ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

ORGANISATION DE COOPÉRATION ET DE DÉVELOPPEMENT ÉCONOMIQUES

3rd OECD GREEN INVESTMENT FINANCING FORUM (GIFF)

Focus on Asia: growing economies, developing financial markets, and green investment needs

Event Summary

13-14 October 2016 | Tokyo, Japan

The Paris Agreement on Climate Change at COP21 marks a decisive turning point in our collective response to climate change. Its entrance into force before COP22 in Marrakech within 12 months is remarkable, not only because the last major international agreement on climate action, the Kyoto Protocol, took 8 years. Each signatory to the Paris Agreement is now tasked with spelling out a credible roadmap for action consistent with the goal of holding the average temperature increase to well below 2°C above pre-industrial levels and pursuing efforts to limit the increase to 1.5°C. As countries formulate their strategies, it will be important to consider how policies can help investors seize the vast opportunities presented by the transition to a low-carbon economy and overcome investment barriers. Effective policies will unleash the transformational capacities and capital of the private sector and allow all actors, including investors, to plan with confidence.

Nowhere are the opportunities and challenges from this transition more evident than in Asia. Here, economies are growing at some of the highest rates in the world, urban populations are expanding rapidly, and green infrastructure investment needs are immense. Policy makers in Asia are increasingly examining ways to promote investment in high-quality, green infrastructure in order to achieve sustainable growth while ensuring the transition to a low-carbon economy. This Forum, therefore, organised by the OECD in association with the Asian Development Bank Institute,[1] was designed to promote dialogue and enhance understanding between a wide range of countries and institutions interested in mobilising private investment financing for low-carbon and climate-resilient infrastructure.

The discussion elicited a wide range of insight. The issues for discussion in Tokyo included: mobilising private investment in low-carbon and climate-resilient infrastructure; managing financial risks arising from climate change; challenges and opportunities for institutional investors; development of green bond markets; early stage equity finance; greening the traditional banking sector; the role of public financial institutions including public green banks; the potential for local and retail green finance; new and emerging actors in green finance; and policies and regulation to get on a low-emissions pathway.

Following a public scene setting from several experts, the rest of the event was then held under the Chatham House Rule. Thus the event summary and extended event summary presented here provide key points made by participants, without attribution.

Scene setting for the Forum

- 2016 was the year of green finance and, more than ever, the momentum is starting to transform ideas and proposals into transformative and tangible actions.
- The finance community must be adept at managing many short-term priorities yet still remain focused on long-term horizons, including the possible impacts of and the physical, transition, and liability risks resulting from climate change.
- Economic growth is needed for development. However the wrong infrastructure will fail to support the most vulnerable populations, and will also have large negative consequences including failing to arrest

[1] See www.adb.org/adbi

damages from climate change. Action to invest in high quality low-carbon and climate-resilient infrastructure, on the other hand, supports and strengthens both growth and development.
- As part of the Paris Agreement, the Nationally Determined Contributions (NDCs) provide a focus on national priorities of infrastructure, and all actors should align to support their financing and ultimate implementation, including increasing ambitiousness over time in line with longer-term objectives.

Session key points—organised by theme

On opportunities and challenges of the green finance transition

- The transition cannot be prevented because of the lack of new technologies, nor the lack of finance, but could instead be challenged because of where we put the capital and infrastructure, and whether the business models we create are sustainable and compatible with climate objectives
- The transition necessitates trillions of dollars and will not consist of incremental or marginal changes, but transformational ones: momentum alone is insufficient to deliver against goals like the Sustainable Development Goals (SDGs) or Paris Agreement.
- Renewable energy investments are now widespread, accessible, and affordable in almost every country. A great deal of learning is there to tap, scale up investment and replicate success.
- Decarbonisation of the power sector is easy in comparison to other sectors—need to ensure progress elsewhere is not missed or underrepresented. The transition necessitates a systematic approach, and financing and planning of investments need to be addressed to fully unlock benefits of green infrastructure.

On managing financial risks arising from climate change

- Three areas of climate-related risks faced by financial market participants are immensely important to measure, understand and respond to: physical, liability, and transition, but immensely hard to quantify with great degree of accuracy.
- Climate-related risks are often connected, correlated, difficult to assess, and their measurement suffers from a lack of robust and freely available data.
- Approaches to understand the effect of climate risks on company performance and investor confidence are only recently becoming major work streams in financial institutions
- Disclosure of asset risk exposure is one such method, but companies need to be asked the right questions to better grasp the scale of the situation and align disclosure regimes to investor analytical needs.

On mobilising the debt capital markets

- Growth of green bonds in several key markets could mean a rapid acceleration in their use globally, becoming a central instrument to finance green investment in the coming years.
- Overcoming national barriers and standardising global green bond practices remain a priority—but is there a "one size fits all" process?
- Discussion topics included: the need for increased harmonisation and standardisation, accurate and fair pricing, incentives for bond issuances, and fit with domestic financial market structures.

On role of the commercial and investment banking sectors in green finance, domestic and international perspectives

- Incentives are needed to ensure the available finance flows to the right places including, from the commercial bank perspective, to the right projects with the right risk parameters.
- Local commercial banks can complement the work of major banks, as they can unlock local community projects and smaller scale assets.
- There are arguments that regulation such as capital adequacy requirements through Basel III could better account for climate-related risks and align more closely with green financing principles.

On role of publicly capitalised green banks and public financial institutions in promoting investment in domestic green infrastructure

- GIBs play a key role in targeting local financing barriers and encouraging domestic markets by gap filling and improving access to finance.
- Regardless of where they are located, GIBs generally share the common objective of becoming and remaining a competitive, green and profitable model.
- Going forward, there is a large potential of GIBs to expand into developing countries, particularly large emerging economies in Asia like China or India.

