



# FINANCING THE TRANSITION: HOW FINANCIAL SYSTEM REFORM CAN SERVE SUSTAINABLE DEVELOPMENT



**Inquiry:** Design of a  
Sustainable Financial System

NOVEMBER 2016

## **The UNEP Environment Inquiry**

The Inquiry into the Design of a Sustainable Financial System has been initiated by the United Nations Environment Programme to advance policy options to improve the financial system's effectiveness in mobilizing capital towards a green and inclusive economy—in other words, sustainable development. Established in January 2014, it published its final report, *The Financial System We Need*, in October 2015 and is currently focused on actions to take forward its findings.

More information on the Inquiry is at: [www.unepinquiry.org](http://www.unepinquiry.org) and [www.unep.org/inquiry](http://www.unep.org/inquiry) or from: Ms. Mahenau Agha, Director of Outreach [mahenau.gha@unep.org](mailto:mahenau.gha@unep.org).

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## Executive Summary

### The New Dynamic

The core purpose of the financial system is to serve the real economy – providing a range of core services for households, enterprises and public authorities. The transition to sustainable development reframes this historic relationship, inserting new parameters around inclusive prosperity, poverty elimination and respect for planetary boundaries.

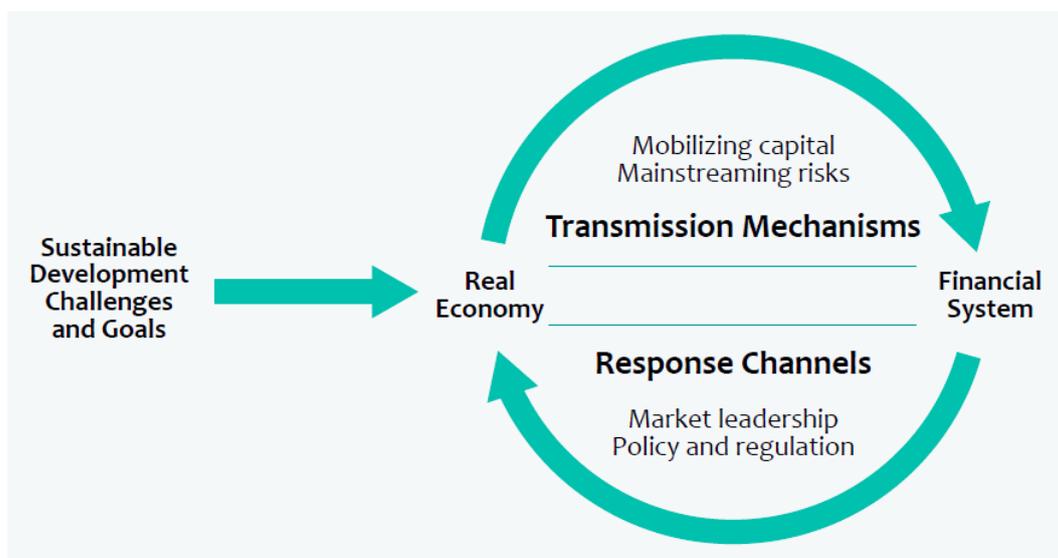
Simply put, a two-way relationship can be identified (Figure 1):

- first, sustainability challenges in the real economy are driving new demands on the financial system, expressed through a set of transmission mechanisms that call for large-scale capital mobilization, mainstreaming social and environmental risks, as well as new approaches to changing social expectations;
- second, actions in the financial system in turn are also shaping environmental and social outcomes in the real economy through a set of response channels, notably market leadership by banks, capital markets, institutional and insurance companies, technological innovation applying fintech to sustainable development as well as policy and regulatory measures.

In essence, the new role for the financial system is to serve a real economy that is in transition to sustainable development. Ideally, these response measures should ensure that the system is as effective, efficient and resilient as possible to deliver the transition to sustainable development.

This report is focused on understanding how the growing number of policy and regulatory measures taken in the financial system can support a real economy in transition, seeking to answer the question: *‘what measures are most needed to deliver efficiency, effectiveness and resilience in ways that the financial system can contribute to specific sustainability priorities in the real economy?’* To answer this question, we have examined a subset of actions in 10 countries that are focused on the three interlocking challenges of energy, climate change and land-use.

**Figure 1: The New Dynamic between the Real Economy and the Financial System**



Source: UNEP Inquiry, 2016

Looking across emerging practice, five common themes have emerged that cut across the key sectors of the financial system (the ‘Five R’s’): capital reallocation; risk management; the responsibilities of financial

institutions; reporting and disclosure; and strategic roadmaps. Some of these measures seek to have a direct impact on the real economy – for example, actions to build up green bond markets to more efficiently channel capital to sustainable development priorities. Others are more focused on managing the sustainability challenges flowing from the real economy – such as the prudential implications of climate change – and in turn can send important signals back to real economy actors.

The key case studies examined in this report can be found in Table 1.

**Table 1: Summary of Key Case Studies**

Case Area	Country	Themes	Actions
Sustainable Energy	India	Reallocation	<ul style="list-style-type: none"> <li>- Introduction of 76.5 gigawatts (GW) of voluntary renewable energy financing commitments from Indian banks</li> <li>- Extending Priority Sector Lending requirements to decentralized renewables to boost energy access.</li> <li>- Introduction of Green Bond requirements by securities regulator (SEBI) to deliver consistency.</li> </ul>
Climate Transition	European Union, Netherlands, Sweden, UK	Risk, Reporting	- Assessments by central banks and regulators of the implications of climate change and the energy transition for financial institutions and the financial system as a whole.
	California, France	Risk, Reporting and Reallocation	<ul style="list-style-type: none"> <li>- Introduction of requirements for investors to report on environmental, social and governance (ESG) risks and their contribution to the energy transition, as well as launching a process to integrate climate factors in banking stress tests (France)</li> <li>- New requirements for insurance companies to report on exposure to fossil fuel holdings and a request to divest from coal (California)</li> </ul>
Sustainable Land Use	Brazil	Reallocation	- Linking allocation of rural credit with environmental compliance to reduce deforestation (Resolution 2008, Forest Code programme).
		Risk, Responsibility	- Mainstreaming environmental and social factors into risk management and governance of financial institutions (including ICAAP for banks).
	Indonesia	Roadmaps	- Implementing the Roadmap for Sustainable Finance through pilot programmes to build capacity in banks to support sustainable palm oil production.

*“Financing the decarbonization of our economy implies a sweeping reallocation of resources and a technological revolution. For this to happen, “green” finance cannot conceivably remain a niche interest over the medium term.”<sup>26</sup>*

Mark Carney, Governor, Bank of England

These case studies point to three areas for further policy design and action – the sectoral, the national and the international:

- **Sectoral Action:** Traditionally, sectoral policies to deliver sustainability (for example in agriculture and energy) have largely ignored the need to review financial system rules. These case studies point to the complementary role that financial reform can play. Brazil's actions on rural credit and India's measures to scale up renewable energy could be considered by other countries with similar goals and challenges. Within the energy system, concerted efforts are now urgently needed to unlock financing for efficiency improvements in buildings: the tagging and reporting of loans to the energy performance of buildings is one step that could help create markets and enable enhanced risk profiling. More broadly, the potential for financial system innovation and reform could be considered as a routine factor in the development of key sector policies, with the development of sector-by-sector guidance, drawing on existing practice.

- **National Strategies:** A common lesson from these examples is the importance of placing specific financial measures within the wider context of a system-wide strategy at the country level. Financial reforms are made to address specific sustainability problems – for practical reasons of mandate and prioritization. But this can mean that the wider implications for other parts of the financial system are not fully considered. For example, there could be powerful lessons from the recent regulatory initiatives on the insurance sector in the UK and the US for the banking sector. Indonesia's Roadmap on Sustainable Finance is the clearest example of a system-wide approach, but the Netherlands has also launched a platform on sustainable finance, led by the central bank and involving key private sector actors. Roadmaps can be useful tools for consolidating the often fragmented and bottom-up approaches. China's experience with its Green Finance Task Force shows how a system-wide initiative can highlight priority actions and help embed these in country strategy (such as China's 13<sup>th</sup> Five-year Plan) and deliver specific market changes (such as new rules for green bonds). Roadmaps can also provide the framework for learning from experience and measuring progress towards a sustainable financial system. The national financing frameworks that are needed to help deliver both the Sustainable Development Goals (SDGs) and the Paris Agreement provide an opportunity to develop and launch roadmaps for harnessing the financial system.

*“In China, establishing a green finance system has become a national strategy. In the first quarter of 2016, China was responsible for around 50% of the world's green bond issuance.”*

Zhou Xiaochuan, Governor, People's Bank of China

- **International Cooperation:** All these case examples were driven by specific priorities at the national (and sub-national levels). But all have also highlighted the need and potential for international cooperation to share experience and develop consistent approaches to common global challenges. At the sector level, the International Solar Alliance offers one mechanism along with the International Renewable Energy Agency (IRENA), which could help spread good practice on financial reform in the renewable energy arena; a similarly targeted initiative could also take forward the role of financial reform for sustainable land use in both tropical and temperate contexts. The Financial Stability Board Task Force on Climate-related Financial Disclosures (FSB TCFD) is another clear example, as is the emerging Sustainable Insurance Forum, a network of leading insurance regulators. As the Inquiry's working paper on international financial standards shows, there is considerable scope to build on existing frameworks, realizing the latent potential for these standards to contribute to sustainable development.

# 1 Introduction

## 1.1 The New Dynamic: Serving a Real Economy in Transition to Sustainable Development

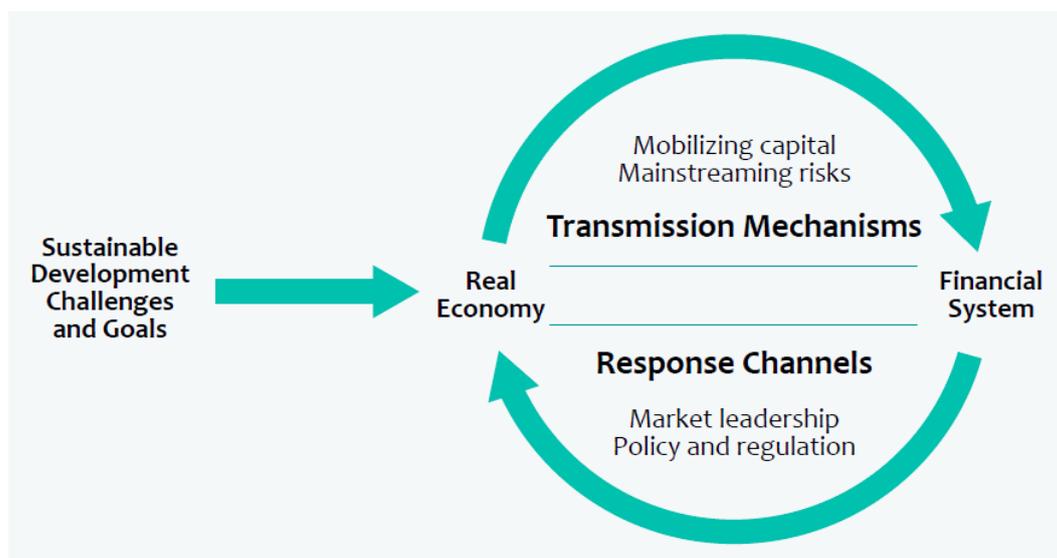
The core purpose of the financial system is to serve the real economy – providing a range of core services for households, enterprises and public authorities. The transition to sustainable development reframes this historic relationship, inserting new parameters around inclusive prosperity, poverty elimination and respect for planetary boundaries.

This dynamic moved to the next level in 2015 when the governments of the world reached three major agreements which set out their vision for the coming decades: a new set of 17 sustainable development goals, the Financing for Development package, and the Paris Agreement on climate change.

Simply put, a two-way relationship can be identified, illustrated in Figure 2:

- first, sustainability challenges in the real economy are driving new demands on the financial system, expressed through a set of transmission mechanisms that call for large-scale capital mobilization, as well as the mainstreaming of social and environmental factors;
- second, actions in the financial system in turn are also shaping environmental and social outcomes in the real economy through a set of response channels, notably market leadership, along with policy and regulatory measures and international cooperation.

**Figure 2: The New Dynamic**



Source: UNEP Inquiry, 2016

In essence, the new role for the financial system is to serve a real economy that is in transition – indeed harnessing the US\$300 trillion global financial system is essential if countries are to make a rapid and orderly transition to sustainable development.<sup>1</sup> Ideally, response measures should ensure that the system is as effective, efficient and resilient as possible to deliver the transition to sustainable development.

### 1.1.1 Transmission Mechanisms

Sustainable development creates a new set of demands on the financial system – expressed through a set of transmission mechanisms:

- **Mobilizing Capital:** Estimates suggest that US\$5-7 trillion a year is needed to implement the SDGs, the bulk of which will need to come from private sources. Critical priorities include ensuring financial inclusion (e.g. small and medium enterprises), raising capital for sustainable infrastructure (e.g. energy, housing, transport, urban design) and financing critical areas of innovation (e.g. agriculture, mobility, power).
- **Mainstreaming Sustainability:** Sustainability factors are increasingly relevant and material for financial institutions and the system as a whole. This means integrating environmental and social factors into risk management (e.g. climate disruption, water stress), rethinking the responsibilities of financial institutions (e.g. fiduciary duty) and substantially improving the reporting on sustainability factors both from corporations and financial institutions.
- **Changing Expectations:** Importantly, sustainability is also changing consumer and investor preferences as well as the ‘social license to operate’ for the financial sector. These pressures can challenge traditional financial practices, drive product innovation and prompt new initiatives that reconnect the financial system with broader societal objectives (for example in the wake of the global financial crisis).

