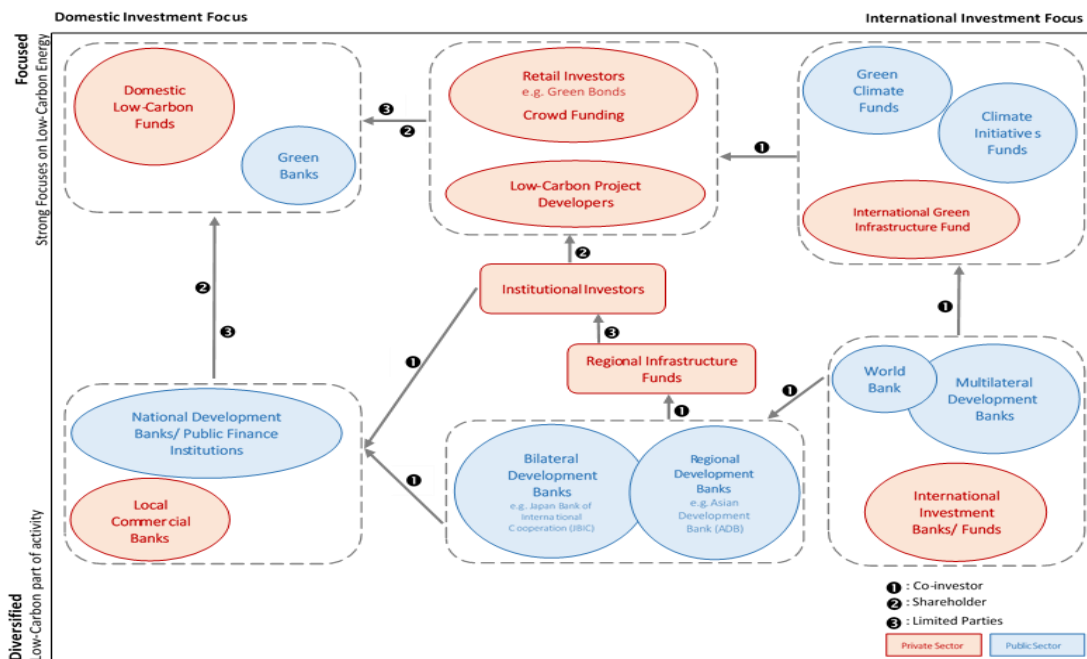
Source: Compiled by authors from Principles for Responsible Investment (PRI, 2015, 2016, 2017); Oliver et al. (2018).

This increase was driven by a large increase in private sector investment in 2015, particularly in renewable energy, while the average annual market rate debt of \$219 billion per year was the most important instrument used to channel low-carbon finance flows (Oliver et al., 2018). It should be noted, however, that the CPI report excluded several significant funding sources such as institutional investors and ETS from its landscape because of data limitations, so the landscape likely understates the level of low-carbon finance flows from both the public and private sectors.

4.2 Public Finance Players

Public finance is a crucial player and has a leveraging role for bringing in private sector resources, particularly by getting the private sector to focus a portion of its far-larger resource base on the problem (Anbumozhi, Kalirajan, and Kimura, 2018). In combination with the appropriate policies and regulatory environment, public finance can help stimulate and direct flows of private capital by demonstrating feasibility, creating markets, fostering innovation, and reducing risk. In addition, public finance provides critical support for delivering those public goods – such as many adaptation projects – that the private sector is unwilling or unable to provide (Amerasinghe et al., 2017). Public low-carbon finance players include multilateral development banks (MDBs), official development assistance (ODA) agencies, other official sources of funding, and a variety of multilateral and bilateral climate investment funds. All these players are involved in some combination of mitigation, adaptation, or the building of capacity at the national or subnational level to improve a given country’s ability to develop and implement low-carbon projects (Figure 4).

Figure 4: Existing Public and Private Financing Channels for Low-Carbon Energy Investment and their Inter-Relationship



Source: Authors.

Multilateral development banks. The majority of financing provided by MDBs is in the form of loans, either at market or below-market concessional rates for specific low-carbon projects. Project support may also come in the form of equity, grants, other risk-sharing instruments such as guarantees, technical assistance, and other advisory activities. A key element of the value proposition of MDB involvement in a project is its ability to lower the project's financial risk profile and thus attract/mobilise additional external sources of funding. Some of the multilateral and bilateral development banks also act as channels for multilateral climate funds such as the Green Climate Fund (GCF). All MDBs are heavily involved in financing low-carbon projects, having committed more than \$158 billion from 2011 to 2016 in such projects. In 2016, climate finance of \$27 billion comprised 20% of financing operations at the six primary MDBs. After including mobilised financing, total climate financing at these MDBs in 2016 was \$65.3 billion (African Development Bank et al., 2017). About two-thirds of this aggregate total of \$65.3 billion was allocated to public entities, with the remainder going to private enterprises.

Green Climate Fund. The European Union (EU) is the largest provider to the GCF, with a share amounting to \$3,583 million (34.98%). The United States (US) ranks second, with a commitment of \$3,000 million (29.29%). The amount pledged by Japan exceeds that of the United Kingdom – i.e. \$1,500 million (14.64%) versus \$1,211 million (11.82%). Other developed countries, including Canada and Australia, also contribute to the GCF, with contributions amounting to \$277 million (2.70%) and \$187 million (1.83%), respectively (GCF, 2018).