On local green finance

- Local green investment is an often overlooked contribution to the finance architecture to deliver socio-economic development and the Paris Agreement.
- However, local green finance comes in many flavours and has the potential to potentially unlock large volumes of capital.
- Non-traditional funding such as community-based funding can be better at efficiently allocating capital while generating positive environmental and social impacts.

On the challenges and opportunities for institutional investors

- Signalling and implementing the integration of ESG considerations into long-term investment decisions is a growing priority for many institutional investors.
- Institutional investors explained the need to pay attention to their fiduciary duties and adherence to regulatory requirements at the same time as managing, often widespread, climate-related financial risks. They face challenges of balancing competing interests of diverse stakeholders.
- There is a need to shift away from infrastructure that is perhaps still perceived as less risky (e.g. brown-field), and better account for the wide range of benefits that green investment can offer.

On the role of international public finance to mobilising private investment and bridge financing gaps

- Private sector participation requires both direct cooperation from public actors like development banks and actions to help construct longer-term enabling environments and bankable projects through policy and technical assistance.
- Public financial institutions like development banks can take advantage of large leverage factors by co-financing private investment.
- Data availability and case studies are critical elements to understanding investment trends, needs, barriers and opportunities, particularly in light of scaling up green public-private financing.

On the role of financing green innovation and commercialisation

- Public support in research, development and deployment is an effective means to kick-start interest in early-stage technologies but, over longer time horizons, private sector support needs to ensure the commercialisation of more mature technologies.
- Green innovation comes from business opportunities—it is important to put it in the context of business strategies.
- A set of new business models and tools that are available to finance providers could generate better availability and management of information and thus foster better investment decision making.

Extended Event Summary

Day 1: 13 October 2016

Opening Remarks

Rintaro Tamaki, OECD Deputy Secretary-General

Mr. Rintaro Tamaki welcomed participants and highlighted that the GIFF aims to promote dialogue and enhance understanding between a wide range of countries and institutions interested in mobilising private investment financing for low-carbon and climate-resilient (LCR) infrastructure. Mr. Tamaki reiterated that this year's forum is particularly exciting for two reasons: the Paris Agreement would officially enter into force just a few weeks after the Forum before COP22 and brings together bottom-up actions with a top-down direction for the transition, and; in association with the Asian Development Bank Institute, we focus here on one of the regions with the greatest potential for change and opportunity, Asia, where the damages from or inaction to climate change in South and South-East Asia are high.

The ratification of the Paris Agreement is not the end, but rather the start of a process to ramp-up the ambition of action by all nations, and ensure action comes from all sectors of the economy and from all economies. Today is fortunately a different world from the days of the Kyoto Protocol, which took 8 years to enter into force: civil society, scientific, policy and, importantly, investors all understand better than ever the challenge and opportunities of action on climate change. Achieving zero net emissions in the second half of the century is the key long term goal of the Paris Agreement which will require the systemic transformation of infrastructure. As it will take decades to transform infrastructure, we need to get started immediately. The OECD Secretary General, Mr. Ángel Gurría, stated before that unlike a financial crisis, there is no bailout option with climate. Indeed, the Agreement itself calls for "making finance flows consistent with the pathways towards low greenhouse gas emissions and climate resilient development." Put simply, capital is not lacking—rather, deep pools of private capital are waiting to be mobilised if the right domestic conditions are created and if financial markets are progressively "greened".

Mr Tamaki reminded attendees that there is a lot of work to do and a lot of successes upon which to build efforts. This year was the first "year of green finance" and world leaders at the recent G20 summit (September 2016) underlined, for the first time, the need to scale up green finance. The forum therefore builds on this foundation and pioneering work from the OECD to provide an opportunity to discuss the great developments in green finance and see how even more can be done.

Scene-Setting: Remarks on Asian perspectives of financing action on climate

Dr. Bokhwan Yu, Deputy Dean, Asian Development Bank Institute (ADBI), provided an overview of the challenges facing Asia today, and that the two main policy issues covered by the ADBI are 1) environment and sustainability, and 2) infrastructure to promote economic development in Asia. For Asia to achieve sustainable growth now but also in the future, we must develop ways to stimulate economic growth without damaging the world around us.

Mr. Yoshihiro Seki, State Minister of the Environment, Japan, explained how the COP21 outcome in Paris means that, for the first time, all countries can participate in a fair framework on climate change. The Paris Agreement showed resolve by all countries to make a transition from fossil fuels to

a decarbonised economy and society. The Forum is particularly timely given that on 11 October 2016 the Japanese parliament started the ratification process of the Paris Agreement in order to formally approve it. With this going forward, Japan can be a leading figure in action on climate change.

Mr. Masatsugu Asakawa, Vice Minister of Finance for International Affairs, Ministry of Finance, Japan, called for this year to be a good chance to build on the salient successes from COP21. Mr. Asakawa's time as chair of the OECD's Committee on Fiscal Affairs since 2012 has reinforced his belief that in issues such as financing climate change, international cooperation is essential, and the huge risks created by climate change cannot be addressed without cooperation in terms of taking opportunities and sharing knowledge and information. Indeed, climate action is not only a matter of the environment but should also be seen from a financial viewpoint, thus finance ministers, regulatory agencies and central banks worldwide will play a part.

Dr. Bambang Susantono, Vice President, Asian Development Bank, explained the critical role that Multilateral Development Banks (MDBs) play in supporting member countries to translate sustainable development goals and the Paris Agreement into actions. Their role is key for ensuring the sustainability of infrastructure including its resiliency to climate change, and is important since in Asia and the Pacific where basic infrastructure is still being built in many places. This further provides an opportunity to leapfrog inefficient and greenhouse gas emitting development by greening investments. In his remarks, he highlighted the 2016 report from the Global Commission on the Economy and Climate[2] which showcases that growth, development and climate action are inextricably linked in that development is impossible without growth, but growth is pointless unless it lifts up the poorest. Climate change, on the other hand, threatens both growth and development; without ambitious climate actions, any gains from development could be reversed.