### 1.1.2 Response Channels

These new demands on the financial system in turn generate a set of supply-side responses from the financial system: importantly, these responses go beyond serving immediate requirements and look to anticipating future needs and challenges. Three key response channels can be identified:

- **Market Leadership:** Increasing efforts are being taken by market actors within the banking, capital markets, insurance and institutional investment sectors to align their operations with sustainable development. Leadership by individual institutions as well as collective action can help to set new norms, incentives and standards in key financial markets. For example, the amount of assets now managed by institutions committed to ‘responsible investment’ has grown almost tenfold since 2006 to US\$59 trillion.<sup>2</sup> The potential for – and limitations of – market leadership for sustainable development are examined in more detail in a companion Inquiry-UNEP FI working paper.<sup>3</sup>
- **Technological Innovation:** Technology is a powerful driver of financial sector performance – both enabling greater efficiency and facilitating greater short-termism. To date, technology has been treated as a given in discussions on financing sustainable development. Increasingly, however, recognition is growing that financial technology can be shaped to deliver key environmental and social outcomes, and that environmental and social outcomes need to be included in the application of financial technology to avoid potential negative outcomes. These issues are examined in more detail in the Inquiry’s working paper on fintech.<sup>4</sup>
- **Policy and Regulatory Action:** Over the past decade, central banks, financial regulators and market standard setters have increased their efforts to align the rules that govern the financial system with long-term sustainable development. The driver for this is a growing acknowledgement of the value of sustainability factors for efficient capital allocation to the real economy, the delivery of risk-adjusted returns and the management of financial stability. Internationally, two recent initiatives at the international level highlight the shift that is under way:
  - The FSB has launched the TCFD, a new industry-led task force to develop voluntary recommendations for better disclosure both by corporations and also financial institutions.<sup>5</sup>

- Under China’s presidency of the G20, a new Green Finance Study Group has been established to develop policy options on “how to enhance the ability of the financial system to mobilize private capital for green investment.”<sup>6</sup>

This working paper is focused on understanding how the growing number of policy and regulatory measures taken in the financial system can support a real economy in transition, seeking to answer the question: *what measures are most needed to deliver efficiency, effectiveness and resilience in ways that the financial system can contribute to specific sustainability priorities in the real economy?*

To answer this question, we have examined a subset of actions in 10 countries that are focused on three interlocking challenges of energy, climate change and land use. Some of these measures seek to have a direct impact on the real economy – for example, actions to channel capital to sustainable development priorities, such as renewable energy or reroute capital away from deforestation. Others are more focused on managing the implications of new sustainability risks in the real economy for the financial system; these measures then send important signals back to capital allocation in the real economy.

## 1.2 Why Financial System Action Is Critical for Real Economy Transition

To deploy capital at the scale and speed required to achieve sustainable development, a number of interlocking elements have to be in place:

- first, *policy action is needed in the real economy* to remove market failures such as unpriced pollution and resources. Progress has been made to internalize externalities into market prices and better match macroeconomic and sectoral policies with the need to regenerate natural capital, for example in agriculture, energy, housing, industry, transport, water and waste. But serious market failures remain worldwide – and without effective pricing of scarce natural capital, the risk-adjusted returns for sustainable finance are likely to be inadequate to attract sufficient capital.

- second, *the effective deployment of public finance is needed* to provide public goods and stimulate private action. Public finance is essential to deliver collective goods that the market cannot provide – and also to stimulate private action through incentives and subsidies. For sustainable development, public finance is important both domestically as well internationally to assist the transition process in developing countries. In all countries, public finance is scarce – and particular attention is needed to identify cost-effective options with high-leverage impacts.

- third, *action is also needed within the financial system* to remove market and institutional barriers that can prevent the efficient allocation of capital to sustainable development. These can include misaligned incentives, short-termism, inadequate risk management, insufficient transparency and poor stewardship.

Action within the system is particularly important to address a number of critical financing challenges, including:

- *Capital Intensity:* Sustainable development often involves replacing the exploitation of natural capital with human expertise and clean technologies. From a financial perspective, this can mean higher upfront capital costs for investments in buildings, energy and transport, matched by much lower operating costs, ultimately resulting in improved life cycle costings. As a result, finding ways of reducing the cost of capital is a critical task.
- *Speed and Scale:* Current levels of sustainable finance also need to be considerably increased over a short period to meet key time-bound targets. For example, to keep global warming below the 2°C target agreed in Paris, “a sharp ramp up in investment into lower- and zero-carbon energy

sources will be required over the next decade”, according to Bloomberg New Energy Finance.<sup>7</sup> Global clean energy investment would need to climb almost four-fold from US\$1.2 trillion between 2010-2014 to US\$4.4trillion between 2021 and 2025.

- *Extending the Time Horizon:* Delivering these short-term priorities over the next decade requires taking a strategic view, particularly for long-lived buildings and infrastructure. But financial markets and financial policy can suffer from a ‘tragedy of horizon’ in the words of Bank of England Governor Mark Carney, discounting future risks in today’s decisions, risking irreversible damage.

The task ahead is to develop a financial system that is ‘fit for purpose’ for this transition. This is clearly a major challenge – but sustainable finance is an increasingly dynamic arena, with high-level policy agreements now being matched by changes in both financial practice and financial policy. The first global report of the UNEP Inquiry, *The Financial System We Need*, highlighted a ‘quiet revolution’, as financial rule-makers and institutions include environmental and social factors into the capital allocation process.<sup>8</sup>

### 1.3 The Emerging Policy and Regulatory Toolkit: the ‘Five R’s

Looking across emerging practice, financial policy and regulation is being used to deliver five broad outcomes across the financial system. These can be described as the ‘Five R’s – reallocation; risk; responsibility; reporting; and roadmaps – and each has different impacts on the pursuit of sustainable development in the real economy.

#### 1.3.1 Reallocation of Capital

Financing a sustainable economy will require the efficient reallocation of capital. Market dynamics alone may not be enough to mobilize capital for critical priorities at scale or limit flows of capital to unsustainable assets. Over the coming 15 years, the world will need to invest around US\$90 trillion in sustainable infrastructure assets, more than twice the current stock of global public capital.<sup>9</sup> Here, financial policy and regulation have a *direct* impact on the allocation of capital in the real economy.

Financial policy and regulation can, for example, help to develop capital markets to better cater for the needs of sustainable development. Here, countries such as China and India have introduced formal ‘green bond’ guidance to help grow these pivotal markets, building on market principles and standards. In addition, financial policy and regulation is also deployed in some developing countries to achieve alignment with key environment and development goals. For example in India, renewable energy has recently been added to the list of activities that fall within the long-standing requirement on banks to allocate 40% of lending to ‘priority sectors’. In Brazil, financial regulation is deployed to ensure that the allocation of subsidized rural credit is limited to landowners that can demonstrate compliance with environmental laws.

#### 1.3.2 Risk Management

The degradation of the environment can also generate risks for financial assets and institutions – and potentially for the financial system as a whole. Here, the primary focus of financial policy and regulation has been on understanding the scale of these risks and then putting in place measures that strengthen the ‘safety and soundness’ of financial institutions to these shocks. The linkages to the real economy are therefore largely *indirect* as a result of changes to risk appetite and risk pricing.

In developing and emerging economies such as Bangladesh, Brazil, China and Peru, financial authorities have introduced guidelines and requirements to make the assessment of socio-environmental factors a

routine part of financial risk management, particularly in the banking sector. This year, a number of European central banks and regulators in France,<sup>10</sup> the Netherlands,<sup>11</sup> Sweden<sup>12</sup> and the UK<sup>13</sup> have taken steps to evaluate the implications of climate change for their financial systems.

### 1.3.3 Responsibilities of Financial Institutions

Sustainable development can also have potentially profound implications for the core duties of financial institutions to their clients and other stakeholders.<sup>14</sup> Growing numbers of financial institutions are adopting shared principles that guide the integration of ESG factors – but market forces alone can be insufficient to ensure sufficient breadth or depth of implementation. Policymakers in a growing number of countries, such as South Africa and the US, have supported this process by clarifying how core responsibilities link to sustainability factors such as the fiduciary duty of pension funds to their beneficiaries. Again, the primary focus here is on relationships within the financial system – between pension funds and their clients – with *indirect linkages* back to the real economy as greater recognition of ESG factors changes capital allocation and stewardship decision-making.

Evidence of change is emerging, with a recent global investor survey finding that over 65% of respondents agreed that acting on the SDGs was aligned with their fiduciary duties.<sup>15</sup> Alongside this, key policy frameworks such as the UN Guiding Principles on Business and Human Rights and the Organisation for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises focus on the risks that financial activities pose for critical social and environmental outcomes.<sup>16</sup> In another example of the mutual signalling between the market and policy, a new statement was launched in June 2016 by leading institutional investors making clear that investors must “take account of environmental, social and governance (ESG) issues and support the stability and resilience of the financial system” – and asking for policy clarity at the national and international levels.<sup>17</sup> Beyond the investment industry, sustainability factors have also become part of efforts to restore trust in the broader financial system in the wake of the financial crisis. For example, in the Netherlands, the banking sector recently adopted its ‘societal statute’ in which banks define their role in helping society overcome critical challenges such as climate change and health care.

### 1.3.4 Reporting

Enhanced reporting is a foundational element for the establishment of sustainable financial systems – enabling consumers to pick the right financial products, investors to make informed choices and regulators to assess the threat to the resilience of the financial system from sustainability-related disruption.<sup>18</sup> The financial system relies on information flows to enable the efficient allocation of capital – and ensure accountability. Efforts to improve the disclosure of financially relevant sustainability information have been under way for more than 20 years – with financial policy and regulation working to improve coverage, consistency and comparability. Enhanced reporting can be considered as a *bridging* action focused on improving information flows between the real economy and financial system actors.

Disclosure is not just needed from corporations – but also from financial institutions themselves. As part of its new Energy Transition Law, France has introduced requirements for corporations to extend their reporting on ESG factors. In addition, institutional investors need to report their own exposure to climate-related risks and the alignment of their portfolios with the 2°C target.<sup>19</sup> Importantly, the users of these disclosures are not just financial consumers and institutions, but also potentially financial policymakers and regulators, as they start to examine the aggregate impacts of environmental threats as well as the progress in capital reallocation.

### 1.3.5 Roadmaps

Many countries have elements of a sustainable financial system in place – but these are often not joined up or focused in a strategic way. However, action to deliver the SDGs and the Paris Agreement will need to involve a system-wide approach to financial system reform – with the Agenda 2030 identifying the need for ‘integrated national financing frameworks’,<sup>20</sup> and the Paris Agreement setting out the need for Intended Nationally Determined Contributions (INDCs) to be translated into more detailed ‘climate investment plans’ or ‘green finance strategies’. These roadmaps are perhaps the least developed dimension of the Five Rs – but are critical to achieve a *systemic* approach that connects financial practice with real economy needs. Crucially, these cannot be abstract plans – but need to drive actual changes in financial practice.

Some countries have started to develop their own roadmaps to promote green and sustainable finance. The People’s Bank of China, for example, established a Green Finance Task Force in 2014, co-convened with the UNEP Inquiry, which delivered a 14-point strategy. Green finance has been made part of the country’s 13<sup>th</sup> Five-year Plan and specific measures have been introduced to expand the green bond market. In Indonesia, the country’s financial regulator, OJK, has launched a Roadmap for Sustainable Finance, setting out key steps in the banking and capital markets sectors through to 2019. Sweden has committed to ensuring that ‘the financial sector serves sustainable development’, a statement of strategic intent which is driving specific actions. These roadmaps are perhaps the least developed dimension of the Five Rs – but are critical to achieve a *systemic* approach to sustainable finance.

Table 2 summarizes the Five Rs and their relationships with in the real economy.

**Table 2: The Sustainable Financial System Toolkit and the Real Economy relationship**

Theme	Action area	Examples	Relationship
1. Reallocation	Market Creation	- Green Bond regulations (China, India) - Property-linked energy efficiency finance schemes (US, UK)	Direct
	Policy Alignment	- Priority sector lending for clean energy (India) - Linking rural credit to environmental compliance (Brazil)	Direct
2. Risk	Prudential Regulation	- Climate risk and insurance regulation (UK, US) - Assessment of financial risks of Energy (EU, the Netherlands)	Indirect
3. Responsibility	Fiduciary Duty	- Consideration of environmental and social risks in pensions’ regulation (South Africa, US)	Indirect
4. Reporting	Corporate Disclosure	- SEC Guidance on Climate-Related Financial Disclosures (US)	Bridging
	Financial Disclosure	- Investor reporting on contribution to low-carbon transition (France)	Bridging
5. Roadmaps	Strategic action across multiple priorities	- Green Finance Task Force (China) - Roadmap for Sustainable Finance (Indonesia)	Systemic

Source: UNEP Inquiry, 2016

## 1.4 Examining the Process of Change

Using this analytical framework, the rest of this paper looks in detail at a series of case studies to understand the intent and effectiveness of financial policy and regulation in the transition to sustainable development.

- ***Mobilizing Capital for Sustainable Energy:*** Chapter 2 first looks at financial reform measures taken to promote sustainable energy, with a case study of India. Early insights suggests that these reforms can usefully complement energy sector policies to mobilize capital for renewable energy, energy efficiency and energy access, through a blending of measures such as market pledges, priority sector lending and green bond market creation.
- ***Managing the Climate Transition:*** Chapter 3 then examines the growing number of regulatory measures being taken to understand and manage the implications of the shift away from high carbon energy for financial assets, institutions and the system as a whole. Efforts so far to strengthen resilience also have indirect impacts back into the energy system through changes in risk appetite and moves to reallocate assets away from high-carbon energy.
- ***Delivering Sustainable Land Use:*** Chapter 4 explores financial system action to drive sustainable agriculture and forestry. These are furthest advanced in Brazil, with measures to constrain rural credit for landowners in breach of environmental rules. Indonesia's more strategic initiative to introduce a sustainable finance roadmap could also have profound implications for its agriculture and forestry sectors.