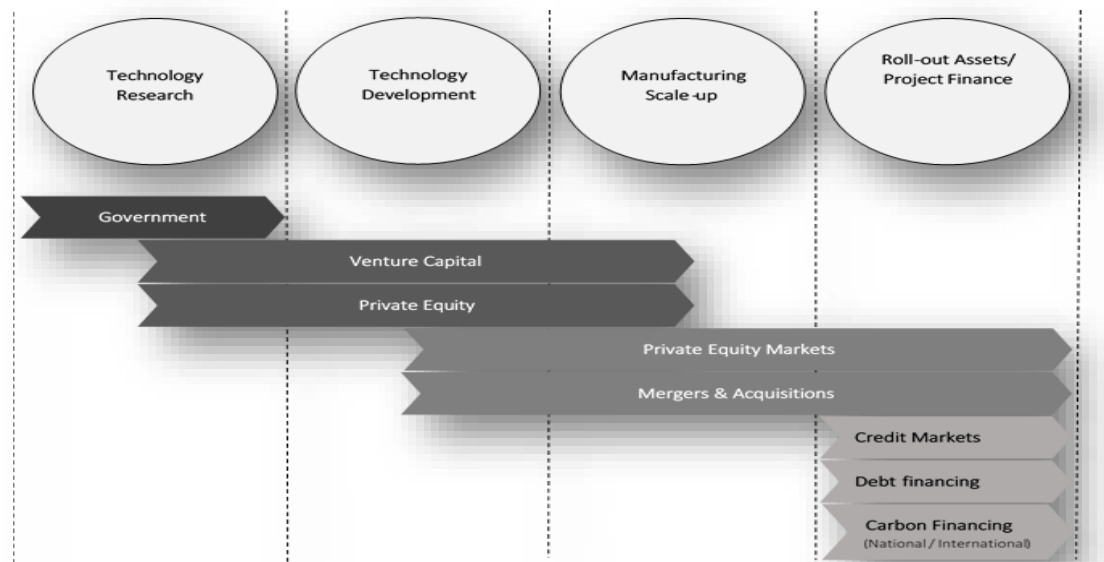
Bilateral official development assistance. Bilateral ODA is also financing low-carbon actions (which are concessional in nature, with a grant element of at least 25%, using a fixed 10% rate of discount). Countries and territories with gross national income (GNI) per capita of less than \$12,745 in 2013, as published by the World Bank (2018), are eligible to receive ODA. For example, at the Japan International Cooperation Agency (JICA), ODA loans to low-income countries are offered with a 40-year repayment period, an interest rate of 0.01%, and a 10-year grace period. In contrast, ODA loans from JICA to borrowers from upper middle-income countries may be fixed or have a floating rate and have varying repayment periods (15–40 years) and grace periods (5–12 years), with the level of the interest rate dependent on whether

the purpose of the loan is a high priority for JICA. Quality infrastructure projects such as low-carbon high tech are in the highest priority category. All other projects receive the agency’s general terms.

5. Bridging the Financing Gap with Private Finance

Private finance plays both direct and indirect roles with respect to accelerating the low-carbon transition. The private sector is the predominant source of direct investment in low-carbon energy, led by project developers, with non-bank private financial intermediaries playing a substantial role. This smaller direct role is a function of the structure of the financial system, which tends to focus on more mature sectors with higher minimum funding needs. This does not match up well with the comparative newness of the various technologies and business models involved in delivering low-carbon investment, or the limited scale of many projects along the financing value chain illustrated in Figure 5.

Figure 5: Low-Carbon Technology Focused Private Financing Continuum



Source: Authors.

This mismatch is precisely why public financial institutions are involved: to accelerate the development of low-carbon projects such that the perceived risk of these projects is lowered to the point that those institutional investors – asset owners as well

as asset managers – capable of providing direct finance can get involved. Often, authorities provide a statute to manage and wind down government grant programs over time to facilitate the deployment of new technologies, such as rooftop solar grant programs.

5.1 Instruments and Channels of Private Finance

The low-carbon financing functions performed by private financial institutions include loans, corporate lending, project finance, mezzanine finance, and refinancing. These functions are described by the United Nations Environment Programme’s Sustainable Energy Finance Initiative (UN Environment Inquiry, 2016) as follows:

Loans and corporate lending. This refers to the provision of finance to companies to support everyday operations, and these bank-derived instruments place few restrictions on how the company can use the funds, provided certain general conditions are met. An assessment is made of the company’s financial strength and stability, and debt is priced accordingly. When private banks provide project finance, debt is borrowed for a specific project, and the amount of debt made available is linked to the revenue that the project will generate over a period of time, as this is the means to pay back the debt. This amount is then adjusted to reflect inherent risks (e.g. the production and sale of power derived from renewable energy). In the case of default on such loans, similar to a typical mortgage, the banks will establish first ‘charge’ or claim over the assets of a business. The first tranche of debt to be repaid from the project is usually called ‘senior debt’. Since project-specific financing typically requires a bank loan in addition to the project owner’s equity investment, projects that fail to secure private loan financing often do not reach the construction phase.