Mr. Karnam Sekar, Deputy Managing Director and Chief Sustainability Officer, State Bank of India, noted that the feature of global climate change necessitates a global response. In India, there is a simple but important expression which translates as leading by example. This is relevant at this Forum because, as others highlighted, we need action from a whole range of leaders: political, economic, and financial.

Dr. Ma Jun, Chief Economist, People's Bank of China, Co-Chair G20 Green Finance Study Group, began by highlighting the importance of green finance to the PBOC, and the wider focus is has in the economy as a whole, and his role as Co-Chair of the G20 Green Finance Study Group, proposed by China during its G20 Presidency. 2016 has been a busy year for green finance: as mentioned previously, it was the "year of green finance", and in the space of a few weeks in September and October, Dr. Ma described the many summits focusing on green finance to highlight the speed at which the topic is moving, and hopes the work continues to highlight challenges faced by many and, importantly and positively, the possible solutions needed to ensure all finance are some "shade" of green.

[2] See http://newclimateeconomy.report/2016/wp-content/uploads/sites/4/2014/08/NCE_2016Report.pdf

Plenary Roundtable Discussion: Opportunities and challenges of green investment to meet goals under the Paris Agreement and SDGs

Key points to session: i) urgency of the climate change challenge; ii) how the wrong infrastructure could remove or erode any margin for error that we have; and iii) what we know about enabling policies, the scale and colour of the pipeline and opportunities for green investment

Chair (Mr. Rt. Hon. Simon Upton): introductory remarks

Rt. Hon. Upton laid out the purpose of this opening roundtable: to get a feel for the opportunities and the challenges of green investment, particularly in light of meeting the goals as expressed in the Paris Agreement. Infrastructure investments, being long-lived, will determine any long-term trajectory and we will need to be conscious of whether this trajectory ultimately leads to zero net emissions of greenhouse gases as targeted in the Paris Agreement. This transition represents a huge opportunity, not only because the volume of investments required, but because we are looking at a very different economy, both in the physical nature and soft-wiring sense: from decarbonising power trains in transport to how software, how digital solutions change the way we live, to the way our cities evolve.

Mr. Upton reminded the audience that, although there will always be winners and losers in such transitions, governments should ensure that new technologies and new business models can penetrate to the extents needed. Policies, for instance, and their alignment to the goals, as OECD analysis suggests could be one of the biggest barriers to this. What we do know is that the transition cannot be prevented because of the lack of new technologies, nor the lack of finance, but could instead be challenged because of where we put the capital and infrastructure, and whether the business models we create are sustainable and compatible with climate objectives. In many cases, incumbents will lobby governments for their business models, but they will have to decide whether they want to be part of the future or not. We also know that everyone is affected, yet modelling suggests Asia, East Asia, South Asia will be particularly vulnerable by changes in the climate. At the same time, the opportunities are particularly bigger because of the scale of investment that is going to take place anyway. Since the Forum is in that part of the world, the question is, will the investment be green or not?

Firestarters:

- ***Ms. Cecilia Tam, Special Advisor, Asia Pacific Energy Research Centre***
- ***Dr. Ali Izadi, Head of Japan, Bloomberg New Energy Finance***

A multi-sectoral and multi-country approach is needed. Energy efficiency and other investments outside of the energy sector also play an important role in understanding where we need to focus green finance. Indeed, even within renewable energy investments, there will also be large differences within and across the countries in the APEC region, for instance: China sees a mix of wind, solar and hydro; the US and Oceania mainly wind and solar, and; mainly solar in North East Asia. Development of clean energy in Asia has huge potential, but often faces numerous barriers and, depending on the country, can be issues linked to affordability, energy access, and whether coal is still the preferred energy choice. To get financing moving, the Forum was reminded that we also need to approach the technical and institutional capacities of economies in order to help transform the utility business models, as well as shift institutions towards accelerating local green financing, particularly in the developing regions of developing economics.

The clean energy investment landscape is dynamic and evolving. The decoupling of global emissions of greenhouse gases and the economic valued added from goods and services (e.g. gross domestic product, GDP) can be linked to the shift in finance to clean energy. Last year, USD 300 billion annual was invested in renewable energies despite the lowest commodity prices in almost a decade. Wind and solar technologies are spread now all over the world, and attract more investment than other energy technologies in many regions: China is the largest such market, but the cheapest technologies are in the Middle East and North Africa (Morocco for wind, Dubai/Abu Dhabi for solar).

Paris Agreement means every country has a chance to commit to stronger targets as costs fall. The power sector is the easiest to decarbonise, and we are seeing some good progress on energy storage, particularly batteries. The five year review of NDCs could unlock stronger targets from improving technology economics. Analysis by BNEF of power sector finance needs to 2040 showed that 80% of the USD 11.4 trillion investment in energy generation will flow to zero emission technology. But to get on a pathway compatible with 2°C another USD 5.3 trillion is needed, so what is needed to get there?

Panellist interventions and discussion

- ***Mr. Shigemoto Kajihara, Vice-Minister for Global Environmental Affairs, Ministry of the Environment, Japan***
- ***Mr. Iain Henderson, Programme Officer, United Nations Environment Programme (UNEP)***
- ***Ms. Annika Rosing, Head of Department for Growth and Climate, Nordic Council of Ministers***

Changes in how financial markets approach green finance are happening at a greater scale and speed than ever before. There are valuable new business models, new institutions, and new products pushed forward by a wave of new financial tools and instruments, including better disclosure and agreements between investors, regulators, policy makers. These have the capacity to positively or negatively reshape the contours of the financial system as a whole. It is clear to the panellists that the alignment of financial systems in 2016 with the objectives, challenges, and scale of sustainable development, means that green finance could soon become a critical, importantly mainstreamed, element to all aspects of financial market operations. In this respect, a "quiet revolution" is taking place.