## 2 Mobilizing Capital for Sustainable Energy

### 2.1 The Sustainable Development Challenge for Energy

Achieving the energy transition is one of the most critical sustainable development tasks. The 2030 Agenda for Sustainable Development established the first-ever universally agreed goal for energy (SDG 7), which aims to ensure universal access to affordable, reliable, sustainable and modern energy by 2030.<sup>21</sup> Most SDGs depend on achieving progress on energy – and 125 of 169 SDG targets are linked to the energy system.<sup>22</sup> The sustainable energy transition is critical across a range of complex and interlinked sustainability challenges, including:

- **Climate Change:** The energy sector is the leading contributor to global greenhouse gas (GHG) emissions, accounting for roughly 60% of global emissions, making it the primary target for decarbonization efforts in the INDCs: 108 countries plan to increase renewable energy, and eight to achieve 100% renewable energy.<sup>23</sup>
- **Public Health:** Air pollution associated with high-carbon energy systems (such as coal-fired power generation and diesel transportation) has severe public health impacts. The International Energy Agency (IEA) estimates that 6.5 million premature deaths result every year from air pollution linked to the energy system.<sup>24</sup> The OECD estimates that increases in premature deaths from outdoor air pollution will alone will cost roughly 1% of global GDP by 2060.<sup>25</sup>
- **Access to Energy:** One in five people lacks access to modern electricity, and over 3 billion people rely on wood, charcoal or animal waste for cooking and heating. Delivering sustainable energy for underserved populations has catalytic effects on multiple livelihood and health outcomes, including education and reducing gender inequality.<sup>26</sup>

The sustainable energy imperative is posing new demands on the financial system, which can be broadly broken down into two related dimensions:

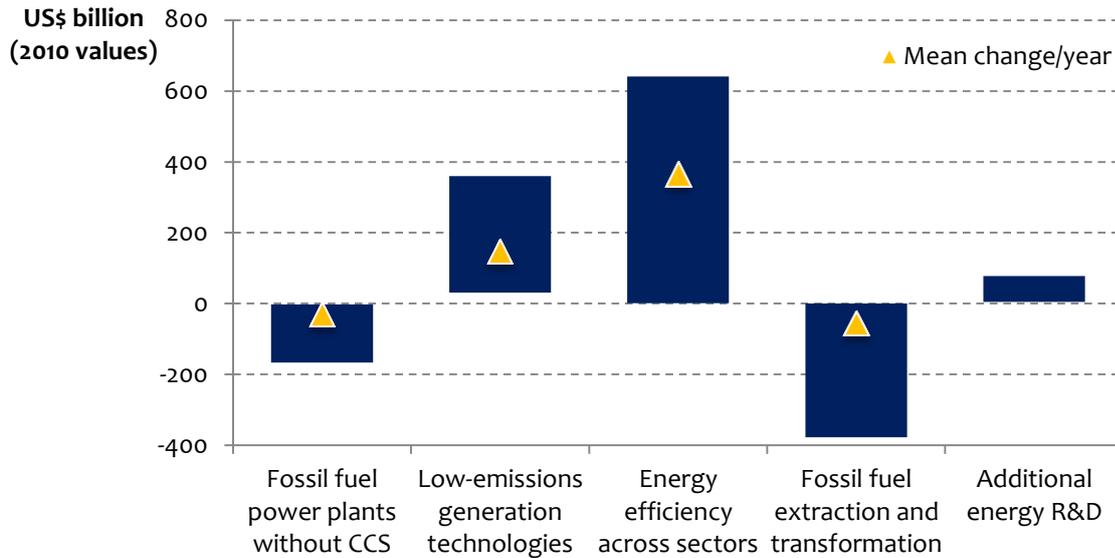
- **Reallocating capital** for sustainable energy investments, including renewable energy and energy efficiency, which is the focus for the rest of this chapter.
- **Mainstreaming the risks** involved in the transition away from high-carbon energy, the focus of the next chapter.

### 2.2 Reallocating Capital for Sustainable Energy

Achieving this energy transition will require a fundamental reorientation of capital flows away from high-carbon assets towards low-carbon investments. The Intergovernmental Panel on Climate Change (IPCC) estimate that global investments in low-carbon generation, energy efficiency across sectors and additional energy-related research and development (R&D) need to increase by as much as US\$1.1 trillion per year between 2010 and 2029.<sup>27</sup> Over the same time, annual investments in fossil-fuel power generation (without carbon capture and storage) and fossil fuel extraction will need to decrease by over US\$530 billion in constant 2010 US\$. In many jurisdictions, the lifetime cost of investing in new renewable energy is now cheaper than building new fossil-fuel power assets – and it is expected that in roughly a decade, building new renewable energy infrastructure will be cheaper than running existing fossil fuel assets.<sup>28</sup>

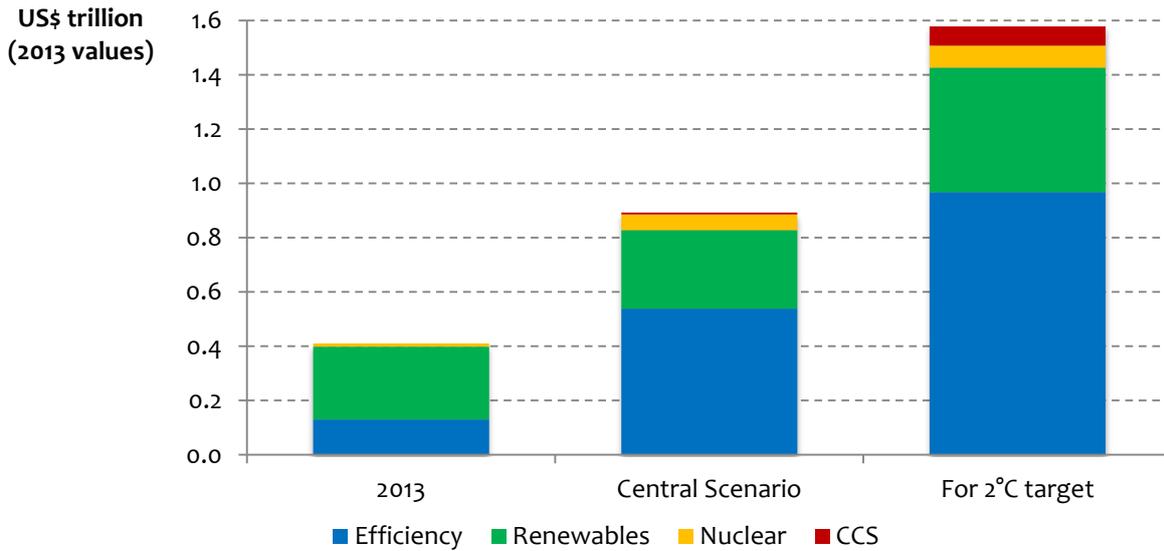
Importantly, flows of finance for energy efficiency – critical to the delivery of all deep decarbonization pathways – will need to increase by several orders of magnitude, with the IEA forecasting annual energy efficiency investments needing to increase by nearly eight times by 2040 to achieve a 2°C scenario.

**Figure 3: Changes in Annual Investment Flows, 2010-2029 (US\$ billion per year)**



Source: IPCC

**Figure 4: Annual Low-carbon Investment, 2014-40**

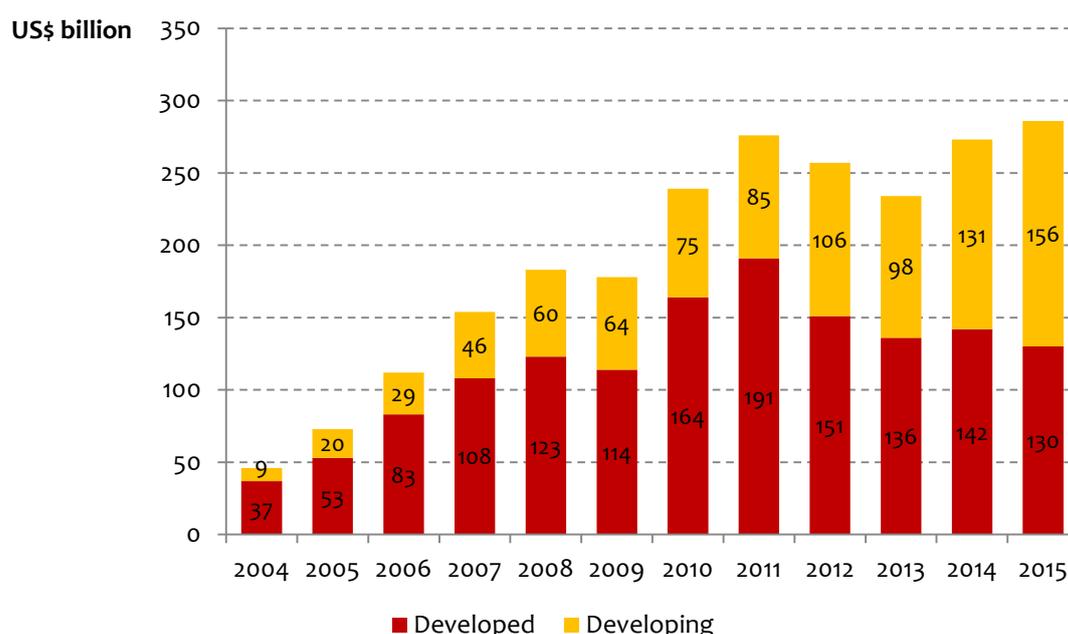


Source: IEA

Financial flows for clean energy have increased significantly over the last decade, with 2015 seeing record investment of US\$285.9 billion in renewable energy excluding large hydropower investments (Figure 5).<sup>29</sup> The 134 GW of renewable power capacity built in 2015 comprised 53.6% of global capacity additions – making 2015 the first year renewable energy exceeded fossil fuels in terms of new capacity.

Renewable power capacity additions in 2015 were strongly dominated by solar power, attracting US\$161 billion (56% of total investment). 2015 also represented the first year that investments in renewable energy in developing countries outpaced investments in the developed world, with US\$156 billion invested representing 19% growth over 2014, and 17 times the 2004 amount.

**Figure 5: Global Renewable Energy Investment, 2004-2015**



Sources: FS-UNEP and Bloomberg New Energy Finance (2016)<sup>30</sup>

However, recent figures suggest that renewable investment over the first half of 2016 was 23% lower compared with the same time period in 2015.<sup>31</sup> This apparent decline in financing comes in part from further reductions in technology costs, including for solar PV. The learning curve for solar shows that every doubling of installations generates a 25% reduction in costs: since 1975, costs have fallen 115 times and costs are estimated to decline by a further 60% through to 2040.<sup>32</sup>

Over the past decade, a combination of policy levers drove this global increase in renewable energy investment, notably:

- **Real economy policy** frameworks, including energy sector and environmental policies designed to internalize externalities and support sustainable energy infrastructure deployments (including feed-in tariffs and carbon prices)
- The use of **public finance** support to clean energy investments, ranging from support for R&D through to development finance initiatives to crowd in private capital, including through the establishment of public green investment banks.

Financial markets have responded through a range of new financing vehicles – as well as commitments from banks and investors to increase their exposure to sustainable energy assets. Market-based rules have also emerged, notably the Green Bond Principles as well as the Climate Bond Standards.

More recently, complementary policy efforts have been taken within the financial system to boost the supply of capital for sustainable energy, profiled in Table 3.

**Table 3: Financial Reform for Sustainable Energy**

Asset class	Examples of financial system measures
Banking	India: Incorporating renewable energy within Priority Sector Lending requirements Bangladesh: Banks required to allocate 5% of lending to green finance priorities from 2016.
Debt Capital Markets	China: Green Bond disclosure and listing requirements India: Green Bond disclosure requirements USA: Property Assessed Clean Energy (PACE) programme
Equity Capital Markets	UK: Creation of Renewable Energy Investment Trusts

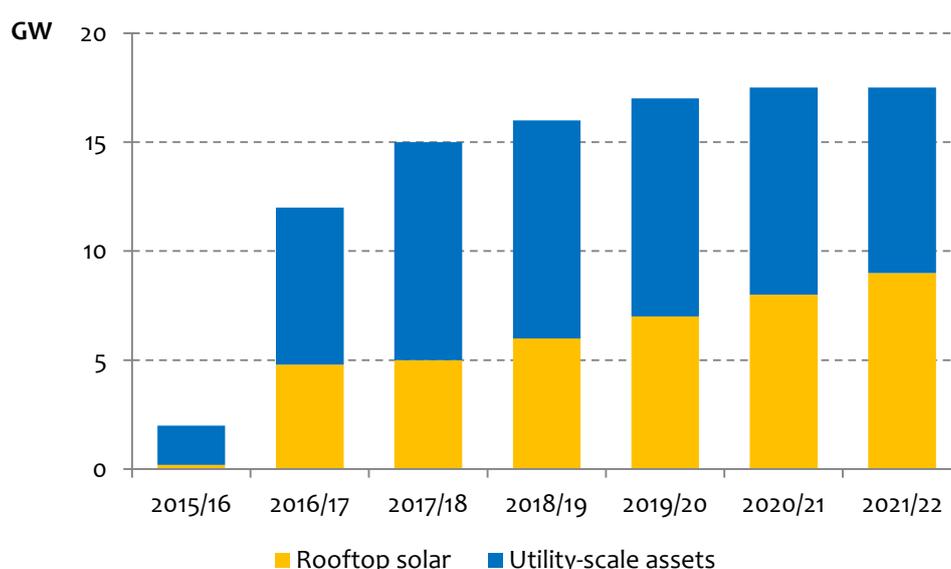
Source: UNEP Inquiry, 2016

### 2.3 Financing the Renewables Revolution in India

In 2014, Indian Prime Minister Narendra Modi announced a new target of implementing 175 GW of renewable energy generation capacity by 2022, 100 GW of which will be solar power. The expansion of solar power is key to the Indian government’s commitment to providing 24/7 access to electricity for all citizens by 2019, meeting growing energy demand and reducing environmental impacts as reflected in the country’s INDC.

India’s Ministry of New and Renewable Energy (MNRE) has launched a roadmap setting out how it will achieve this 100 GW goal for solar power.<sup>33</sup> Of this proposed capacity, it is envisioned that 40 GW will be made up of grid-connected rooftop solar and other installations, with the remaining 60 GW comprised of medium and large scale solar projects (Figure 6).

**Figure 6: India’s Solar Power targets 2016-2022**



Source: MNRE, 2016<sup>34</sup>

In recent years, India has exhibited strong growth in renewable energy capacity, but the 2022 target is still considered extremely ambitious – requiring a consistent 24% CAGR to 2022. Significant progress has been achieved, with 7.5 GW of grid-connected solar projects commissioned under the solar initiative as of June 2016.<sup>35</sup> A further 12.1 GW of approved solar capacity is expected to be commissioned during 2016/17.

Investment in India’s renewable energy sector has been steadily increasing in recent years, but requirements are expected to more than double to meet the 175 GW target. Analysts estimate the total cost meeting the 175 GW goal to be around INR17.5 trillion, or roughly US\$260 billion.<sup>36</sup> This equates to roughly 30% of the US\$834 billion estimated financing requirement for strategies to deliver India’s INDC.<sup>37</sup>

Efforts to mobilize funds for India’s solar revolution span energy market reforms at the national and state levels. Public finance is also playing a major role, with a government allocation of roughly INR10,000 crore (US\$1.5 billion) for 2016-17 including INR5,000 crore from the National Clean Energy Fund (NCEF) and contributions from Internal and Extra Budgetary Resources (IEBR).<sup>38</sup> In addition, international flows of climate finance are critical to meet India’s targets.

Alongside these efforts, the government, along with the central bank and financial regulators are taking action within the financial system to channel capital towards sustainable energy investments.