Equity. In addition to loan financing by banks and other finance institutions, low-carbon energy projects and companies also require equity financing. A range of financial investors (including private equity funds, infrastructure funds, and pension funds) place equity investments into companies or directly into projects or asset portfolios. Depending on the type of business, the stage of technology development, and the degree of associated risk, different types of equity investors engage. For example, venture capital is focused on ‘early stage’ or ‘growth stage’ technology companies. Private equity firms, which focus on later stage and more mature technologies or projects, generally expect to ‘exit’ their investment and make their

returns in a 3- to 5-year time frame. Infrastructure funds, which are also interested in lower risk infrastructure (e.g. roads, rail, grid, and waste facilities), have a longer-term investment horizon and therefore expect lower returns over this period. Institutional investors (e.g. pension funds) have an even longer time horizon and larger amounts of money to invest, with a lower risk appetite.

Mezzanine capital. This is a type of lending that sits between the top level of senior bank debt and the equity ownership of a project or company. Mezzanine loans take more risk than senior debt because regular repayments of mezzanine loans are made after those for senior debt. However, the risk is less than equity ownership in the company. A low-carbon energy project may seek mezzanine finance if the amount of bank debt it can access is insufficient. The mezzanine loan may be a cheaper way of replacing some of the additional equity that would be needed in that situation, and therefore can improve the cost of overall finance. A project or a business can be refinanced when it has already borrowed money but decides, or needs, to replace existing debt arrangements with new ones.

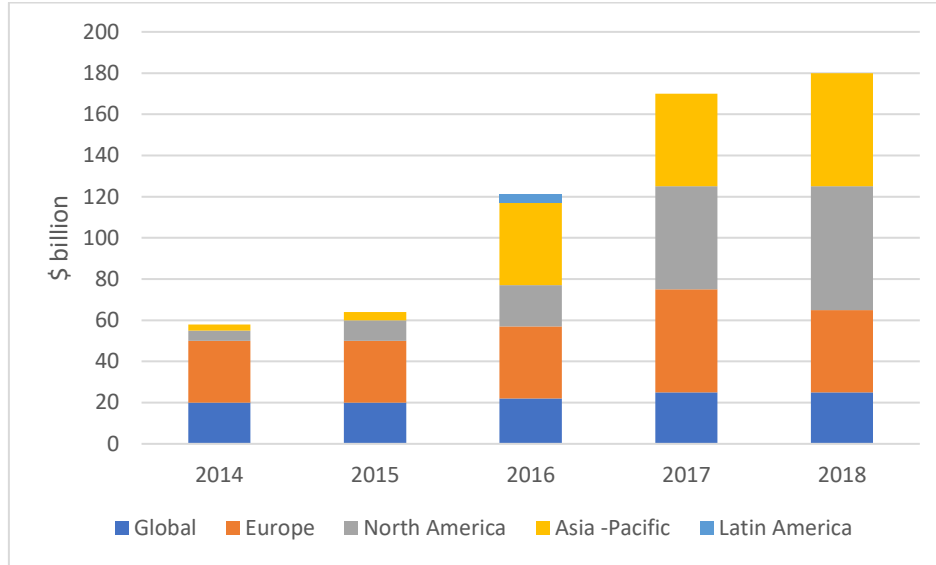
Refinancing. This is sometimes sought when more attractive terms become available in the market, perhaps as lenders become more familiar with low-carbon technology, meaning more money can be borrowed against the asset. The decision to refinance may also be motivated by the duration of the loan facility, as loans are often structured to become more expensive over time because of the increasing risk of changes to regulation or market conditions.

Investment funds. Investing in existing infrastructure funds can be attractive for smaller low-carbon energy projects. Individuals and institutional investors can make equity investments, e.g. in a solar lease fund, which is used to finance many small distributed solar generation projects. Banks can also set up their own debt or equity investment funds. New investments allow project developers to sell their stakes and finance new projects.

Green bonds. By issuing bonds, banks and institutional investors can recapitalise a loan warehouse. By issuing green bonds, banks and companies can draw large amounts of private institutional capital to low-carbon infrastructure. Depending on the legal authority, an entity may be able to issue government-backed bonds. This facilitates lower interest rates, enabling the entities to lend the funds at a lower cost of

capital. The sovereign and corporate green bond market has been growing rapidly in recent years (Figure 6).

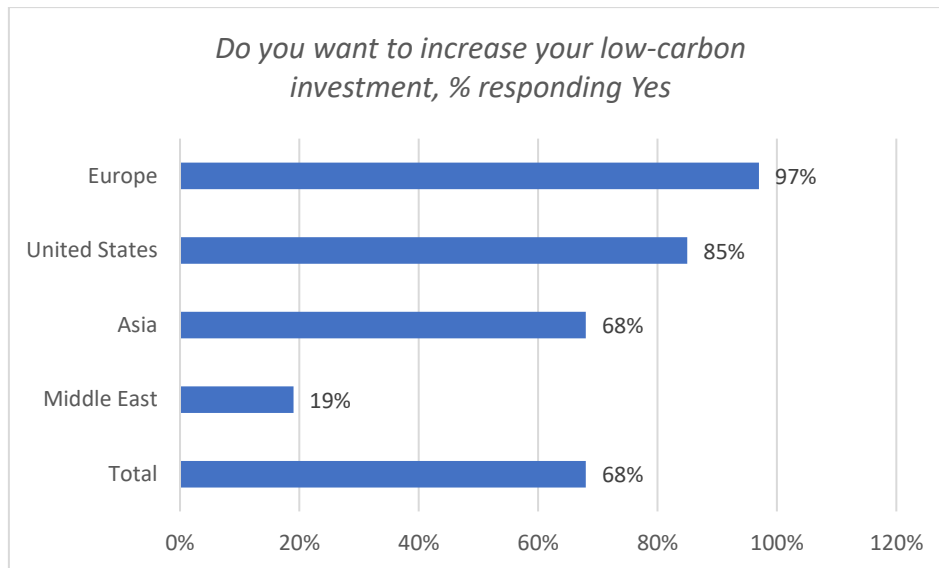
Figure 6: Growth of the Green Bond Market