Cooperation within and between countries is important to unlock all financing sources, including the support of new entrants. A reference point given by the panel was the success of the Financial Stability Board and the G20 in 2016, who for the first time decided to develop a global financial system that takes greater account of environmental issues. This asks for closer alignment between public and private participants, inclusion of sustainability into the core of operations among central banks, regulators, stock exchanges, commercial actors, investors, industry, and civil society. New entrants in green finance, such as local banks, can help support finance in local communities (see Section 9), if they are supported with information on and capacity to assess new technologies and options. Japan introduced a platform for the disclosure of environmental information. The Japanese Green Fund also demonstrates new funding models to crowd-in private finance sources by mobilising over nine times its initial financing from private sources.

Governments can play an important role. In Nordic countries, for example, the relationship between economic growth and emissions of GHGs has been broken by key drivers such as regulatory

responses and regional cooperation initiatives between national and municipal governments. Stability and predictability of policies are important in making the transition happen.

The green finance momentum is still not sufficient to deliver the objectives as laid out in the Paris Agreement and Sustainable Development Goals. In his opening remarks, Mr. Upton explained that the issue here is that the transition will not consist of incremental or marginal changes, but transformational ones. Trillions of dollars will be invested anyway, and the future will be different. We can either invest these trillions in ways that mitigate and help nations adapt to the locked-in effects of climate change, or invest in a business-as-usual sense and suffer the potentially devastating consequences.

Session 4: Plenary Roundtable Discussion: Managing financial risks arising from climate change

Key points to session: the Bank of England identified three types of risks that climate change may pose to financial markets (physical, liability and transition). How are these risks emerging in Asia? How can they be addressed and managed (e.g. climate disclosure and decarbonisation)?

Chair (Mr. Michael Sheren, Bank of England, Co-Chair G20 Green Finance Study Group): introductory remarks

Mr. Sheren began by explaining that the G20 Green Finance Study Group understands how important risk analysis is to the transition to a low-carbon economy, and that the session will focus on these. The Bank of England's Governor, Mark Carney, describes three areas of climate-related risks faced by financial market participants: physical, liability, and transition. Quantifying these to any great degree of accuracy requires serious analysis but is critical to understanding the implications of these risks on the stability of the financial system and essential for moving forward and addressing climate change, such as: attributing physical damages to changes in the climate (intensity and frequency of additional damages); quantifying investor exposure to fossil fuel assets and its associated risk, or; determining the future liabilities of insurers.

Panellist interventions and discussion

- ***Mr. Ben Caldecott, Director, Sustainable Finance Programme, University of Oxford***
- ***Brian Cahill, Managing Director, Moody's Investors Service & Task Force on Climate-related Financial Disclosures (TCFD)***
- ***Mr. Mitsugi Sumiya, CFO, AXA Life Insurance Co.***
- ***Ms. Mariko Kawaguchi, Managing Director, Research Division, Daiwa Institute of Research***
- ***Mr. Kazuo Matsushita, Professor Emeritus, Kyoto University***

Climate-related risks are often connected, correlated, difficult to assess, and their measurement suffers from a lack of robust and freely available data— if you do not measure risk, you do not understand it, and so are not going to be able to respond to it. There are a great number of interconnections between financial risks associated to climate change. Presently, they are mispriced or often ignored. But the panel agreed that it is perhaps understandable why financial institutions find it difficult to tackle these risks and price them accordingly, because the data are "live" and temporally dynamic, nonlinear in nature (complex and trendless), without a robust track record, interdisciplinary and, over recent years, the risks appear to be accelerating in the scale of their impacts. Companies

right now tend to be taking different approaches to measuring these risks and could benefit from bottom-up assessments of their asset vulnerabilities rather than from the top-down.

Achieving a better alignment of company disclosure regimes to investor analytical needs would greatly improve the provision of quality and valuable data. The panel suggested that while the current suite of disclosure methodologies are a decent first attempt at assessing portfolio risks but improvements are needed. They lack standardisation and quality, are relatively slow moving processes, and thus cannot provide a full picture of investment portfolios. The TCFD has discussed principles of full disclosure, welcoming standardised and consistent analysis frameworks for disclosing scenarios of climate related risks across regions, sectors, and time horizons. The challenge will be to bring together many datasets together which, as the panel suggests, exist already to some extent but are held by many bodies in proprietary and non-proprietary spaces but lack a global initiative to host it all in one transparent and credible location.

Approaches to understand the effect of climate risks on company performance and investor confidence are only recently becoming major work streams in financial institutions. The implications, or degree of impact, on companies' assets from these climate or environmental risks unsurprisingly vary by sector, but most sectors will see some degree of impact to their businesses in the medium-term with important implications, including credit implications, that the financial and international community need to understand. High quality and easily accessible and useable data and information are fundamentally important. The Paris Agreement, and associated national legislation and targets, will have profound medium- to longer-term consequences for sectors which are carbon intensive or have difficult "exit" strategies, and so will lead to far reaching investment opportunities and investor risks.

Japanese investor approaches to tackling climate risks is picking up speed. A new framework (consisting of the *2014 Stewardship Code* and the *2015 Corporate Governance Code*) has triggered both institutional investors and also corporations to focus more on environmental, social and governance (ESG) issues. When the Government Pension Investment Fund signed up to the UN Principles for Responsible Investment, it triggered the Japanese investors market to do the same. Likewise, the Japanese sustainable investment market is also speeding up: in 2014 it was listed as YEN 1 trillion (ca. USD 10 billion) but now is more than YEN 26 trillion / ca. USD 260 billion. In response to this increasing governance, Japanese corporations are now developing long-term strategies as they start to produce more integrated reporting and ESG information disclosures.