*“India has a huge opportunity to discuss policy intervention required to drive the flow of sustainable financing and to align the financial system towards a sustainable development agenda. Several goalposts – including creating awareness of the financial sector, developing common definitions of green finance indicators, developing green products, measuring progress and framework for assessing financial risks – are critical for achieving this.”*

Deputy Governor R. Gandhi, Reserve Bank of India<sup>39</sup>

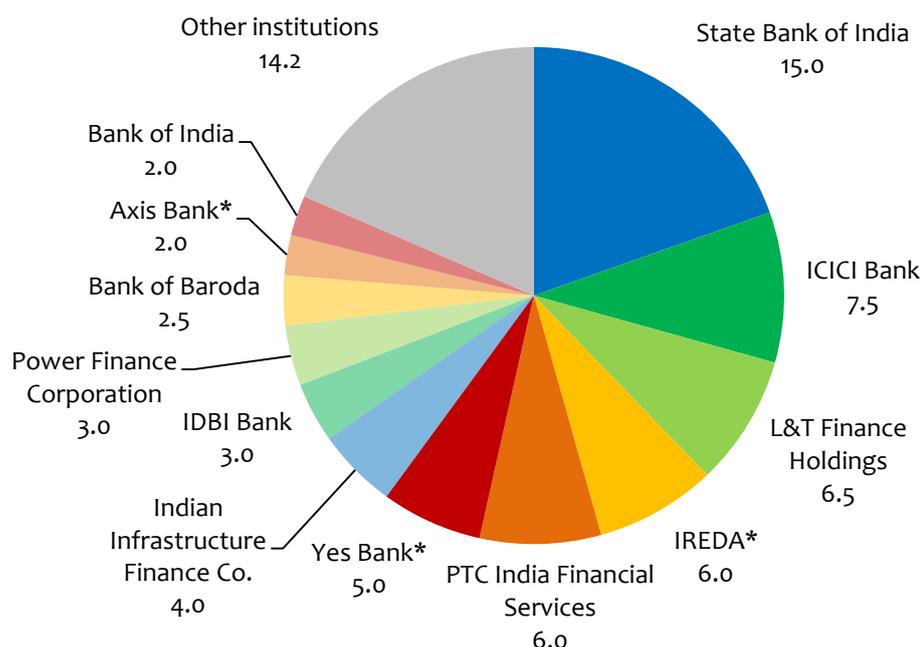
India’s financial system is dominated by banking – and banks will be the largest source of funding to deliver the renewables’ targets. To mobilize increased supply of capital, India has taken three steps within the financial system to boost bank lending for renewables:

- First, gathering voluntary financing commitments from India’s banks
- Second, extending Priority Sector Lending coverage to renewables
- Third, issuing regulations to encourage the expansion of green bonds

### 2.3.1 RE-Invest: Gathering Voluntary Financing Commitments

In February 2015, at the RE-Invest renewable energy financing event hosted by the Indian government, the MNRE invited public and private corporate and financial firms to invest in the country’s renewable energy sector in the five-year period from 2015-2019.<sup>40</sup> An estimated USD\$200 billion in financial sector and corporate commitments have now been made.<sup>41</sup> Through this initiative, India’s banks have made a cumulative commitment to finance 76.5 GW of renewable energy capacity by 2019 (Figure 7).

**Figure 7: Clean Energy Commitments of Indian Financial Sector Firms (to October 2015) in GW**



\* Banks that have issued Green Bonds

Source: Re-Invest (2015)<sup>42</sup>

### 2.3.2 Extending Priority Sector Lending to Renewables

For almost four decades, the Reserve Bank of India (RBI) has required banks to allocate 40% of their lending to priority sectors in the Indian economy, including agriculture, infrastructure, education and small and medium-sized enterprises.<sup>43</sup> Following a review of the Priority Sector Lending (PSL) framework in 2014, the RBI took action to update PSL requirements with new national goals – and in April 2015 expanded the PSL framework to include lending for renewable energy and social infrastructure.<sup>44</sup> Banks loans up to a limit of INR15 crore (US\$2.5 million) per non-household borrower for renewable energy generation and distribution infrastructure may be considered as part of priority sector lending requirements. For individual households, the loan limit is INR10 lakh (US\$15,000) per borrower. A particular focus was to stimulate funding of renewable applications that would increase access to energy.

While these modifications to the PSL framework are fairly new, the RBI has indicated that flows of finance to renewable energy assets under the PSL have steadily increased, and that loan limits may be increased in the future (with due consideration of the potential for concentration risk). As many banks do not meet their PSL targets, and as sector limits are set by individual banks depending on risk appetite, the introduction of renewable energy has represented an opportunity for banks to better fulfil their obligations. The introduction of a trading scheme for PSL certificates between banks in April 2016 could also provide a market-based incentive for leading banks to expand renewable energy financing.<sup>45</sup> Going forward, the RBI will monitor the financial flows under the PSL framework to better understand the net benefit of the policy.

### 2.3.3 Supporting Green Bond Market Development

Green bonds are seen as a critical catalyst for delivering the additional finance needed for India’s renewable energy revolution. India’s green bond market kick-started in February 2015 – at the same time as the RE-Invest and PSL efforts. By July 2016, US\$2 billion of green bonds had been issued – with about 40% raised by banks that have RE-Invest commitments.

**Table 4: Green Bond Issuance in India, 2015-2016**

Issuer	Issuer Class	Date	Currency	Issuance (US\$ million)	Tenor (years)	Cert.	Comments
Yes Bank	Private Sector Bank	February 2015	INR	161	10	No	First Indian Green Infrastructure Bond, proceeds used to fund renewable energy infrastructure projects, including solar, wind, biomass and hydropower projects. Oversubscribed nearly two times.
Export-Import Bank of India	Public Sector Bank	March 2015	US\$	500	5	No	First Indian dollar-denominated green bond, proceeds used to fund green projects in Bangladesh and Sri Lanka. Oversubscribed by more than three times. Priced at 147.5 basis points over benchmark US Treasury Bonds, for a coupon of 2.75%.
Yes Bank	Private Sector Bank	August 2015	INR	50	5	No	Entire issuance subscribed by the International Finance Corporation (IFC), which then issued a AAA-rated LSE “Green Masala Bond” for same amount (essentially capitalizing Yes Bank green bond, lowering the cost of lending to green projects).
CLP Wind Farms	Corporate	September 2015	INR	90.3	Multi	No	First Indian Corporate Green Bond. Proceeds used both for capital expenditures and refinancing of wind assets.
ReNew Power Ventures	Corporate	September 2015	INR	68	17.5	No	Proceeds used to refinance bank loans for the company’s 85 MW wind power plant in Maharashtra.
IDBI	Public sector bank	November 2015	US\$	350	5	No	Certified through the Climate Bond Standard.
IREDA	Public agency	January 2016	INR	150	Multi	No	Tax-free bond offering retail investors up to 7.68% interest rate for tenures ranging between 10 and 20 years, oversubscribed by over five times.
Hero energy Futures	Corporate	February 2016	INR	44	Multi	Yes	First climate certified green bond in India (non-convertible debentures certified by the Climate Bonds Standard) to finance the development of wind projects
Axis Bank	Private Sector Bank	June 2016	US\$	500	6	Yes	Certified through Climate Bonds Standards for Wind, Solar, Low Carbon Transport & Low Carbon Commercial Buildings

Sources: NRDC, IREDA, CBI

Some green bonds have been up to five times oversubscribed<sup>46</sup> suggesting sizeable unmet demand.

For India, green bonds represent a strategic way to access larger volumes and, potentially, lower-cost capital for its renewable expansion plans. To support this process, the Securities and Exchange Board of India (SEBI) adopted a set of green bond requirements in January 2016.<sup>47</sup> The rationale for regulatory action was five-fold:

1. *Develop new financing channels:* “The financing needs of renewable energy space in the country require new channels to be explored.”
2. *Reduce the cost of capital:* These new financing channels can “not only provide the requisite financing, but may also help in reducing the cost of the capital.”

3. *Fulfil India's INDC*: India's Intended Nationally Determined Contribution (INDC) also “impresses upon the need of financing needs for achieving the stated goals.”
4. *Facilitate green investment*: “These measures by SEBI will facilitate in taking investment decisions by investors who have a mandate to focus on green investments.”
5. *Promote consistency*: These measures “will also provide uniformity in disclosure standards”.

The SEBI requirements build on many of the provisions of the market-based Green Bond Principles – and make these a regulatory obligation. In India, the issuance of green bonds will be governed by the 2008 Issuance and Listing of Debt Securities Regulations 2008 – and issuers will be required to make annual disclosures on the use of proceeds to the country's stock exchanges.<sup>48</sup> Independent third-party reviews are, for the moment, optional. Although eight areas are highlighted for green bond investing, renewable energy is expected to be the largest segment in the short term.

A final dimension of India's strategy for renewable energy is an explicit focus on collaboration with other countries through the International Solar Alliance (see Box 1).

### **Box 1: Global Leadership on Clean Energy – International Solar Alliance**

At COP21, the Indian government took the lead in instituting the International Solar Alliance, which aims to bring together developed and developing countries, governments, industries, academics and other relevant institutions. The members of the Alliance will make joint efforts through innovative policies, projects, programmes, capacity building measures and financial instruments to “mobilize more than US\$1 trillion of investments that are needed by 2030 for the massive deployment of an affordable solar energy”. India will be hosting this initiative at the premises of the National Institute for Solar Energy and will provide around US\$30 million to build the secretariat infrastructure. All partners hope that this will help catalysing investments and research in solar energy across the world, with the private sector expected to play a critical part.

## **2.4 Financing Energy Efficiency – A Need for Policy Innovation**

Within the energy system, more attention is needed to unlock financing for efficiency improvements. Improving energy efficiency lies at the heart of national and global strategies to drive down energy costs as well as environmental damage, comprising over half of what G20 countries must do to deliver against their collective pledge in the Paris Agreement. Growing numbers of banks and investors are focusing on providing capital for improving energy efficiency for households, enterprises as well as public sector organizations. Interest is also growing in the so far untapped potential for issuing green bonds based on energy-efficient buildings and vehicles.

The gap between what is financed and what is needed is, however, huge. The UN initiative Sustainable Energy for All estimates that US\$560 billion a year is needed to double the global rate of energy efficiency improvements, but only US\$130 billion is currently being deployed – meaning that while renewable energy investment on the supply side needs to be doubled to hit global targets, energy efficiency finance needs to be more than quadrupled. Awareness of the need to close this gap is growing in the financial system: for example, 115 banks and 40 investors managing close to US\$4 trillion of assets have committed to increase their consideration of energy efficiency across their operations.<sup>49</sup> At the G20 level, the Energy Efficiency Finance Task Group has developed the *Voluntary Energy Efficiency Investment Principles* that suggest a supportive policy framework to scale up energy efficiency investments in participating countries.<sup>50</sup>

Two major obstacles are the lack of basic data on energy efficiency investments and the challenge of aggregating many small investments into a size that the capital markets or banks will accept. In the US, the Property Assessed Clean Energy (PACE) programme enables retrofit financing of real estate to be paid back through municipal tax codes and provides the platform for bundled green bond issuance.

An additional measure could help to improve market transparency, enable market creation in energy efficiency markets and support green bonds and form the basis for valuable insights into the relative financial performance of energy-efficient assets. Starting with bank loans for real estate and automobiles, the key innovation would be to tag these loans to the underlying asset's energy performance, fuel efficiency or environmental standards that already exist in growing numbers of countries. For example, 20 countries now have energy performance standards for buildings (including the EU as one unit). In the EU, all properties when sold have to obtain an energy performance certificate that places the property on an A-G scale. However, at present there is no data on how many loans are going to A-grade buildings, or how many are going to poorly performing buildings that can be retrofitted during the lifetime of the mortgage. Similarly, 10 countries and markets accounting for three quarters of vehicle sales have fuel economy or greenhouse gas automobile labelling. Labelling is also in place for other key products such as white goods and air conditioning, which could be relevant for consumer finance.

If banks tagged their loans to these existing energy and environmental standards, aggregated these and then published the results on an annual basis, three steps forward in catalysing the finance market for energy efficiency could be taken:

- First, there would be a leap in market transparency on the flows of finance to energy efficient products.
- Second, this data would provide valuable information on the portfolios of energy efficient loans that could be packaged as asset backed securities into green bonds.
- Third, it could provide the basis for evaluating the financial performance of energy efficient loans relative to their inefficient alternatives. Energy efficient houses, for example, should be a better credit risk with fewer non-performing loans as outgoings for heat and power are lower. In the US, one study has shown that “default risks are on average 32 percent lower in energy-efficient homes, controlling for other loan determinants”.<sup>51</sup> But at present, the quantitative assessment of this hypothesis is not available due to a lack of consistent data. As data became available through the ‘green tagging’ initiative, analysis could be conducted to better evaluate loan performance and correlate it to energy efficiency. As the link was demonstrated, this could result in lower capital requirements, thereby at the margin further improving the flow of capital to energy efficiency.

Moving ahead on this would be a simple and low-cost way for countries to scale up finance for energy efficiency using existing standards, and it would also provide the platform for banks to grow the energy efficiency finance market by the amounts required to meet country targets. In Europe, the EMF-ECBC has proposed a new “energy efficiency label” for mortgages, based on certain energy performance indicators, with a lower interest rate and additional retrofitting funds to improve the energy performance of the property. This would free up disposable income and, in parallel, reducing credit risk for borrowers, lenders and investors.<sup>52</sup>

### 3 Managing the Climate Transition

#### 3.1 The Decarbonization Challenge for Energy

The energy transition poses a constellation of new risks to the financial system, stemming from complex and interrelated policy, market, civil society and physical change factors that affect the value and stability of investments, securities, loans, and other capital allocation decisions to the energy sector. A key transmission mechanism is the financial system’s exposure to high-carbon assets in the real economy and the risk that these could potentially become “stranded” as a result of the low-carbon transition.

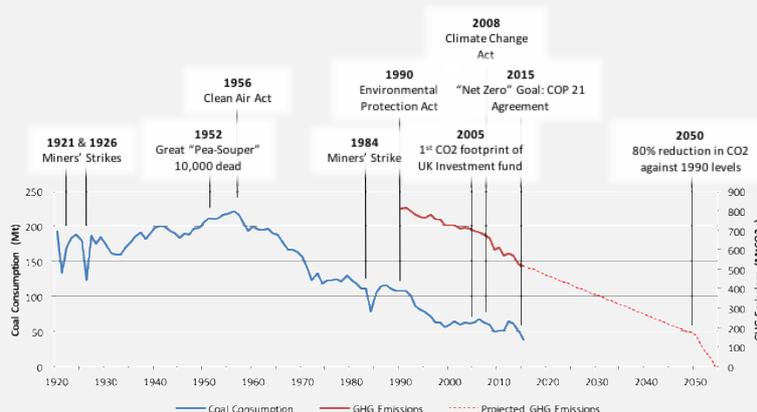
Looking back at historical experience and then forward to the energy system of the future, from a climate perspective a broad three-step transition be identified: the first step is achieving the maximum use of coal (‘peak coal’); the second step is achieving the maximum emissions of energy-related greenhouse gases (‘peak carbon’); and the third step is to achieve net zero emissions of carbon from the energy system in line with the Paris Agreement (‘decarbonization’). New forecasts suggest that the global energy system may soon reach peak consumption of fossil fuels for electricity – but with continued growth potential in the transport sector.<sup>53</sup>

Moving through these stages can take decades. A look at the UK’s energy history suggests that carbon emissions peaked well before the onset of climate policy, due to action to tackle smog, increase energy security as well as through broader industrial restructuring (see Box 2). The same forces are now impacting emerging economies such as China and India – but at a much larger scale. The delivery of new pathways for the energy transition – that “leapfrog” over high carbon investments, and associated human and environmental health costs – will be contingent on continued technological innovation, strengthened real economy policy frameworks, and action within the financial system.