Source: Compiled by authors from Climate Bonds Initiative, 'Labelled Green Bonds Data: Latest 3 Months'. <https://www.climatebonds.net/cbi/pub/data/bonds> (accessed 25 January 2020).

In Europe, the US, and Asia, low-carbon investments have become more mainstream in the world of private finance, and generally fall into the environmental, social, and governance (ESG) category in industry parlance. A 2017 survey of HSBC found that 68% of global investors plan to increase their investment in low-carbon themes (HSBC, 2019). European and US investors were the leaders in this regard, with banks and institutional investors in Asia lagging (Figure 7). In Europe, the intention is consistent with the trend seen in broader ESG and climate change mitigation, with such assets increasing by 25% from 2014 to 2016 to \$23 trillion, representing 26% of total managed assets (Global Sustainable Investment Alliance, 2017).

Figure 7: HSBC Institutional Investor Survey on Low-Carbon Investment



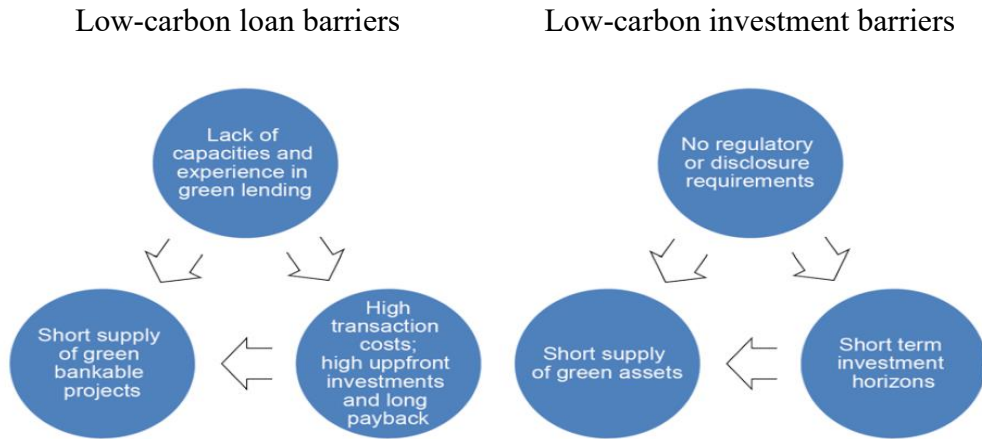
Source: HSBC (2019).

5.2 Limitations and Challenges for Scaling up Low-Carbon Investment by the Private Sector

Institutional investors are increasingly important players in low-carbon financial markets, as they have been sources of long-term capital, with an investment horizon tied to the long-term nature of their liabilities, whereas banks as creators/originators have an advantage in short- to medium-term financing of the construction of projects. In a low-interest environment, low-carbon energy projects have the potential to play a much greater role – especially as a recycler of assets, i.e. being in a position to acquire and hold assets for the long term from the creators of those assets, having freed up financial capacity on their balance sheets (Global Green Finance Council, 2017; Ng, 2018).

Lending and investment barriers to low-carbon assets are illustrated in Figure 8. In many cases, institutional investors have to invest for the long term to fund liabilities that are multigenerational in nature.

Figure 8: Lending and Investment Barriers in Low-Carbon Assets



Source: Dikau and Volz (2018).

At the core of the issue of limited investment is that investors with fiduciary responsibilities generally require policymakers to foster investment certainty and improve the risk-adjusted financial return. Many commercial banks and institutional investors have yet to conclude that low-carbon energy investments offer a sufficiently attractive risk-adjusted financial return. Standing in the way of increased investment are several barriers to green investor flows, mostly related to standards and information availability. These are summarised in Table 5.

Table 5: Barriers Faced by Institutional Investors in Developing Low-Carbon Projects by Asset Class

Asset class	Demand barriers to low-carbon investment flow	Supply barriers to low-carbon investment flow	Challenges in low-carbon investor practice	Primary gap identified
Listed equities	Technology and policy risks associated with certain subsectors (e.g. renewable energy)	Portfolios heavily invested in certain domestic economies may have limited opportunities	Incorporation of low-carbon issues and active ownership under way, but challenges with usefulness of data	Data policy framework
Fixed income	‘Greenwashing’ linked to lack of standards for green bonds and clarity in	Oversubscription of green bonds, although overall issuance is low	Green bond standards are under development. Investor incorporation of low-	Standards policy work

	use of the proceeds		carbon issues under way for corporate and sovereign bonds, but challenges with credit rating agencies' consideration of low-carbon issues and private debt.	
Private equity	Technology and policy risks associated with certain sub-sectors such as energy efficiency. Limited demand for thematic private equity, with mixed performance records.	Early-stage high-risk investments are unsuitable for many mainstream investors.	Limited partners asking general partners to integrate low-carbon issues with due diligence tools under way. Challenges in quantifying and monitoring implementation.	Supply policy framework
Low-carbon infrastructure fund	Considered a specialist asset class outside regular asset allocation by some asset owners	Deals are considered unsuitable by asset owners lacking specialist knowledge, or may fall outside regular asset allocation.	Industry capacity building under way through Global Real Estate Sustainability Benchmark (GRESB) on low-carbon issues	Demand and supply

Source: PRI (2016).