Session 5: Launch of the OECD Centre on Green Finance and Investment

Rt. Hon. Upton, OECD Environment Director, and Mr. Adrian Blundell-Wignall, Special Advisor to the OECD Secretary-General on Financial and Enterprise Affairs, announced the launch of the new OECD Centre on Green Finance and Investment.[3]

Investment in the green economy needs to take place on a far greater scale over coming decades if we are to achieve the Sustainable Development Goals and the ambition of the Paris Agreement. In 2016, the OECD has taken a major step to support these objectives by establishing a Centre on Green

[3] See the Centre for Green Finance and Investment, www.oecd.org/cgfi

Finance and Investment. The Centre's mission is to help catalyse and support the transition to a green, low-emissions and climate-resilient economy through the development of effective policies, institutions and instruments for green finance and investment.

Leveraging the OECD's policy and economics expertise, the Centre will provide a global platform for engaging with key players and harnessing the marketplace intelligence of private sector partners. It will enable knowledge exchange among leaders from the private sector, government and regulatory institutions, academic and civil society. The OECD Centre will develop rigorous, innovative and compelling analysis and practical recommendations, organise high-impact events, and engage effectively in the wider policy debates and arenas, helping to support the rapid scaling-up of green investment and financing flows on a scale commensurate with the challenge.

A number of participants expressed their support for the Centre and the OECD's work on green finance and investment.

Session 6: Green Bonds: Mobilising the debt capital markets

Key points to session: The role, state and trends of green debt capital markets in Asia. What potential is there for scaling up the development of green bond markets and mobilising capital from institutional as well as retail investors? What policy actions are underway to scale up green bond markets and what is the most efficient and effective way forward?

Chair (Mr. Nicholas Pfaff, Senior Director, International Capital Markets Association, Secretary to the Green Bond Principles): introductory remarks

The market for green bonds has seen a significant evolution in the last few years, yet still only represents a very small share of the overall bond market issuance (less than 3%). Several countries are taking the lead on building the green bond market, and China has arrived (spurred also by the G20 Green Finance Study Group during China's presidency) as a leader alongside the more traditional issuers such as in Europe, the US and supranationals like multilateral development banks.

An important stage to the future of green bonds is to develop a strong set of widely accepted and employed principles, standards and taxonomies (e.g. what is included and what is not), transparency of reporting processes, and independent due diligence to review, verify and audit the use of bond proceeds. In order to mobilise the market, there needs to be alignment of processes to design and monitor green bonds, with the proper incentives to encourage their use and overcome barriers which exist domestically and internationally. Both sides of which are discussed in this session.

Panellist interventions and discussion

- ***Mr. Christopher Kaminker, Economist, OECD***
- ***Mr. Ma Jun, PhD, Chief Economist, People's Bank of China, Co-Chair G20 Green Finance Study Group***
- ***Mr. Tomas Werngren, President and CEO, Kommuninvest Cooperative Society***
- ***Mr. Hiroshi Ozeki, CIO, Nippon Life Insurance***
- ***Comment: Ms. Teiko Kudo, Director and Unit Leader, Growth Industry Cluster Department, Sumitomo Mitsui Banking Corporation***

- ***Comment: Mr. Hiroyuki Kato, Director General, Treasury Department, Development Bank of Japan***
- ***Comment: Mr. Lars Strøm Prestvik, Chief Lending Officer, Kommunalbanken Norway***

Growth of green bonds in several key markets could mean a rapid acceleration in their use globally, becoming a central instrument to finance green investment in the coming years. A recently presented OECD study (in collaboration with Bloomberg, Vivid Economics and MIT) estimates that the low-carbon bond market could grow from approximately USD 100 billion globally in 2016 to USD 620–720 billion annually by 2035 in China, Japan, EU and the US. This means that, in only these regions, bonds could be a majority source of debt finance for low-carbon investment needs (perhaps over 55% of estimated debt needs). Panellists also discussed a need for "shading" of green (such as suggested by CICERO) because of the incorrect assumption in emerging markets that green bonds only fund technologies to reduce greenhouse gases and account for broader remits of investors and issuers.

Overcoming national barriers and standardising global green bond practices remain a priority—is there a "one size fits all" process? Each country and region has its own circumstances and needs for developing green bonds, with various public and private actors involved across investor and issuer perspectives. Panellists discussed a number of the key barriers to green bond market development, including:

- *Need for increased harmonisation and standardisation*. Discussions focused on the trade-offs of having more certification or labelling but maintaining some level of issuance flexibility to encourage wide participation. Panellists also discussed what impact the limited expertise and capacity in global independent verifications have on the green bond market: where the low capacity may push up prices for small transactions, meaning aggregation could be a possible solution. Green bond index products were also highlighted as important to mainstreaming rating methodologies and achieve more accurate ratings.
- *Accurate and fair pricing*. Some panellists agreed that the capital market may give the same price for green bonds as for ordinary bonds, meaning the investor may get the "green for free", despite additional costs faced by issuers for monitoring purposes. The panellists argued that it is important to consider who captures the most value from green bonds, noting that lower interest rates are more attractive to issuers yet higher pricing is more attractive to investors.
- *Incentives for issuances of and investment in green bonds*. Panellists discussed the role of incentives for bond issuances, suggesting that it's not a trade-off between normal bonds and green, rather green bonds broaden the investor base and reputational gains /social recognition from such issuances often have large and valuable spill-over effects. Many private sector actors ask for more from the national governments to encourage market developments such as introducing tax benefits or guaranteeing less credible issuers. From an investor perspective, a panellist suggested that creating green investor certification would promote more investment in green bonds.
- *Fit with domestic financial market structures*. Panellists suggested that the potential demand for green bonds could be influenced by the domestic dependence on debt. Japan, for instance, may be dependent on bank loans and liquidity, and its high environmental standards and energy efficiency rates are some of the highest among OECD countries, so any incremental investment in energy efficiency measures are quite small so developers may not have enough size to access the capital market directly for funding. The Chinese market for green bonds is

growing fast (already accounting for 40% of global issuances in the first 9 months of 2016). This represents a case in which the government can play an important role in helping the development of the nascent green bond market. However, there are a number of actors who each have their own guidelines to adhere to meaning there may be an opportunity to streamline such processes.