#### Box 2: The Great Decarbonization – Moving from Peak Coal to Zero Carbon

In the UK, coal consumption peaked in 1956 (221 Mt), with peak CO<sub>2</sub> emissions in 1970 (685 Mt) and peak GHG emissions in 1991 (818 Mt) – both the first years of record.

Figure 8: The UK



Sources: DECC UK Energy Trends, UK ONS

The shift from peak coal to peak carbon in the UK was driven by a range of factors, including:

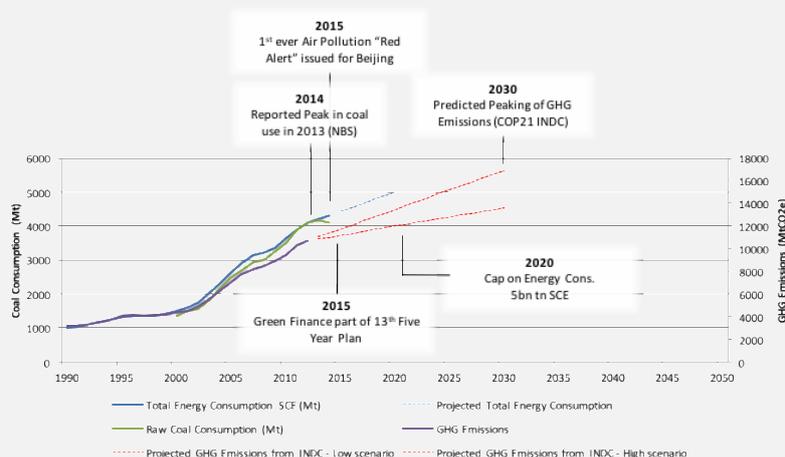
- **Human Health:** The major death toll from the “pea-souper” smog in the 1950s, leading to the implementation of the Clean Air Act in 1956;

- **Industrial Policy:** Scaling back of heavy industry, including domestic coal mining industry, alongside take off in offshore oil and gas;
- **International Trade,** leading to outsourcing of emissions to developing countries;
- **Environment and Climate Policy,** with binding emissions reductions targets with 2008 Climate Change Act, setting carbon budgets out to 2027; and
- **Energy Policy:** Closure of coal-fired electricity by 2025, increasing renewable energy and other low-carbon penetration.

The UK is committed to reducing GHGs by 80% from 1990 levels by 2050 and pledged to incorporate the Paris Agreement goal of achieving ‘net zero emissions’ into law.

In China, where energy and industrial systems are undergoing a rapid transition, peak coal may have already have been reached. China has committed to halting growth in GHG emissions by 2030, and there are signals that that emissions may peak even earlier, potentially by 2025.

**Figure 9: China**



Sources: China National Bureau of Statistics, 13th Five-year Plan

Here, a diverse range of factors is also driving this shift beyond climate concerns – with a top priority being abating air pollution.

- **Human Health:** Urban air pollution in China is causing significant human health impacts;
- **Industrial Policy:** Cutting capacity in coal-fired electricity generation, coal production, heavy industry facilities (aim to eliminate up to 500 Mt of coal capacity by 2020);
- **Water availability:** China’s power sector is highly exposed to the risk of water scarcity, with almost 12% of national water withdrawals used in the power sector.<sup>54</sup> China’s five largest power utilities are estimated to face water risk abatement retrofit costs of US\$20 billion,<sup>55</sup>
- **13<sup>th</sup> Five-Year Plan:** Aims to keep energy consumption within 5 billion tons of standard coal equivalent by 2020; and
- **Energy and Carbon Intensity:** Energy intensity to be cut by 15%, and carbon intensity to be cut by 18% by 2020 from 2015 levels.

Ultimately, decarbonization means that an estimated 80% of fossil fuel reserves cannot be commercialized, according to Carbon Tracker.<sup>56</sup> This poses a series of risks for existing energy assets, future investment plans as well as energy system business models. One of these is the risk of stranded assets – where energy assets experience unanticipated or premature write-downs, devaluations or conversion to liabilities as a result of environmental factors.<sup>57</sup> Tightening air pollution regulations, increased energy efficiency and the rising share of renewable energy have already had serious implications for valuations in the coal,<sup>58</sup> oil<sup>59</sup> and gas<sup>60</sup> as well as power generation sectors.<sup>61,62</sup>

The key is to anticipate the shift to a decarbonized energy system and reallocate capital in a prudent manner. Mainstream investors are shifting their portfolios away from high-carbon assets. For example, AXA and the Norwegian Pension Fund have decided to withdraw investments in the coal sector. Investors are also calling on companies in the fossil fuel sector to carry out low-carbon ‘stress tests’ to evaluate the implications for capital expenditure plans.

### **3.2 Financial System Responses to the Climate Transition**

Now, governments and financial regulators in an increasing number of jurisdictions are seeking to better understand how such energy transition risks may have systemically important implications, and what responses are best suited to address these emerging challenges. Often, these initiatives are part of wider exercises examining the implications of climate change for key financial sectors and the system as a whole, generating findings and actions that go well beyond the energy system.

Here, we examine the range of efforts in the US (including California), as well as in the EU, France, the Netherlands, Sweden and the UK. A detailed overview of the initiatives that are examined here can be found in Table 5.

Actions in these jurisdictions are diverse in their sectoral focus and issue scope, ranging across prudential action to assess the broad implications of climate change for the insurance sector (in the UK and the US), evaluation of the impacts of the energy transition on macroeconomic growth and stability (in the Netherlands), along with new reporting and stress testing requirements (in France).

A common theme is to ensure that the financial system responds in an efficient and orderly way to the challenge of the energy transition and climate change more broadly. Here, the focus is on responding to the new environmental pressures coming from the real economy, taking regulatory action to achieve change in the financial system, which in turn could have potential indirect consequences back on the allocation of capital in the real economy. Current efforts fall into two broad categories: first, an assessment of the implications for the financial system; and second, starting to take action across a range of priority areas.

**Table 5: How Financial Regulators Are Responding to Climate Change and the Energy Transition**

	EU – European Systemic Risk Board	France – Agence France Trésor, Banque de France, ACPR	Netherlands – De Nederlandsche Bank	Sweden – Finansinspektionen	UK – Bank of England Prudential Regulation Authority	US – NAIC, California Department of Insurance
<b>Action</b>	Too late, too sudden: Transition to a low-carbon economy and systemic risk	Requirements under Article 173 of the Energy Transition law: investor reporting and bank stress tests	Time for Transition: An exploratory study of the transition to a carbon neutral economy	Climate Change and Financial Stability	The Impact of Climate Change on the UK Insurance Sector	Climate Change Reporting (NAIC), Climate Risk Carbon Initiative (CRCI)
<b>Driver</b>	Response to European Parliament	Implementation of government legislation	Independent action, following previous government request	Response to government request	Response to government request	Independent response to climate risks
<b>Issue scope</b>	Energy transition	Energy transition	Energy transition	Climate change	Climate change	Climate change
<b>Market scope</b>	Financial system	Banks and investors	Financial system	Financial system	Insurance sector	Insurance sector
<b>Action areas</b>	Risk assessment	Risk assessment, Supervision and Regulation	Risk assessment	Risk assessment	Risk assessment and Supervision	Risk assessment, Supervision and Regulation
<b>Analytical findings</b>	A late and abrupt transition could have adverse financial implications. In the short term, improved disclosure and incorporating climate into stress tests could help. If stress tests find risks are material, then actions could include building capital buffers, capital surcharges based on carbon intensity, and large exposure limits.	New reporting and stress testing requirements are designed to stimulate market innovation in response to the energy transition. There is significant scope for learning and development as practice develops. It is important to evaluate the aggregate implications of reporting.	Energy transition potentially has a far-reaching impact. Dutch financial institutions have small direct exposures to carbon assets and sectors, but there is potential for broad-ranging impacts. The new Dutch platform for sustainable finance will examine the strategic risks and opportunities, led by the private sector.	Climate and transition risks are lower for the Swedish financial sector than for many other EU countries; stability risks linked to these risks are currently limited and do not warrant regulatory action.	Firms reasonably well equipped to deal with current level of physical risks. Transition and liability risks have to potential to have substantial impact. Improved disclosure, integration into supervision, further research and international collaboration are priorities for follow-up	Improved disclosure by insurance firms remains a priority along with incorporation of climate risks into routine supervision (e.g. Examiner’s Handbook). In California, increased risk perception has led to a tightening of reporting requirements and a request to divest high-carbon assets (such as coal)

Sources: California Department of Insurance, US NAIC, Bank of England Prudential Regulation Authority, European Systemic Risk Board, Finansinspektionen, De Nederlandsche Bank, Autorité de Contrôle Prudenciel et de Résolution.

**Table 6: Regulatory Responses to the Energy Transition and Climate Change**

		European Systemic Risk Board	Agence France Tresor, Banque de France, ACPR	De Nederlandsche Bank	Finanspektionen	Bank of England Prudential Regulation Authority	California Department of Insurance
		EU	France	Netherlands	Sweden	UK	US
Assessment	Relevance	X		X	X	X	X
	Materiality	X		X	X	X	X
	Quantifying Exposure			X			Expected 2016
	Signalling	X		X		X	X
	Further Research			Expected 2016		X	
Action: Supervision and Regulation	Risk (Firm and System level)		Expected 2017	X		X	X
	Responsibility (Fiduciary duty)		Expected 2017			X	X
	Reporting		Expected 2017				X
	Reallocation		Expected 2017				X

Source: UNEP Inquiry, 2016

### 3.2.1 Assessment

A starting point for regulators in several jurisdictions is to assess of the implications of climate change and the energy transition for key financial sectors and the system as a whole. This has involved the recognition of relevance and materiality, analysis of exposure, the signalling of results, commissioning further research – and also stimulating a range of regulatory and supervisory actions.

#### Relevance and Materiality

The first step taken across jurisdictions is the recognition of the basic relevance of climate, carbon or energy transition risks to the health and stability of the financial system. While the impetus for this judgement varies across jurisdictions – including legislation, requests from the government or independent action – many can be tracked to a statutory basis, in terms of core supervisory, regulatory, and policy mandates of institutions.

- **Netherlands:** In 2014, the central bank (DNB) was requested by Parliament to provide information on the potential risks posed by the carbon bubble to the Dutch financial sector.<sup>63</sup> Its more recent study, released in 2016, provides a deeper assessment of the energy transition – considered by DNB to be “one of the greatest challenges that the economy faces in the long term” – on the basis of building a “well-informed perspective.” Here, action was taken independently to signal importance to the financial sector, in alignment with DNB’s reconfigured mandate to “safeguard financial stability and thus contribute to sustainable prosperity in the Netherlands”.

- **Sweden's** Finansinspektionen (FI) was commissioned in 2015 by the government to investigate sustainability issues linked to the financial sector, focusing on bank lending practices and broader financial stability. Here, climate change and energy transition risks are considered as part of a broader set of macroeconomic risks which may affect capacity to maintain financial stability: FI notes it “must in all circumstances take account of how developments in other areas might make attaining its objectives more difficult,” with climate change falling into “this array of surrounding conditions and surrounding risk.”
- **UK:** the Prudential Regulation Authority (PRA)'s 2014-15 review of climate change and the UK insurance sector was initiated on the basis of an invitation to complete to complete a climate change adaptation report from the Department for Environment, Food & Rural Affairs (Defra) under the Adaptation Reporting Power introduced as part of the UK Climate Change Act 2008.<sup>64</sup> Under this provision, the PRA examined the impacts of climate change in line with its statutory objectives of promoting the safety and soundness of insurance firms, and securing an appropriate degree of policyholder protection.
- **US:** In the United States, insurance is regulated at the state level, with the National Association of Insurance Commissioners (NAIC) acting as a national standard setting body. A coalition of leading states, including Washington State, Nebraska and California, were instrumental in establishing a work programme on climate change with the NAIC, starting with a public hearing on the implications of climate change on insurers and insurance consumers in 2005. In 2008, the NAIC released a white paper examining the effects of climate change on insurance underwriting practice, investment decisions, and required disclosures.

*“De Nederlandsche Bank believes it can – and must – contribute to sustainable development. It follows from our legal mandate. And it follows from our mission, which is to contribute to the sustainable prosperity of the Netherlands by safeguarding the financial stability.”<sup>65</sup>*

Klaas Knot, Governor, DNB

#### Analytics and Exposure

Climate, carbon, and transition risks are broadly recognized as relevant in terms of sectoral and systemic financial stability. The majority of studies conclude that such risks do not pose immediate or near-term threats to the financial system – but remain poorly understood and need to be managed over the medium and long term. The degree of nuance across these conclusions stems from analytical scope, level of detail, and methodology employed.

**Overall understanding of risk:** Regulators understand that climate change and energy transition risks may have implications for sector- and system-level stability, with varying agreement over the potential for such risks to have systemic implications over the short and medium term (in turn affecting prescribed responses). However, all regulators conclude that such risks are likely to increase over time, and as such, warrant further consideration (Box 3). Such actions range from further high-level monitoring to specific sets of actions in the financial system, discussed below.