Other obstacles to lending by banks and other financial institutions, as surveyed by the Economic Research Institute for ASEAN and East Asian (Anbumozhi et al, 2020), include policies that favour investment in incumbent high-carbon projects over low-carbon energy, which are summarised below as specific to ASEAN and East Asian financial markets.

- **Small project size.** Projects are often diffuse and too small to be attractive to lenders. As a result, project development and implementation costs are high.
- **Transaction costs.** Companies may not apply for grant or loan programs because filling out forms or reporting is burdensome. Banks also lack the

technical expertise to implement low-carbon energy projects. This is a significant factor affecting access to finance, particularly for small and medium-sized enterprises.

- **Intangibility.** Financial institutions may not consider energy saving (i.e. avoided emissions/energy costs) to be a potential source of cash flow that could be used for debt payment. This is particularly problematic in industry, where a significant amount of savings can be achieved by altering process rather than investing in new assets.
- **Lack of harmonised monitoring and verification protocols.** Independent assessment of projects using monitoring and verification protocols is needed to win the trust of financiers, as energy savings typically change over time depending on production volumes, process change, and equipment degradation.
- **Lack of data and skills to assess transactions and risk.** A lack of transparent data and research makes it difficult to compare performance and attract investors. Performance data for energy efficiency projects are not collected systematically.
- **Lack of financial instruments and funds with attributes that are attractive to institutional investors.** Few available financial instruments and funds have the investment grade ratings, low transaction costs, and liquidity to be attractive to institutional investors.
- **Policies and regulations that favour investment in unabated high-carbon activities.** Inconsistent policy signals – such as continued support for fossil fuel use, low or no carbon prices, and unpredictable changes to low-carbon policies – can limit the attractiveness of low-carbon investments.
- **Financial regulations with unintended consequences.** International financial regulations to increase banks' level of capital and reduce their exposure to long-term debt may discourage long-term investments in areas of renewable energy, energy efficiency, and fuel economy.

In addition to the above-mentioned barriers, further risks are unique to banks' operations in the developing economies of ASEAN (Table 6). For instance, options to mitigate regulatory, macroeconomic, technological, and institutional risks are more costly. The mismatch between investment opportunities and risks is particularly evident here.

Table 6: Perceived Lending Risks Experienced by Banks and Borrowers

Barriers	Perceived Risks	Specific to Low-Carbon Investment	ASEAN Country Risk
Regulatory	Policy uncertainty		x
	Lack of legal support		
	Fossil fuel subsidies	x	x
	Absence of carbon price	x	x
	Investment restrictions		x
Macroeconomic	Lack of bankable projects	x	x
	High up-front cost	x	x
	Higher cost of capital		x
	Refinancing		
	Volatility in demand	x	
Technology	Environmental Due diligence	x	x
	Difficulties in getting necessary information on local supplies		x
	Absence of common standards for low-carbon projects	x	
	Limited capacity to structure deals		
Institutional	Lack of incentives for NDC targets	x	x
	Legal protection on investments		
	Unofficial payments to get investments		x
	Uncertainty about joint ventures		x
Regulatory	Policy uncertainty		x
	Lack of legal support		
	Fossil fuel subsidies	x	x
	Absence of carbon price	x	x
	Investment restrictions		x
Macro-economic	Lack of bankable project	x	x
	High upfront cost	x	x
	Higher cost of capital		x
	Refinancing		
	Volatility in demand	x	
Technology	Environmental Due Diligence	x	x
	Difficulties in getting necessary information on local supplies		x
	Absence of common standards for low-carbon	x	
	Limited capacity to structure deals		
Institutional	Lack of incentives for NDC targets	x	x
	Legal protection on investments		
	Unofficial payments to get investments		x
	Uncertainty about joint ventures		

ASEAN = Association of Southeast Asian Nations, NDC = nationally determined contribution.

Source: Authors.

The question is what financing instruments and channels as well as conditions will be required for a broader group of private investors to invest in low-carbon sectors that contribute more meaningfully to total investment needs. In the economies where new instruments such as green bonds and equity markets have emerged, they all have unique challenges which will need to be surmounted to evolve to a position where they can mobilise private finance at a scale, connect to projects of all sizes, and contribute to the expansion of low-carbon energy.