Session 7: The role of the commercial and investment banking sectors in green finance, domestic and international perspectives

Key points to session: How is the banking sector, which plays a dominant role in financial markets particularly in Asia, working to mainstream green finance from the risk and return sides of the equation (e.g. through ESG stress tests, green lending and creating platforms and opportunities for investors across the capital structure and asset classes)?

Chair (Mr. Adrian Blundell-Wignall, PhD, Special Advisor to the OECD Secretary-General on Financial and Enterprise Affairs, OECD): introductory remarks

A common discussion topic is that there exists enough money to potentially invest in green technologies, but the pipeline of investment is not enough, driving up prices and driving down returns. As such, the commercial banking sector plays one of the most important roles in financing a green transition, as it needs to balance risks and returns across jurisdictions, understand demands for new technologies, adapt to different stages of investment participation, and include different actors such as investment banks or private equity providers. This session therefore takes a domestic and international green finance from a commercial bank perspective.

Panellist interventions and discussion

- ***Mr. Karnam Sekar, Deputy Managing Director and Chief Sustainability Officer, State Bank of India***
- ***Mr. Yuji Matsumoto, Managing Director, Merchant Banking, Goldman Sachs***
- ***Mr. Koji Omachi, Managing Director, Citigroup***
- ***Mr. Amane Yamazaki, General Manager, Social & Environmental Risk Assessment Office, Structured Finance Division, Bank of Tokyo-Mitsubishi UFJ***
- ***Comment: Ms. Mariko Kawaguchi, Managing Director, Research Division, Daiwa Institute of Research***

Incentives are needed to ensure the available finance flows to the right places including, from the commercial bank perspective, to the right projects with the right risk parameters. Panellists discussed examples in Asia which included government utilities buying power from renewable energy projects at a higher rate, starting a virtuous cycle of further deployment and associated cost reductions to a level where large incentives are no longer needed. Panellists called on active involvement and cooperation from governments, regulators and the commercial banks to ensure new technologies become commercially viable, and encourage deal flow and a pipeline of bankable projects. Commercial banks in many regions have had to find some innovative refinancing arrangements because of the tenor mismatch between short-lived commercial loans and the needs from upfront capital-intensive renewable energy assets.

Local commercial banks can complement the work of major banks, as they can unlock local community projects and smaller scale assets. However, they need technical information and assistance to channel engagement at the individual level. The Japanese Ministry of Environment have made such guidelines on how to make loans or how to evaluate loans for solar and wind and micro hydro and so on, which actually accelerated the loan programmes for local renewable energy projects. Local buy-in also helps support transformative strategies of changing people's attitudes, and in many cases such projects can offer returns better than savings banks. While not a mainstream concept as such, panellists cited examples of local ownership from Austria, Denmark, India, Japan, and US State Vermont. In Germany the largest class of asset owner in energy is actually private households and individuals.[4]

Regulation such as capital adequacy requirements through Basel III could better account for climate-related risks and align more closely with green financing principles. It was argued by panellists that in order to accelerate the transition, not only new loans but the existing loan portfolio has to become greener (and therefore less exposed to transition risk). This change could come from reviewing the regulatory framework. If the loan portfolio becomes greener, the risk of the financial institution lowers, and so could theoretically require a smaller capital requirement than those stipulated in financial regulation (such as *Basel III* and *Insolvency II*). Rating agencies have a key role to play in this debate on measuring climate risks of portfolios, but this will require predictability of policies in the future. A number of participants suggested that this is an area OECD could start to investigate.

Session 8: The role of publicly capitalised green banks and public financial institutions in promoting investment in domestic green infrastructure

Key points to session: How green investment banks and other domestic public financial institutions are catalysing private investment in domestic green infrastructure. What are the current barriers facing the expansion of GIBs?

Chair (Mr. Robert Youngman, Team Leader for Green Finance and Investment, OECD): introductory remarks

This session discusses the role of green investment banks (GIBs) in the low-carbon transition. GIBs are publically capitalized financial entities with a mandate to support and facilitate private investment into green technologies, and could become an important model for governments to consider as they try to meet energy and climate targets. Many countries and sub-national regions, which typically do not already have national development banks, have now established GIBs. They are a relatively new institution, but one that the OECD feels has a great potential going forward as they provide an independent, transparent and responsive role in enabling domestic (and now sometimes international) financial markets. The Green Bank Congress was convened on the previous day in Tokyo back to back with the GIFF, and a panellist provided its summary.

Panellist interventions and discussion

- ***Mr. Takejiro Sueyoshi, CEO, Green Finance Organisation, Japan***
- ***Mr. Gavin Templeton, Head of Sustainable Finance, U.K. Green Investment Bank***
- ***Mr. Bert Hunter, CIO, Connecticut Green Bank***

[4] See also Session 9.

- ***Mr. Kevin Holmes, Chief Governance and Strategy Officer, Clean Energy Finance Corporation***
- ***Mr. Syed Ahmad Syed Mustafa, CEO, GreenTech Catalyst Sdn Bhd, Malaysia***
- ***Comment: Ms. Andrea Colnes, Coalition for Green Capital***
- ***Comment: Mr. Douglass Sims, Natural Resources Defense Council, Green Bank Network***

GIBs play a key role in targeting local financing barriers and encouraging domestic markets by gap filling and improving access to finance. The panellists discussed the use of a large suite of instruments available to the GIBs depending on the build of project capital or what sector or investment barrier they target, traditional equity or commercial rate/concessional debt, co-investments, risk guarantees or insurance (e.g. first-, second-loss), individual project lending or programmatic, aggregation of assets or warehousing to scale up.