### Box 3: Transition Risks – Unpredictable and Growing in Magnitude

“Based on the existing exposures of the Dutch financial sector, very few predictions can be made as to which vulnerabilities may arise if, during the transition process, sectors that cannot be directly linked to fossil fuel consumption are also affected. Eventually, all sectors may have to contend with adjustment costs. While it is difficult to quantify such indirect risks at this moment in time, in the case of the Netherlands such risks could be sizeable because the Dutch economy is relatively energy intensive” – DNB

“Markets may not have fully priced in the risks from climate change. Climate change is seen as only possibly having effects in the long term. When combined with uncertainty about climate change and emissions abatement policies, this may have led to an underestimation of the problem and its effect on growth prospects, firms’ cash flows, and asset payoffs.” – European Systemic Risk Board (ESRB)

“Firms are reasonably well equipped to manage the current level of physical risks. Looking further ahead, increasing physical risks could present meaningful challenges to insurance business models and the full range of risks from climate change identified in this report will be important to consider.” – UK PRA

**Market scope:** The insurance sector has been a primary focus across many jurisdictions, due to its more immediately tangible exposures to environmental risks that may be exacerbated by climate change (such as natural catastrophes). In much of the debate, insurance has been taken up as a bellwether for the broader financial sector in terms of exposure and risk mitigation techniques. Where systemic assessments have been undertaken, banking, insurance and pensions are the main focus – with less attention paid to other capital markets, interlinkages across asset classes and financial holdings, and implications for macroeconomic growth.

**Methodology:** A common feature of these assessments is the review of existing literature quantifying potential impacts of climate or energy transition on financial firms. DNB has also undertaken primary research based on survey data from three major banks, five insurers and three pension funds dominant in each market segment. Based on this, DNB has quantified financial system exposure to fossil fuel producers and to carbon-intensive sectors (including power generation, industry, transport and agriculture) in terms of share of total assets (Table 7).

**Table 7: Exposure of Dutch Financial Institutions to High-carbon Assets and Sectors**

	% share of total assets	
	Fossil fuel producers	Carbon-intensive sectors
Banks	2.0%	9.7%
Insurers	1.2%	4.3%
Pension funds	5.5%	12.4%

Source: DNB, 2016<sup>66</sup>

### Signalling Results

A notable feature of these assessments is how the results have been signalled within the financial system and beyond. Perhaps the most striking case is the Bank of England’s assessment of the implications of climate change for the insurance sector. What could have been a routine release of an operational report

was made an issue of strategic significance by the Bank’s Governor Mark Carney, who isolated the core barrier to action on climate change as ‘the tragedy of horizon’: “in other words, once climate change becomes a defining issue for financial stability, it may already be too late”.<sup>67</sup> The findings of the PRA’s insurance report provided the basis for specific follow-up actions and the foundations for the new FSB TCFD.

*“Financing the de-carbonization of our economy implies a sweeping reallocation of resources and a technological revolution. For this to happen, “green” finance cannot conceivably remain a niche interest over the medium term.”<sup>26</sup>*

Mark Carney, Governor, Bank of England

This signalling is an important regulatory tool – allowing authorities to inform the market of changing strategic priorities without necessarily requiring specific regulatory action. Other central banks and regulators have also decided to use their assessments to signal to market actors the need to anticipate potential shocks.

#### Further Research

Inevitably, these first-round assessments conclude that further research is a priority to underpin other financial system actions, including supervisory dimensions. Certain regulators are using initial high-level assessment as a foothold for addressing climate and energy transition risks in other areas. The UK PRA notes that its role as an insurance supervisor, where issues with longer timelines are more relevant in comparison to banking or capital markets, brings “challenges such as climate change much more clearly into focus,” providing “a natural starting point for the Bank’s work examining the impact of systemic environmental risks.”<sup>68</sup> Under its One Bank research agenda, the Bank of England recently released a follow-up discussing how climate change could affect a central bank’s ability to meet its monetary and financial stability objectives,<sup>69</sup> and is holding further research collaborations and convenings throughout 2016.<sup>70</sup>

### **3.2.2 Action: Supervision and Regulation**

#### Risk: Firm-level Analysis and System-level Stress Testing

Most regulators have so far concluded that climate change and the energy transition are unlikely to pose risks to financial stability over the short term. This means that there is no pressing need for a regulatory response to immediate financial stability issues, for example, through changes to capital charges. Nevertheless, some regulators are starting to incorporate climate and energy transition issues into routine supervisory frameworks:

- In **France**, Article 173 of the Energy Transition law contains provisions requiring the government to report by end 2016 on how to assess climate-related risks in the banking sector, including a methodology for a sector-level stress test.
- In the **UK**, the PRA is now working to assess how best to incorporate the identified climate change risk factors into its existing framework and supervisory approach. At the firm level, this includes building climate factors into the existing Business Model Analysis framework for supervisory engagement, and review of Own-Risk Solvency Assessment (ORSA) filings from firms to assess whether climate change factors are being appropriately identified and assessed. At the system level, the PRA is also considering how to include climate factors further into insurance sector stress tests – noting that such stress tests already consider environmental factors such as natural catastrophes.

- In the **US**, the NAIC has included climate change factors into supervisory engagement standards, with revisions to the Financial Condition Examiners Handbook in 2013 to provide guidance on supervisory questions to ask insurers regarding potential impacts of climate change on solvency.

As many climate and energy transition issues involve co-variant risks, and may have complex relationships and feedback loops across timescales, it remains unclear what aspects of current system-level stress testing approaches (from one-year time horizons for credit risk to “1-in-100” year scenario analysis for insurers) may be most useful to inform forward-looking assessments that consider a range of potential futures.

- In the **Netherlands**, DNB highlights the development of climate stress testing as a priority, noting the possibility of imposing capital requirements or exposure limits based on stress test results.
- In **Sweden**, FI has stated that “different types of stress tests and scenario analyses to capture how vulnerability, in more tangible terms, could be manifested and obtain indications of potential preventive measures” – but the financial sector should lead such work.
- The **ESRB** states identifies research and consultation on policy development as a medium-term response, with possible topics including building systemic capital buffers, specific capital surcharges based on the carbon intensity of individual exposures, and large exposure limits applied to the overall investment in assets deemed highly vulnerable to an abrupt transition to the low-carbon economy.

#### Reporting: Achieving End-to-end Transparency from the Asset to the System Level

Alongside the deepening of prudential supervision, improved disclosure and reporting from financial institutions has been a critical area for regulatory action from the beginning. In the US, the NAIC introduced the world’s first climate risk disclosure survey for the insurance sector in 2009. The survey contains eight questions to assess insurer strategy and preparedness with regard to investments, mitigation, financial solvency (risk management), carbon footprints and consumer engagement. Implementation of the survey is voluntary at state Insurance Commissioner’s discretion, and following the first reporting year has had comparatively low geographic penetration across the US. With participating states in 2015 including California, Connecticut, Minnesota, New Mexico, New York and Washington State, the survey captures approximately 77% of the US insurance market. Survey results are summarized and made publicly available by the California Department of Insurance.

Now, the California Department of Insurance has taken its own steps to implement a new disclosure regime for insurance companies under its Climate Risk Carbon Initiative (CRCI).<sup>71</sup> Announced by Commissioner Dave Jones in January 2016, the CRCI sets out mandatory requirements for financial disclosure of insurance companies’ investments in fossil fuel enterprises (including coal, oil, gas and electricity generation) through a data call seeking additional information about insurance company’s exposure to other fossil fuel investment risk.<sup>72</sup>

Perhaps the most ambitious set of reporting requirement for financial institutions related to climate change risks and opportunities was implemented under Article 173 of the French Energy Transition law. Enacted in August 2015, the law provides a medium- and long-term strategy for the low-carbon transition in France. Article 173 is designed as a consistent package of measures affecting a wide range of entities, with several key measures to foster the integration of climate change (and ESG issues) into the decision-making process of financial institutions.

Provision VI of the legislation extends an existing ESG reporting requirement (Article 224 of the 2010 Grenelle II law) to require an explanation of how physical and transition risks related to climate change are taken into account, and an assessment of the contribution of the asset allocation to the low-carbon transition. It also extends the reporting requirements so that both asset managers and institutional investors (including the investment arms of insurance companies) are now required to report on how they take into account ESG criteria into their investment strategy. The French government has allowed considerable freedom in how investors can meet this new reporting requirement. The French government considers this flexibility to be critical to inspiring a comprehensive approach to risk thinking among investors in terms of their alignment with high-level transition goals. Investors are currently developing methodologies, with the initial reports required in 2017. A review is expected in 2019, taking stock of the first two years of reporting; this will enable France to benefit from the results of the TCFD, which will report in 2017.

Three dimensions are emerging from the current approach to improving disclosure:

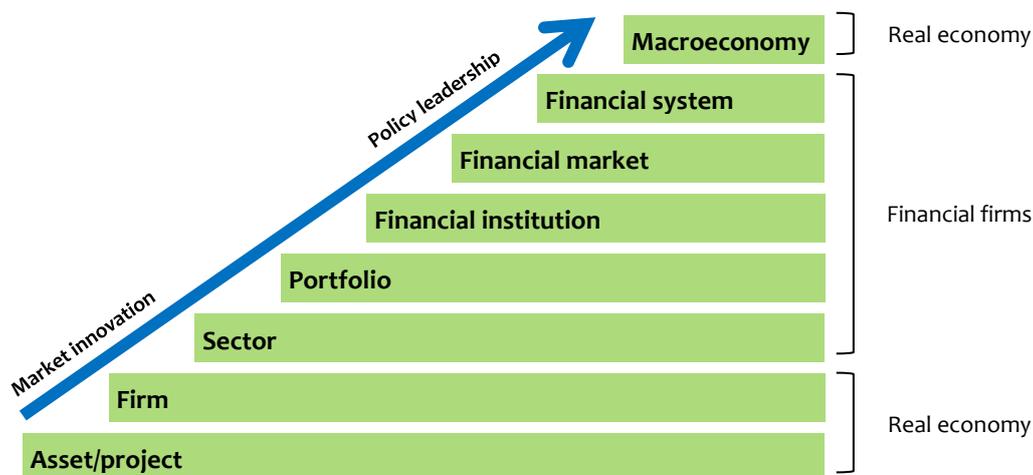
- **Forward-looking:** The focus of disclosure has shifted from only presenting historic results and past performance to emphasizing the centrality of forward-looking material, which will be critical to enabling clients, investors and other stakeholders to understand how well the institution is grappling with competing future trajectories. One striking result from the consultation undertaken by the TCFD was that “96% of respondents see scenario analysis as a key component of disclosure”.<sup>73</sup>

- **Multiple Users:** The increasing focus on disclosure by regulatory authorities is leading to a realization that the users of reported information will not just be clients and investors within the financial system, but also policymakers who are looking to glean insights into potential real economy implications – including for fiscal instruments and the effectiveness of energy, environmental and economic policies.

- **Linking Disclosure Levels:** Disclosure is needed at multiple levels to enable effective decision-making. Clearly, there needs to be consistency in scenarios and reporting methodologies to enable coherence across levels of analysis:

- **Asset:** the specific climate challenges facing a new project or investment.
- **Firm:** the implications for a specific firm as requested by a growing number of investors.
- **Sector:** enabling a comparative view across companies in the same sector.
- **Portfolio:** providing the basis for a cross-sectoral analysis at the portfolio level.
- **Institution:** with portfolio implications becoming aggregated up to the level of the financial institution.
- **Sector:** for financial regulators, the overall implications for a specific segment of the system are key, whether banking, insurance or investment.
- **System:** these in turn can create system-level impacts.
- **Macroeconomy:** finally, system level impacts can feed through to macroeconomic variables such as growth, employment and prices, fiscal and trade balances, as well as inequality and environmental quality.

**Figure 10: Linking the Levels – From the Asset to the System**



Source: UNEP Inquiry, 2016

Reallocation: Enabling Efficient Capital Rebalancing

As the risks of the climate transition become better acknowledged, assessed and priced, so capital is likely to be reallocated. In the case of mobilizing capital for sustainable energy, the intention is to have a direct effect on financial flows in the real economy. Here, the effect is more indirect. Looking across risk, responsibility and reporting dimensions, it is becoming clear that action on the mainstreaming the climate transition – focused in the financial system – is having implications for capital reallocation.

In California, tangible evidence can be found in the second pillar of the new CRCI – a request for all insurance companies doing business in California to voluntarily divest from their investments in thermal coal. This independent action, made on the basis of research and evaluation of the potential solvency risks of thermal coal investment, is understood by Commissioner Jones to arise from his “statutory responsibility to make sure that insurance companies address potential financial risks in the reserves they hold to pay future claims”.<sup>74</sup>

*“I do not want to sit by and then discover in the near future that insurance companies’ books are filled with stranded assets that have lost their value because of a shift away from the carbon-based economy, jeopardizing their financial stability and ability to meet their obligations, including paying claims to policyholders. Insurance companies divesting thermal coal assets will help reduce coal combustion, the single largest contributor to global climate change in the United States.”*

*Commissioner Dave Jones, California Department of Insurance*

A fundamentally risk-based approach can also reinforce regulator efforts to build up markets for low-carbon assets – such as green bonds – as a way to enable an efficient rebalancing of their portfolios. It also underscores continuing efforts to ensure that core prudential measures are not placing unwarranted barriers in the way of investment in green infrastructure.

Finally, advancing policy, regulatory, and research-related agendas on climate change from a risk perspective can provide the basis for establishing broader-reaching efforts oriented towards economic alignment with the low-carbon transition, and the reallocation necessary to fulfil this ambition. DNB is acting as a catalyst for discussions on sustainability in the financial sector and has established a new

Platform on Sustainable Finance in 2016. These actions formed the basis for the first-ever discussion of how to finance the transition to a sustainable economy by EU finance ministers as part of the Netherlands' presidency in the first half of 2016.<sup>75</sup>

All the case examples described here have been driven by specific priorities at the national (and subnational levels). Looking across this work, it becomes clear that there is a burgeoning need for international cooperation to share experience and develop consistent approaches to common global challenges. The FSB's task force is one clear example, as is the emerging Sustainable Insurance Forum, a network of leading insurance regulators tackling sustainability challenges.

## 4 Financing the Land-use Transition

### 4.1 The Sustainable Development Challenge for Land Use

The land-use sector – including agriculture, forestry and other land use practices – is the primary driver of human impact upon global ecosystems. Mounting population pressures and changing lifestyles (including dietary patterns) are driving the depletion of core natural capital stocks through continued land degradation, biodiversity loss and declining species' richness. Meeting the economic development and nutrition needs of a global population nearing 9 billion by 2030 will require the 'sustainable intensification' of food systems – generating more output, with much less resource use, much less waste and far greater attention to social impacts.<sup>76</sup>

The interconnected nature of the land-use sector makes it one of the most critical sustainable development challenges, especially for developing countries.