5.3 Risk Mitigants and Investment Transaction Enablers

To increase the attractiveness of low-carbon energy investments, the following interventions are found to reduce the perceived risks or help to make the financial transactions accessible to a wider range of stakeholders (for a detailed explanation of the instruments, see OECD (2015)):

- credit enhancement
- subordination
- loan loss reserves
- guarantees and insurance products
- credit enhancement for bonds
- political and policy risk coverage
- public investment funds
- cornerstone investment
- securitisation
- warehousing
- standardisation of contracts and reporting and data collection
- co-investments and joint ventures

5.4 Role of Green Investment Banks in Scaling Up Private Investment

To overcome investment barriers and leverage the impact of available public resources, more than a dozen national and subnational governments have created public green investment banks (GIBs) and GIB-like entities in recent years. A GIB is a publicly capitalised entity established specifically to facilitate private investment in low-carbon infrastructure and other green sectors such as water and waste management. These dedicated green investment entities have been established at the

national level (Australia, Japan, Malaysia, Switzerland, and the United Kingdom); state level (California, Connecticut, Hawaii, New Jersey, New York, and Rhode Island in the US); county level (Montgomery County, Maryland, US); and city level (Masdar, United Arab Emirates) (OECD, 2016).

While GIBs differ in name, scope, and approach, they generally share the following core characteristics: a mandate focusing mainly on mobilising private low-carbon investments, using interventions to mitigate risks and enable transactions; innovative transaction structures and market expertise; independent authority and a degree of latitude to design and implement interventions; and a focus on cost-effectiveness and performance.

Despite being smaller than other public financial institutions, some GIBs such as the United Kingdom Green Investment Bank, Australia's Clean Energy Finance Corporation, and the Connecticut Green Bank are successfully targeting institutional investors – notably pension funds, insurance companies, sovereign wealth funds, and mutual funds – for co-investment in funds and other transactions. These investors represent a large pool of capital and an increasingly important alternative source of financing for low-carbon energy infrastructure investment.

GIBs are not the only institutional option available to governments seeking to accelerate investment in domestic, low-carbon projects. Some national development banks, such as Germany's KfW, have been providing financing for low-carbon projects since the late 1990s. Institutions like GIBs can be understood as a tool to mobilise private investment, which can complement climate policies but cannot substitute them. If enabling policies for low-carbon investment are in place – including a robust and credible carbon price; fossil fuel subsidy reform; well-designed renewable energy incentive policies; and clear, long-term climate policy goals – GIBs and other institutions can play a supportive role in overcoming the remaining investment barriers (OECD, 2015).

6. Strategies to Scale Up Low-Carbon Investments and Enhance the Service Delivery of Asian Banks and Non-Financial Institutions

Asian banks and non-financial institutions have a major role in the financing of the low-carbon energy transition. Even as market-based institutional investors gain a larger share of the financing needs of low-carbon energy projects in Asia, banks will continue to play an important role not only in terms of traditional lending, but also in a range of intermediary functions and in their role as investors. Based on the above discussions, aimed at banks, non-financial institutions, and banking regulators, the following recommendations are made to scale up low-carbon investments and the integration of enhanced service delivery.

6.1 Harmonisation

Common Accepted Terminology

While bank credit dominates financing in ASEAN and East Asia, representing more than two-thirds of investment, only a small portion is explicitly classified ‘low-carbon’. This may also be due to the lack of clear and uniform definitions. Lack of clarity as to what constitutes low-carbon finance activities and products, such as low-carbon loans and low-carbon assets, represents an obstacle, inter alia, for investors, enterprises, and banks seeking to identify opportunities for low-carbon investing. Without appropriate definitions – the starting point for internal budgeting, accounting, and performance measurement – it is difficult to see how banks can begin to allocate financial resources efficiently for low-carbon projects and assets.

The concept of materiality already demands that industry and financiers include climate risks in their valuation of low-carbon investments. However, definitions, metrics, and methodology generally vary across sectors and different parts of the global/regional financial market. Convergence is needed to enable the successful inclusion of these risks across markets. Diverging definitions and methodologies create risks in themselves, exacerbating the difficulties in the methodological inclusion of climate-related risks in different parts of the financial system.

The FSB TCFD provides both the means by which financial measurement can be used to catalyse market developments and an opportunity to establish a common regional framework for low-carbon finance. A reasonable level of harmonisation around which financial measurement can converge, common definitions, and technical implementation measures or guidelines have the potential to provide a common basis for reporting, review, and certification processes; and for the creation of a protected green bond label (ASEAN Capital Markets Forum, 2017).

A common taxonomy and a set of minimum standards will also be important in mitigating the risk of ‘greenwashing’ or the overstating of the environmentally or socially conscious attributes of a firm’s offering. It is important that such a taxonomy be developed through a transparent multi-stakeholder process. The risk of greenwashing is real and particularly present in emerging green asset classes (e.g. ESG funds, low-carbon asset-backed securities, or index-linked green products).

Common Disclosure Framework

Comparable disclosures on low-carbon performance and risks are a prerequisite to addressing the lack of information and to internalising associated costs. Data are not currently available to support market analysis, impact assessments, or any other recommendations. The lack of data; non-harmonised metrics (e.g. regarding the CO₂ emissions of the energy mix of individual countries, or lack of harmonisation of energy labels for houses); and resulting lack of comparability represents a major obstacle for awareness-raising, market and risk analysis, and the development of new products that could be offered on a comparable basis. A common ASEAN and East Asia taxonomy and disclosure framework would improve the data collection, key performance indicators, and availability of quantitative data. Furthermore, disclosure requirements have the potential to act as a catalyst for increased sustainability in lending portfolios.