Regardless of where they are located, GIBs generally share the common objective of becoming and remaining a competitive, green and profitable model. They are active in both project delivery and supply sides of the market. Innovative methods need to be explored including making impact and transformational investments, using green balance sheets concepts to examine the impacts of both assets and liabilities of their portfolios, or enabling multilateral climate funds to invest in green banks. Panellists agreed that they have to ensure they provide predictability for investors, yet gain buy-in from policy makers and have the flexibility to adjust to local needs. It was also agreed that it is important for GIBs to meet the "additionality" objective, that is crowding-in private investment or unlocking finance that would not have occurred otherwise.

Going forward, there is a large potential of GIBs to expand into developing countries, particularly large emerging economies in Asia like China or India. With their relatively unique structure (in that they are not banking institutions), panellists agreed that green banks can complement and sit alongside existing national and multilateral development banks with a more focused mandate on green infrastructure financing. Collaboration among the GIBs was seen as important, where resources and existing operational experiences are often limited (e.g. less than five years).[5] Discussants also pointed to the importance of having increased interactions and fostering better relationships with outside organizations such as the OECD and others who attended the Forum.

Day 2: 14 October 2016

Special remarks: Decarbonising the transport sector.

Mr. José Viegas, Secretary-General, International Transport Forum

Mr. Viegas reminded the Forum that transport must be a priority for green financing, as it is responsible for about 26% of energy-related emissions of greenhouse gases and a greater amount of air pollutants in urban areas. Sustainable transport is a necessary component and enabler of sustainable development. It is a complex industry and so necessitates a systematic approach, covering jobs and wider economic market developments, producers and consumers of transport services, and important social development. He provided two examples to highlight big changes are coming to transport: shared urban mobility solutions simulated in Lisbon, and driverless vehicles.

[5] See, for instance, the Green Bank Network at: www.greenbanknetwork.org

Mr. Viegas reiterated the importance of good regulation in a world of very low transportation costs, such as from electric and autonomous vehicles, because without it, we risk massive traffic congestion in cities. For instance, today with European prices, the cost of driving an electric vehicle per kilometre is between six and eight times lower than the diesel car. So the propensity to have more cars running is very large and is a huge potential challenge to sustainable development, particularly when ownership is low in many developing countries. Investment will need to address these issues (e.g. better planning of infrastructure, institutional organisations, safer transportation, cleaner fuels), and business models of financing transport including revenue generation may be very different in 10 years' time.

Session 9: Local green finance (ADBI session)

Key points to session: The focus is now shifted to a more micro-level, community involvement and grass-roots type of sustainable investment activities in regions. Crowdsourcing and micro investing: an interesting subject particularly in Japanese / Asian context.

Chair (Mr. Matthias Helble, Research Economist, Asian Development Bank Institute): introductory remarks

Low carbon or green assets financed by local communities is a topic which is gaining ground in many regions of the world. Earlier in the Forum discussions, examples of locally-owned community projects were given in a wide range of countries, from Austria to Japan and India. Indeed, in Asia, there is a great scope of potential to develop more such projects given it can unlock new sources of rarely accessed finance, support national targets with bottom-up action, address asymmetric information barriers about the benefits of action, and deliver important "buy-in" from communities who become directly interested parties. The Panel discussed many of these issues particularly in a Japanese/East Asian context.

Panellist interventions and discussion

- ***Mr. Naoyuki Yoshino, PhD, Dean, Asian Development Bank Institute***
- ***Ms. Anissa Roberts, Director of Strategic Finance, SunCulture***
- ***Mr. Hoseok Kim, PhD, Senior Research Fellow, Korea Environment Institute***
- ***Mr. Toshiro Nishizawa, Project Professor, University of Tokyo***
- ***Mr. Suk Huyn, PhD, Research Fellow, Korea Capital Market Institute***

Local green investment is an often overlooked valuable contribution to delivering socio-economic development and the Paris Agreement. Indeed, it can target a group of small-scale projects that otherwise might not be financed because of various project barriers: local currency risks, inhomogeneity, small-scale, lack in creditworthiness of the proponent/investor (groups of individuals in some cases), or bespoke methodologies and credit metrics need to be developed to ascertain individual circumstances, financial viabilities, and gather data. Some examples given included: individuals investing and rehabilitating old and unused hydro power plants in Japan following the devastating tsunami of 2011; financing sustainable agriculture technology in small farms in Kenya; and community-based financing for a lake rejuvenation project in India. It was argued that in some cases non-traditional finance providers are better positioned than banks to efficiently allocate capital while generating positive environmental and social impacts.

Local green finance comes in many flavours but has the potential to unlock large volumes of capital. Panellists discussed local financing models ranging from large-scale options, supported by actors like institutional investor, aggregated groups of individual investors, or micro-scale, individual homes and families. Given the challenges faced by the latter options, government intervention might be needed to support these projects (such as paying subsidies above market rates for power). Local finance to green projects can also complement or relieve constrained local public fiscal budgets.

Session 10: Challenges and opportunities for institutional investors

Key points to session: What role for institutional investors in Asian green finance? What is the state of institutional investment in green finance in Asia and how is it different from elsewhere? What barriers specific to investment in projects and corporates are most acute and how to overcome them? What emerging investment channels hold the most promise?

Chair (Ms. Emma Howard Boyd, Chair, U.K. Environment Agency): introductory remarks

Institutional investors manage a vast volume of the world's wealth. Mobilising just a small percentage of this could make a significant difference to financing climate action. However, while there has been progress in the last decade to mobilising institutional investor participation in green finance, there are a number of key barriers still outstanding (such as the lack of internal capacity or mandates to carry out green infrastructure investments). This session discusses the current state of play, in Asia and elsewhere, and describes some of the paths forward.