- **Human development:** Despite significant progress, some 795 million people continue to suffer from hunger and over 1 billion people live in extreme poverty – most of whom rely on agriculture for basic incomes.<sup>77</sup> Agriculture and food systems employ one third of the world's labour force,<sup>78</sup> and more than 1.5 billion people rely on forests for goods such as food, fuel and fresh water.<sup>79</sup>
- **Climate change:** Accounting for between 20-25% of total emissions, the land-use sector is the second largest contributor to global emissions after energy,<sup>80</sup> and is also profoundly affected by increasing disruption to weather patterns and hydrological systems.
- **Ecosystem services:** Globally, food systems are responsible for 60% of global terrestrial biodiversity loss, and the overexploitation of 20% of the world's aquifers.<sup>81</sup> Many of these costs are often invisible as they do not have a market price – providing no incentive for investment in sustainable practices. The estimated cost of natural capital loss within the primary production and primary processing sectors has been estimated at US\$1.8 trillion.<sup>82</sup> Ignoring these costs poses significant risks: 33% of world's arable land is jeopardized by land degradation, triggering economic losses of US\$6.3-10.6 trillion per year.<sup>83</sup>
- **Waste:** Approximately one third of all food produced for human consumption globally every year (roughly 1.3 billion tons) is lost or wasted. If all this food waste were considered as a country, it would be the world's third largest emitter of GHG emissions.<sup>84</sup>

A reformed approach to land-use priorities is critical to many of the SDGs, notably the focus on zero hunger and improved nutrition through sustainable agriculture (SDG 2) alongside the protection of terrestrial ecosystems, sustainable forest management, abatement of land degradation and biodiversity loss (SDG 15). More broadly, 'resource-smart food systems' are key for the achievement of at least 12 out of the 17 SDGs.

#### 4.1.1 The Sustainable Land-use Financing Challenge

Achieving this transition will require a significant reallocation of capital, but estimates vary widely. The United Nations Conference on Trade and Development (UNCTAD) estimates that the food security and agriculture sector will require an additional US\$260 billion in annual investment between 2015-2030 to meet the SDGs, with an additional US\$70-210 billion required for investment in ecosystems and biodiversity.<sup>85</sup> However, understanding the dynamics and scope of the sustainable land use financing challenge is at a much earlier stage compared with sectors like energy and transport. In the energy system, capital reallocation requirements are more easily understood in terms of high-carbon versus low-

carbon assets, mainstream financing models are readily applicable to new sustainable investments, investor confidence is building and project pipelines are maturing. Indeed, the financial dimension of the transition has a very low profile in recent assessments of the land use and food system challenge.<sup>86</sup>

A key reason for this is that land use is characterized by a range of context-specific challenges that complicate financial transactions, including:

- A lack of real economy policy frameworks to appropriately price natural capital inputs and externalities, compounded by a lack of capacity to adequately enforce environmental regulations.
- Profound governance issues, including security of land tenure and basic land rights of rural smallholders.
- Institutional barriers to rural finance, including high transaction costs and information asymmetries, are inherent to land-use finance in many countries, caused by factors such as co-variant risks, low population densities in rural areas and low appetites of financial institutions for rural assets for collateral.
- Tenor and maturity mismatches, which can constrain financing for activities such as forestry, characterized by long loan maturity and payback timelines.
- The lack of commonly accepted and investable sustainable land-use solutions (akin to clean energy), along with absence of clear definitions and standards.
- Capacity building on both market and policy sides on the financial aspects of land-use issues

Efforts to scale up financing for sustainable land use have historically faced a range of supply-side barriers in the financial system, including low levels of financial sector engagement with land-use challenges, inadequate disclosure and flows of information relating to land-use issues, and sparse consideration of broader land-use priorities within financial system policy and regulation in most markets (including rules in jurisdictions hosting major global and regional financial centres).

*“Meeting the many Sustainable Development Goals will require a dramatically higher degree of coordination of landscape finance and investment. Innovative mechanisms for and types of integrated landscape investments are needed to help overcome constraints to mobilizing private finance – such as high investment risk and a mismatch between the time horizons required by investors for a return on their investment and the time horizons of the investment opportunities.”<sup>87</sup>*

## Landscapes for People, Food and Nature Initiative

### 4.1.2 Scaling up Capital for Sustainable Land Use

Interest in finance for sustainable land use among mainstream financial institutions is, however, growing. Land-use issues are emerging as a financial priority in response to reputational risks and civil society pressures, as well as efforts to support clients deliver sustainably sourced agricultural and forest products (including palm oil and timber). New coalitions bringing together corporate and financial actors are focusing efforts on supporting deforestation-free supply chains.<sup>88</sup> Institutional investors are increasingly incorporating environmental and social risks into their engagement with corporations involved in high-impact sectors such as palm oil production.<sup>89</sup> The OECD-FAO Guidance for Agricultural Supply Chains sets out standards for responsible business conduct in agriculture to ensure that activities contribute to sustainable development, including a framework for risk-based due diligence.<sup>90</sup>

In a small number of countries, governments and financial regulators are now working to address key land-use challenges by taking action within the financial system. The totality of such action is much more limited than that focused on the energy sector. Strikingly, these actions are exclusively being taken by developing countries, notably Brazil and Indonesia. Again, policy, regulation and legislation are implemented across multiple channels (Table 8).

**Table 8: Financial Reform for Sustainable Land Use**

Asset class	Examples of financial system measures
Banking	<p>Brazil: Prohibiting bank financing for unsustainable agriculture in sensitive biomes</p> <p>Brazil: Linking bank credit with environmental compliance and participation in environmental monitoring under new forest code</p> <p>India: Priority Sector Lending requirements for agricultural development</p> <p>Fiji: Commercial banks must allocate 4% of deposits and similar liabilities in loans to agriculture (including forestry and fisheries)</p> <p>Lebanon: Reduced reserve requirements for commercial banks on loans to green agriculture products</p>
Securities	India: Sustainable land use considered as a specific category in SEBI Guidelines for Green Bonds
Insurance	Weather-indexed crop insurance for smallholder farmers (Global Index Insurance Facility)

Source: UNEP Inquiry, 2016

In the rest of this section, we examine how governments are working to harness the financial system to address sustainable land-use issues, focusing on:

- A two-track approach in Brazil, with financial regulators at the central bank linking credit allocation with environmental compliance and also mainstreaming environmental and social issues into risk management and governance.
- A strategic approach in Indonesia to building up the capacity of the financial sector to support sustainable palm oil production, flowing from the country's new Roadmap for Sustainable Finance.

## 4.2 Harnessing the Financial System for Sustainable Land Use in Brazil

### 4.2.1 Brazil's Sustainable Land-use Challenge

Brazil is the third largest agricultural exporter to world markets and the agricultural sector accounts for roughly one quarter of its GDP. Historically, agricultural expansion has been closely linked with deforestation in the Amazon and Cerrado biomes – with major impacts on hydrology, biodiversity and carbon sequestration potential of land systems.

At its peak in 2004, Brazil's deforestation amounted to 3.8 million hectares per year – roughly an area the size of the Netherlands. In the years following 2004, however, deforestation decreased significantly, as

the government implemented a range of public policy interventions targeting cattle and soy supply chains,<sup>91</sup> alongside other efforts.

Brazil's annual deforestation now averages around 2 million hectares. Recent analysis from the Brazilian environment ministry suggests that deforestation increased 16% from 2014 to 2015, with deforestation expanding in states such as Rondonia and Mato Grosso. Looking ahead, the land-use sector has a central focus in Brazil's INDC, with a targeted reduction in deforestation rates, and an expansion of targets for land restoration and integrated cropland-livestock-forestry systems by 2030.

#### 4.2.2 Financial Policy Innovation for Sustainable Land Use

Brazil has long tradition of harnessing the financial system for agricultural and rural development. More recently, Brazil has implemented two parallel strategies focused on reducing deforestation and promoting sustainable finance more broadly:

- **Reallocating rural credit:** Starting in 2008, Brazil's central bank has introduced new requirements limiting landowner access to subsidized rural credit to those who can demonstrate compliance with environmental legislation.
- **Risk management:** Starting in 2011, Brazil's central bank also introduced requirements for socio-environmental factors to be mainstreamed into the governance of risk by banks and other financial institutions.

Looking at these two action pillars shows how Brazil's government and central bank have collaborated on a range of direct and indirect measures seeking to align the financial system with sustainable development, linking financial requirements into broader environmental policies.

##### Pillar 1: Reallocation – Addressing Sustainability Issues through Rural Credit

BACEN, Brazil's central bank, established a specific division devoted to rural credit in 1965 (SNCR). Subsidized rural credit is a key source of funding for agriculture in Brazil, accounting for roughly 30% of total required financing.<sup>92</sup> Subsidized rural credits are granted under regulations established by the National Monetary Council (CMN), which links together the central bank, the ministry of Finance and the Ministry of Planning, Budget, and Management.<sup>93</sup> The institutional architecture of the CMN has allowed for the develop of financial system policies that are closely aligned with real economy goals and priorities, which can then be linked to environmental legislation – as in the case of Brazil's forest code.

##### **Linking Rural Credit to Environmental Compliance**

Over the last decade, BACEN has implemented multiple rural credit regulations that redirect capital allocation towards economic development and sustainability objectives, including the reduction of deforestation. With the introduction of Resolution 3545 in 2008, BACEN imposed requirements conditioning the concession of rural credit within the Amazon biome to disclosure of client compliance with environmental regulations and legal requirements on preservation of native forests (legal reserves). Legal reserves for most of the country are at least 20% of farm property in the majority of Brazil, but in the Amazon, the percentage of legal reserve can be as high as 80%. Farmers were also required to provide documentation of legal ownership of land. The central bank had responsibility for ensuring compliance with these provisions.

Resolution 3545/2008 was implemented as part of suite of broader efforts to mitigate deforestation, including constraints on agro-industrial credit for sugar cane and crop expansion in the Amazon biomes

(Resolution 3813/2009) creating as a “double lock” through the financial system to support key environmental enforcement efforts.

Analysis undertaken by the Climate Policy Initiative (CPI) suggests that this policy had a significant impact on rural credit following its introduction in 2008. Looking from 2008-2011, CPI estimates that Resolution 3545/2008 stopped roughly BRL2.9 billion (US\$0.9 billion), which in turn prevented roughly 2700 km<sup>2</sup> of forest clearance – representing a 15% decrease in deforestation over this period.<sup>94</sup> While this policy had its greatest financial impact in its first years, updates were implemented to target improved bank processes and overall stringency.

### **Credit and Compliance under Brazil’s New Forest Code**

Resolution 3545/2008 provided the basis for a major series of reforms that will be implemented as part of Brazil’s new Forest Code, passed in 2012 (Law 12651/2012). The updated Forest Code established new frameworks, rules and compliance systems in Brazil. This included the Rural Environmental Registry (CAR) – an electronic registry of environmental information for all rural properties to support improved environmental and economic planning, monitoring and actions to combat deforestation. Following registration in the CAR, landowners have 20 years to comply with the code through adoption of state-specific restoration models and guidelines.

The Brazilian government has used this new mechanism as the basis for further updating compliance requirements for granting credit – in certain respects, an extension of the Resolution 3545/2008 approach for the Amazon states to the whole of Brazil. Article 78-A of the Code set out that five years from the legislation coming into force (October 2017), financial institutions will only be able to provide agricultural credit to property owners whose rural properties are registered in the CAR database.

Implementation of this ambitious set of requirements is expected to prove challenging. The deadline for registration in the CAR was recently extended, with landowners and banks now having until December 2017 to implement new requirements. Provisions exist for further extensions, potentially until December 2018. Following implementation, real impacts on forest cover may take a significant time to materialize, as credit requirements are only contingent upon registration within the CAR – not approval of submitted information by farmers, or implementation of restoration activities.

The CAR mechanism has been widely accepted by the Brazilian financial sector and is seen as an important channel for further improving risk management related to deforestation. FEBRABAN, the Brazilian Banker’s association, is now working with the Ministry of Environment and other business associations to improve the registry using satellite imagery.

### **Pillar 2: Risk and Responsibility – Mainstreaming environmental and social issues**

Alongside rural credit, BACEN has approached environmental challenges from a prudential dimension, with steps to drive the integration of environmental factors into mainstream risk management by financial institutions.

With Circular 3547/2011, BACEN set in place requirements on all financial institutions to consider social and environmental risks capital adequacy calculations within the international framework of Basel II. Specifically, financial institutions are required to demonstrate how they evaluate the risk arising from exposure to social and environmental damage caused by their activities as part of the Internal Capital Adequacy Assessment Process (ICAAP) calculations – looking across credit, market, operational, interest

rate, counterparty and concentration risks, as well as exposure to broader liquidity, strategic and reputational risks.<sup>95</sup>

This was followed by CMN Resolution 4327/2014, setting out guidelines requiring all financial institutions to establish social and environmental responsibility policies (PRSAs). This policy was developed on the basis of a public consultation developed in collaboration with the Ministry of Environment alongside the Rio+20 sustainable development process in 2012. Based on the principles of relevance and proportionality, the guidelines allow considerable freedom to develop individual policies based on the degree of exposure to environment and social (E&S) risks, and the compatibility with the scope of activities and products. While institutions are required to establish policies, they have until 2019 to fully implement such policies into credit operations.

These actions, squarely focused on advancing BACEN's mandate to ensure the efficiency and soundness of financial institutions, have brought environmental issues into core risk governance and supervision activities. To map progress in the establishment of socio-environmental policies, BACEN is reviewing progress in banking and non-banking institutions. In the non-banking area, this process has included surveying over 1500 small financial institutions, including credit unions and cooperatives. While a final assessment is expected later in 2016, preliminary results suggest that large banks have had greater success in establishing and implementing, in part due a greater scope of credit operations and their previous engagement with Brazil's Green Protocol (developed by FEBRABAN).

The results of these initial surveys will serve as a baseline for possible future supervisory activities related to E&S policy implementation, and will also help to increase the transparency of financial institutions to their clients and shareholders. BACEN sees increasing transparency as a critical component of driving broader cultural change with the financial system, in terms of collective understanding of the importance of environmental priorities for economic growth and social well-being.

#### 4.2.3 Financing Brazil's INDC

Sustainable land use plays a central role in Brazil's INDC. To reduce emissions from land-use change and deforestation, Brazil intends to strengthen implementation of the Forest Code, aiming to achieve zero illegal deforestation by 2030 in the Amazon. In addition, 12 million hectares of degraded forests will be restored by 2030, for example, by enhancing sustainable native forest management systems through georeferencing and tracking systems. An additional 15 million hectares of degraded pasturelands will be restored by 2030 and 5 million hectares developed as integrated cropland-livestock-forestry systems (ICLFS). These are part of the Low-carbon Emission Agriculture Plan (ABC), which is the most important Brazilian strategy to drive its agribusiness sector towards a low carbon economy. Achieving these goals will require an unprecedented mobilization of the financial sector, building on existing market innovations and regulatory requirements (see Box 4).