ASEAN should take steps towards a common disclosure framework that commands broad global support. This necessitates a keen eye as to the practicalities involved. Rather than seeking to draw up its own definitions, the ASEAN task force should seek to build on work under way by the FSB TCFD or the EU Action Plan for Financing Sustainable Growth – ensuring it is suitable for the ASEAN economic, legal, and regulatory environment. The availability and cost of the collection of information,

as well as materiality and proportionality, are important aspects to be taken into account.

A common disclosure framework would require internal capacity building within institutions and the development of tools and methodologies. Banks are dependent on information provided by their counterparties. Further work also needs to be done to define appropriate scenarios and related analysis requirements. Consequently, it may be more feasible in the short run to think about a qualitative disclosure framework complemented by voluntary quantitative information as it becomes available, e.g. through developmental work on the TCFD recommendations. Instead of seeking to mandate on an overly prescriptive basis, ASEAN and East Asia should put in place a ‘comply or explain’ framework which features governance, responsibility, and disclosure, based on common definitions. Tick-the-box reporting will not improve low-carbon cash flow and will most likely increase the risk of ‘window dressing’ or illusionary listing of low-carbon investments. It is also unlikely to contribute to the understanding of risk and risk mitigation, as such reporting is based on banks’ own analysis of what is important for their business and stakeholders (Asian Development Bank Institute (ADBI), 2013).

A period of 3–5 years should be a reasonable time frame for formulating disclosures standards, developing taxonomy, and firming up comparable metrics. Common definitions and methodologies are important to avoid distortion and misleading investors.

Common standards on green bonds

As seen in China, defining minimum standards for green bonds can help as part of the efforts to accelerate market growth. ASEAN and East Asia should give priority to considering how they could use existing international standards and initiatives (or develop new ones) to provide a common Asia-wide basis. A common Asian standard has the potential to support the growth of the green bond market as long as it does not impose overly strict requirements on issuers, thereby curbing the development of a nascent market (ASEAN Capital Markets Forum, 2017).

Green lending principles

Green lending policy usually refers to supportive products such as preferential interest rates offered by banks for low-carbon projects or restrictions on projects with negative carbon performance (PRI, 2016). Green lending includes, but is not limited to, personal housing mortgage loans, motor-vehicle loans, and green credit card services, along with project financing, construction lending, and equipment leasing for enterprises.

Standardisation of contracts and risk performance analysis

Banks could, even if only incrementally, decrease the costs of financing by developing standard contracts for various types of low-carbon projects. Some initiatives aiming for standardisation are emerging in the banking sector, but appear limited by the boundaries of competition law. Public institutions could facilitate such initiatives. Banks and the public sector could jointly work on faster dissemination of accurate risk and performance data to speed up and standardise performance risk analysis.

6.2 Strategic Public–Private Cooperation

Given the huge financing needs, financing of sustainable development activities needs to be based on diverse funding streams – both private and public. Effective use of public policies and finance is vital to lower the risks and maximise the involvement of public and private capital in financing sustainable investments.

Public strategies and policies

Effective public–private cooperation and an alignment of public strategies and policies with the needs of the private sector, including the financial industry, is imperative if we are to accelerate the low-carbon economy and its financing. To provide market participants with enhanced clarity, transparency, and certainty, the ASEAN and East Asian economies need to define a long-term low-carbon strategy – beyond the 2030 agenda and pathway up to 2050 – to align long-term low-carbon finance developments with political objectives.

Sharing of lending risks

The objective of public financing should be to facilitate the participation of private and institutional investments, securing substantial private investment for every public resource committed. The risk mitigation and credit enhancing instruments described above will have to be tested and their effectiveness and efficiency monitored in the countries and circumstances where they are applied. Corrective measures should be taken on the basis of dedicated monitoring systems, if necessary.

6.3 Direct Subsidies

Direct subsidies in the form of tax benefits or subsidised funding conditions, similar to the energy-efficient private home market in certain countries, could be considered. In the US, for example, municipal bond holders do not have to pay income tax where the bonds were issued (neither at federal nor state level) on interest from the bonds they hold, allowing issuers to offer lower yields. Phasing out of inappropriate subsidies to fossil fuel-intensive industries, for instance, is likely to have an impact on risk as well as the pricing of financial assets.

6.4 Publicly Sponsored Capacity Building Programs

Developers of low-carbon projects need to access different sources of financing according to the needs of their project, at a given moment of its life cycle. Many low-carbon energy projects, perhaps with the exception of large-scale wind, solar, or hydro plants, face a number of hurdles in accessing finance.

Small projects, especially in the private sector, often have relatively small investment needs; and management is often inexperienced or lacks financial knowledge. This may be solved by recruiting external consultants to certify the validity of low-carbon projects and to help forecast expected cash flows. Certification and validation of low-carbon projects, such as second-party opinions, entails additional costs, which are unaffordable for small-scale projects in many instances. Public authorities could consider covering such external costs, e.g. the Monetary Authority of Singapore offsets costs for the external review of green bonds.

Banks generally cannot sponsor the additional costs for technical assistance, nor can the initiators of these typically small-scale projects carry them. Publicly sponsored

technical assistance could help increase the number of projects constituting a bankable business case.