#### **Box 4: Brazil Will Need Financial Innovation to Fulfil its INDC**

Meeting Brazilian INDC commitments means harmonizing agriculture and livestock production with restoration practices – a “low-carbon and zero illegal deforestation” agribusiness. To accomplish that, policy innovations will be necessary to mainstream private capital flows into this agenda, improving conditions to make direct long-term funding economically feasible for producers and financial markets.

Innovations that help producers generate incremental cash flows either through additional income or avoided costs as a result of the adoption of “low-carbon and zero illegal deforestation” agribusiness techniques are necessary for mainstreaming financial sector involvement. These additional cash flows are mainly associated with i) price premiums payed by clients for agricultural products or beef produced under responsible environmental practices; ii) an increase in market share due to access to markets where responsible environmental practices are valued; iii) payment for environmental services associated with restoration activities; iv) reduced costs associated with complying with environmental laws, particularly the Forest Code. A complex net of innovations is necessary for those additional cash flows to materialize, from policymaking and enforcement, development of new products and markets to specific financial market instruments that help channel private financial flows to the “low-carbon and zero illegal deforestation” agribusiness.

The Brazilian Forest Code (Law 12651/2012) is one important source of innovation. It creates Environmental Reserve Units (CRA) an offset mechanism designed for landowners to achieve environmental compliance. Furthermore, CRAs could potentially become the basis for a market to pay for environmental services.

Although interesting, mainstreaming involvement of the financial sector with this agenda is still a challenge. The challenge seems even greater for capital markets than for creditors, since the credit market is already financing the Brazilian crop plan – which is around US\$60 billion for 2016/2017 – and has certain social and environmental criteria, 1.7% of which is directed to the ABC Plan.

Since 2000, Brazil has achieved substantial progress in capital market development, including an increase in available financial instruments, better market infrastructure, and a diversified investor base. However, Brazil’s capital markets are still facing a number of challenges, especially its strong focus on short-term instruments. Macroeconomic instability favours a short-term focus, in which uncertainties surrounding business environment leads businesses to favour liquid assets to long-term investments. From the investor’s standpoint, there is greater aversion to risk, which leads to shorter-term and more secure investments, such as fixed income. In 2015, fixed income offerings accounted for 82% of total offerings in Brazilian capital markets, while equity totalled 18%. The Brazilian Capital Markets Association (ANBIMA) has been working with the Brazilian Securities Exchange Commission (CVM), the Ministry of Finance and the Brazilian Development Bank (BNDES) to strengthen Brazilian capital markets, eliminating some of the obstacles that prevent channelling private savings for long-term investments. Combining the capital markets with the sustainability agenda would also be an innovation.

Brazil could benefit from innovations of combining the financial and environmental agendas; learning from other experiences where a combination of market and command-and-control policies were put in place to advance environmental protection. On the fixed income side, Brazil has a strong pipeline of potential green bond issuances. Bringing private, long-term capital makes strong economic sense since public funds will not be enough to fund achievement of Brazil’s INDC.

### 4.3 Tackling Indonesia's Sustainable Palm Oil Challenge through Finance

#### 4.3.1 Indonesia's Agriculture and Deforestation Challenge – Palm Oil

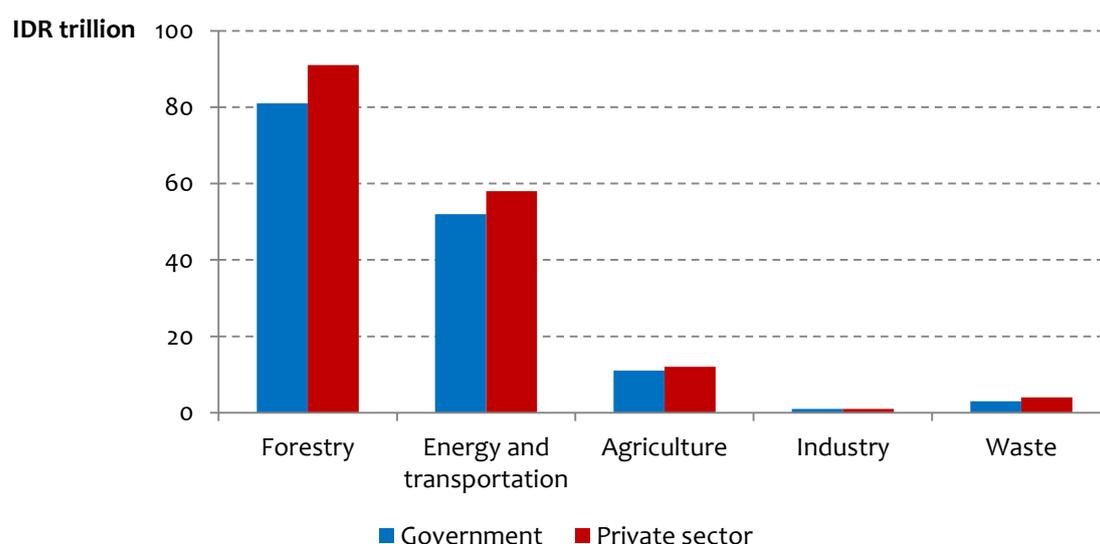
Indonesia is the world's largest producer of palm oil, accounting for 53% of global production.<sup>96</sup> Historically, growth in this nationally significant crop has led to widespread deforestation of tropical rainforest to supply land for palm oil plantations. Currently, palm oil expansion in Indonesia is largely horizontal, with little improvement in intensification, with lower yields per acre compared to countries such as Malaysia.<sup>97</sup> Total land area in Indonesia allocated to palm oil production (comprising immature and mature plantations) has increased significantly since 2000, reaching over 8 million hectares in 2014.

In 2015, Indonesia suffered one of its most devastating peat fire seasons on record, with 2.6 million hectares of land burning between June and October 2015. Driven in large part by unsustainable land-use practices associated with palm oil production (including the draining of peat land), the fires affected 43 million people and caused economic costs totalling US\$16.1 billion, equivalent to about 1.9% of GDP.<sup>98</sup>

Indonesia's government has implemented a broad range of economic and environmental policies to improve the sustainability of its palm oil industry, including developing a mandatory sustainability certification (ISPO)<sup>99</sup> and updating the palm oil concession granting processes. Indonesia's National Medium-term Development Plan (RPJMN) also seeks to balance the growth in agricultural commodity competitiveness with the need to meet the country's emissions reductions commitments of 26% by 2020 – ambitious targets that will require significant additional flows of finance.

Indonesia estimates that it needs US\$300-530 billion of annual investment to meet national priorities between 2015-2019, with funds being directed to critical infrastructure and environmentally sensitive areas such as forestry, agriculture, energy, mining and waste. A significant share of indicative costs related to sector contributions toward the targeted GHG emissions reductions are related to forestry – with over IDR91 trillion (US\$7 billion) needed to be mobilized from the private sector (Figure 11).

**Figure 11: Indicative Costs Related to Sector Contributions to GHG Emissions Reductions**



Source: UNEP Inquiry (2015), based on OJK data.

It is clear that mobilizing private finance will be key to addressing Indonesia's agriculture and forestry challenges. Indonesia's central bank along with its integrated financial regulator (OJK) have responded

to these challenges with a strategic Roadmap for Sustainable Finance – one of the world’s most comprehensive strategies for a sustainable financial system. Here, we assess how Indonesia has started to implement the Roadmap and the implications for sustainable land use.

### 4.3.2 Financial System Innovation for Sustainable Land Use in Indonesia

#### Risk Assessment

Indonesia’s financial regulations have highlighted the need to undertake environmental assessments (Amdal) since 1998. Environmental issues were linked to credit risk assessment with Regulation No. 7/2/PBI/2005 concerning assessment of Commercial Bank Asset Quality, which specifies banks’ obligation to consider the “efforts undertaken by the debtor in the framework of environment conservation”, dependent on a firm’s own assessment. Indonesia has also implemented a series of voluntary guidelines on financing for green projects. However, no mandatory measures were implemented up to 2014.

#### Implementing the Roadmap for Sustainable Finance

In 2014, OJK developed a Roadmap for Sustainable Finance, containing a comprehensive strategic plan for the promotion of sustainable finance in Indonesia. The goals of OJK’s sustainable finance programme are threefold:

1. To improve the resilience and competitiveness of financial service institutions and enable them to grow and develop in a sustainable manner through improved risk management and an ability to innovate and produce environmentally friendly products and services.
2. To unleash financing resources that will be required to achieve Indonesia’s pro-growth, pro-job, pro-poor and pro-environment developmental goals.
3. To contribute to the national commitments regarding climate change mitigation and adaptation and support the transition toward a competitive low carbon economy.

In the one and half years since the Roadmap was announced, OJK has started to implement several key themes, including capacity-building.

#### Tackling the Palm Oil Challenge: Voluntary Commitments and Pilot Projects

OJK has increased its focus on the sustainable palm oil financing challenge through voluntary commitments from the financial sector, and collaborative pilot programme in partnership with WWF. In November 2015, eight of the largest Indonesian banks set out commitments to OJK to enhance competencies in bring the Roadmap into practice, starting with a pilot programme focused on palm oil in January 2016.<sup>100</sup> The programme involves a series of technical assistance and capacity building workshops to identify ESG risk profiles, and to develop frameworks for ESG risks mitigation, as well as the development of a set of technical support guidelines.<sup>101</sup>

In addition to palm oil, OJK has set out its intention to establish new guidelines for banks and insurance companies to support sustainable agriculture, including through lending and the provision of new insurance agricultural insurance products. This project is expected to be launched in 2017.

Efforts to scale up finance to sustainable palm oil investments, including rehabilitation and intensification, face a number of key generic barriers in Indonesia, however. These include a lack of long-term credit for small- and medium-sized producers, asset-liability mismatches and a lack of robust mechanisms to bring financing through international capital market channels. In addition, efforts to improve the sustainability of bank lending will only address one financing channel for palm oil

plantations. Many large agribusiness companies are able to finance plantations from their own balance sheets, suggesting that measures targeted at capital markets and institutional investors may also be needed.

## 5 Lessons and Next Steps

Over the past decade, financial regulators have started to respond to a new dynamic between the financial system and the real economy – with environmental factors increasingly becoming acknowledged as new drivers of demand for financial services and new triggers of risk to financial assets.

Most of these measures are too new to evaluate impact. In the case of Brazil, however, central bank rules linking rural credit to environmental compliance did contribute to a substantial reduction in deforestation. What is clear is the critical signalling effect that many of these measures have had – not just towards institutions within the financial system, but to households and enterprises in the real economy.

What has been achieved in each of the case studies analysed in this report, is a confidence-building process. This has involved a series of often quite tactical steps taken by regulators in response to new and specific environmental problems facing the financial system. What is striking about the past year in particular is the recognition that the financial system needs to play its part in the wider transition to sustainable development. For example:

- Brazil: the combination of cross-compliance between bank lending and the implementation of policies to cut deforestation along with a greater prudential focus on socio-environmental risk provides a foundation for delivering sustainable land use as part of Brazil's INDC.
- California: the increased perception of risks attached to high-carbon assets has prompted a tightening of reporting requirements for insurance companies along with a request to divest from coal assets.
- France: the engagement of banks and investors is viewed as an integral feature of the France's Energy Transition law, focusing initially on reporting as a driver of strategic reflection and product innovation.
- India: new reporting requirements for green bonds are viewed as a tool to help mobilize the investment needed to scale up renewable energy, contributing to key economic, social and environmental objectives.
- Indonesia: building the capacity of banks to understand and support sustainable palm oil is a practical articulation of the strategic objectives of Indonesia's 10-year Roadmap for Sustainable Finance.
- UK: the assessment of the implications of climate change for the insurance sector flowed from the country's Climate Change Act, prompting greater attention to physical and transition risks.

From these and other examples reviewed in this report, it is clear that the new sustainability dynamic between the real economy and the financial system cannot be neatly compartmentalized into a series of linear relationships. The prudential focus on the implications of the climate transition may start with the goal of protecting financial institutions *from* environmental shocks flowing from the real economy. But the results can also prompt a reallocation of capital to the real economy, as the California case showed.

These case studies point to three areas for further policy design and action – the sectoral, the national and the international:

- **Sector:** Traditionally, sectoral policies to deliver sustainability (for example in agriculture and energy) have largely ignored the need to review financial system rules. These case studies point

to the complementary role that financial reform can play. Brazil's actions on rural credit and India's measures to scale up renewable energy could be considered by other countries with similar goals and challenges. Within the energy system, concerted efforts are now urgently needed to unlock financing for efficiency improvements in buildings: the tagging and reporting of loans to the energy performance of buildings is one step that could help create markets and enable enhanced risk profiling. More broadly, the potential for financial system innovation and reform could be considered as a routine factor in the development of key sector policies, with the development of sector-by-sector guidance, drawing on existing practice.

- **National:** A common lesson from these examples is the importance of placing specific financial measures within the wider context of a system-wide strategy at the country level. Financial reforms are made to address specific sustainability problems – for practical reasons of mandate and prioritization. But this can mean that the wider implications for other parts of the financial system are not fully considered. For example, the recent regulatory initiatives on the insurance sector in the UK and the US could have powerful lessons for the banking sector. Indonesia's Roadmap on Sustainable Finance is the clearest example of a system-wide approach, but the Netherlands has also launched a platform on sustainable finance, led by the central bank and involving key private sector actors. Roadmaps can be useful tools for consolidating the often fragmented and bottom up approaches. China's experience with its Green Finance Task Force shows how a system-wide initiative can highlight priority actions, and help embed these in country strategy (such as China's 13<sup>th</sup> Five-year Plan) and deliver specific market changes (such as new rules for green bonds). Roadmaps can also provide the framework for learning from experience and measuring progress towards a sustainable financial system. The national financing frameworks that are needed to help deliver both the SDGs and the Paris Agreement provide an opportunity to develop and launch roadmaps for harnessing the financial system.

*“In China, establishing a green finance system has become a national strategy. In the first quarter of 2016, China was responsible for around 50% of the world's green bond issuance.”*

Zhou Xiaochuan, Governor, People's Bank of China

- **International:** All these case examples were driven by specific priorities at the national (and subnational levels). But all have also highlighted the need and potential for international cooperation to share experience and develop consistent approaches to common global challenges. At the sector level, the International Solar Alliance offers one mechanism along with IRENA, which could help spread good practice on financial reform in the renewable energy arena; a similarly targeted initiative could also take forward the role of financial reform for sustainable land use in both tropical and temperate contexts. The FSB TCFD is another clear example, as is the emerging Sustainable Insurance Forum, a network of leading insurance regulators. The scope to build on existing frameworks is considerable, realizing the latent potential for these standards to contribute to sustainable development.<sup>102</sup>

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