6.5 Monetary Policy

National monetary authorities should consider their role in developing targeted monetary policy measures, such as employing low-carbon reserve management measures, establishing low-carbon project finance guidelines, and accepting certain high-quality ‘green’ assets from banks as collateral for central bank loans that would assist banks in providing more funding for environmentally sustainable economic activity.

6.6 Increasing Stakeholder Awareness

To redress the lack of dialogue between those seeking finance for their projects and financial contributors/investors in search of investable projects, banks and public authorities should cooperate and coordinate in developing measures to increase the awareness of low-carbon finance issues amongst key players.

To promote and accelerate low-carbon finance, the Global Green Finance Council has launched a number of projects including the Green Lending Principles and a Directory of the Global Green Finance Policy Initiatives (Global Green Finance Council, 2017). The objective of the directory is to provide policymakers and global and regional market participants with a simple, easy-to-use reference guide as to which international and regional governments and industry bodies have implemented or are implementing major initiatives on low-carbon, sustainability, and climate change initiatives.

The Comprehensive Asia Development Plan (CADP), which constitutes a crucial element of the ASEAN strategic investments, is a publicly available web portal of investment projects acting as a platform to promote projects to potential investors worldwide. The overarching goal of the CADP is to catalyse and accelerate the development and fruition of investment projects in ASEAN and East Asia, and through this, to contribute to higher employment and economic growth through connectivity (ERIA, 2017). Taking into account the ASEAN Economic Community framework conditions, the emphasis should be given to the areas of low-carbon energy, environment, and climate action; and the achievement of the region’s ambitious targets

set at the COP21 Paris Agreement, while considering the implementation of CADP 3.0, which is under its conceptual stage.

6.7 Harnessing the Opportunities of Fintech

Fintech – mobile payment platforms, high-frequency trading, crowdfunding, virtual currencies, blockchain, and peer-to-peer lending – is transforming the future of the financial system. By reducing costs and boosting efficiency, digital technologies such as distributed ledger, machine learning, artificial intelligence, and the Internet of Things have the potential to

- mobilise green finance and enable poorer people to access clean energy through innovative projects that offset carbon emissions or finance renewable energy projects like solar power;
- unlock greater financial inclusion for those seeking funding for new businesses that will deliver both impacts such as low-carbon pathways and financial returns;
- mobilise domestic savings at scale by providing channels or platforms for retail investors to access low-carbon impact investing opportunities;
- collect, analyse, and distribute information on both financial performance and impact performance for better economic decision making, regulation, and risk management;
- provide financial markets with the level playing field and market integrity needed for long-term real economy investments aligned with the sustainable development agenda.

Closely tied to the application of fintech and blockchain for economic identity and financial inclusion are property rights and land titles, which may enhance the creditworthiness of small and medium-sized enterprise borrowers. Blockchain may increase the efficiency of emissions trading schemes, including by suggesting more efficient systems to transfer or trade carbon credits as well as boosting peer-to-peer renewable energy trading and accelerating international climate finance transfers (Nassiry, 2018).

Fintech solutions can assist in a number of ways, from providing the computing power for big data analysis of data sets and methodologies to standardise green reporting, making it easier for investors to monitor their green investments, to creating digital platforms to facilitate green capital markets issuances, even on a smaller scale,

allowing a greater number of issuers to access capital markets for their green financing needs (UN Environment Inquiry, 2016).

The net effect of applications of fintech and blockchain technology will be to lower overall system costs substantially. The aggregate impact of lower costs in each individual organisation or service provider, given sufficient competition and market dynamics, may have the positive effect of lowering the costs of providing low-carbon goods and services and thus improve their viability.

6.8 Pooling and Standardising Small Investments

With banks required to reduce debt levels in the wake of the financial crisis and government cuts to spending, policymakers have turned to institutional investors – in particular, pension funds and insurance companies – to fill the capital gap. A major challenge in low-carbon finance is the matching of the predictable long-term liabilities of institutional investors with the low-risk cash flows from infrastructure projects. Barriers, such as illiquidity of infrastructure assets, the small size of many low-carbon investments, and the need for diversification, have inhibited institutional investors' investments in the sector until today. This is also the result of increasingly stringent financial regulation in the insurance sector and an increasing trend towards de-risking strategies in defined benefit pension funds, as they seek to protect against rapidly rising funding deficits (Huxham et al., 2017).

Because of a lack of suitable assets and because existing investment vehicles are not ideally suited to meet the requirements of institutional investors, new pooled investment vehicles have to be designed to eliminate the principal barriers, e.g., small fund size and institutional issues such as low institutional capacities for due diligence of small investments and low tolerance for illiquidity risk.

The fund size constraint can be eliminated by pooled investment vehicles, which reduce the risk to the investor by outsourcing the cost of an investment team and pooling due diligence and other transaction costs. Other barriers are of a more regulatory nature and have to be overcome by designing new vehicles which are adapted to a given regulatory environment. A major solution to the small size of investments is a higher degree of standardisation, as opposed to the current tailor-made structuring of investments on a project-by-project-basis, creating high transaction costs. Multilateral and national development banks are suitable actors to design standardised investments on a sectoral basis and promote public–private investment vehicles, pooling a multitude of individual projects.

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