Panellist interventions and discussion

- ***Mr. Hiro Mizuno, CIO, Government Pension Investment Fund, Japan***
- ***Mr. Asger Garnak, Chief Advisor, Climate and Energy Finance, Danish Ministry of Energy, Utilities & Climate***
- ***Ms. Lila Musser Preston, Partner, Generation Investment Management***
- ***Mr. Rajiv Sharma, PhD, Research Director, Global Projects Center, Stanford University***
- ***Comment: Mr. Timothy Bishop, Senior Advisor, Directorate for Financial and Enterprise Affairs, OECD***

Signalling and implementing the integration of ESG considerations into long-term investment decisions is a growing priority for many institutional investors. ESG considerations are an important element of ensuring the long-term sustainability and profitability of assets under management. However, panellists agreed that ESG and long-term investment are still too often seen as being two distinct strategies. The UN Principles for Responsible Investment has been an important actor to ask investors questions on how they integrate both, and the initiative now has signatories with some USD 60 trillion of assets under management.

Institutional investors explained the need to pay attention to their fiduciary duties and adherence to regulatory requirements at the same time as managing, often widespread, climate-related financial risks. Duties including, e.g. maintaining profit for shareholders and complying with capital risk requirements, should also be the same for sub-contracted, external fund managers who often play a large role in many institutional investors. Some investors are interpreting their fiduciary duty very narrowly while some pension fund trustees, however, believe fiduciary duty will be breached if climate risk is not properly taken into account. Panellists discussed the possible value of "broadening" the fiduciary requirements universally beyond short-term profit-making to better account for

investments that make financial sense in the long-term under the current (and possible future) investment climate. This could help manage ESG and long-term climate-related investment risks which, as Session 4 discussed at length, can put at jeopardy investments in assets worth many billions or trillions of dollars.

Institutional investors are facing challenges of balancing competing interests of diverse stakeholders. There are questions about how to treat a fossil fuel company also investing in clean energy, or how a pension fund manager should balance the interests of older beneficiaries who will soon receive pensions and younger beneficiaries whose entitlements are exposed to long(er)-term risks.

There is a need to shift away from infrastructure that is perhaps still perceived as less risky (e.g. brown or high-carbon infrastructure), and better account for the wide range of benefits that green investment can offer. The panel discussed the trade-off between cost and risk from a long-term investment perspective, noting that cost is becoming less of an issue with renewable energy, yet risks remain high with these (commercially viable) technologies. Targeting developing countries, where the need is greater, still remains a challenge given inherent risks in doing so (development, technology, or policy/regulatory) and difficulties in building viable project pipelines. Panellists agreed there is a need to understand better the underlying economic reasons for many developing countries to opt for dirty technology rather than transition to clean, including for instance, the role of fossil fuel subsidies. They also suggested more work is needed to de-risk green investments, finding appropriate financial engineering solutions to mitigate these risks, or share and apportion them to actors more capable of handling them, and investigate alternative investment models such as aligning with public-private partnerships linked to asset opportunities or co-investment platforms.

Special remarks: Green Infrastructure Funding in Developing Asia

Dr. Bokhwan Yu, Deputy Dean, Asian Development Bank Institute

For developing countries, with constrained public budgets, there is a need for other sources of funding. These funds may come from other public sources, like development loans or aid from Multilateral Development Banks (MDBs) like the Asian Development Bank, or by exploring new opportunities involving cooperative private financing such as public private partnerships (PPPs).

Such cooperative financing is an important element to encourage the mobilisation of private investment to reduce burdens on domestic public spending. This is especially true for investments in green infrastructure where private actors in developing countries can face numerous barriers (like a lack of proper regulation and bureaucracy processes, or insufficiently clear policy frameworks). Green infrastructure is important because it allows countries to achieve economic growth without damaging the world around us. Both of these objectives are centrally important to Asian countries.

The ADB and World Bank for instance have both played important roles in extending support through concessional loans, enhancing government capacities, and providing other technical assistance to shift project developments away from environmentally damaging projects, like fossil fuels, towards cleaner sources of renewable energy. Solar power, unlike coal, does not need large infrastructure investments to increase energy access. For example, in Bangladesh 16 million people have gained access to energy from public efforts including ADB and private sector working together.

Session 11: International public climate finance: Mobilising private investment to bridge financing gaps

Key points to session: What gaps in low-carbon and climate-resilient infrastructure investment are likely to persist, particularly in Asia? How can MDBs, climate funds, Development Finance Institutions and other sources of international public climate finance work with governments to address these gaps and mobilise private, low-carbon investment to meet a 2-degree target? How can concessional public climate funding be used effectively to develop a pipeline of 'bankable' projects and attract private finance? What obstacles stand in the way and how can they be overcome? What new forms of public-private collaboration are needed?

Chair (Mr. Haje Schütte, Head of the Statistics and Development Finance Division, Development Co-operation Directorate, OECD): introductory remarks

The UN expects that implementation of the Sustainable Development Goals in developing countries will require infrastructure investment of perhaps USD 3.9 trillion per year,[6] compared to the current annual level at USD 1.4 trillion. The private sector will be expected to fill the vast majority of this gap. But the quality of the infrastructure is important, as is the expected returns that can be made on the new infrastructure. The shift of money from the North to the South (where there is an investment gap and potentially profitable investments can be identified) necessitates new business models built on trust and cooperation. In light of this, this panel therefore explores a major issue in the delivery of the overarching Paris Agreement and the Sustainable Development Goals by employing international public finance to mobilise increasing volumes of private capital.

Panellist interventions and discussion

- ***Ms. Preety Bhandhari, Director, Climate Change and Disaster Risk Management Division, Sustainable Development and Climate Change Department, Asian Development Bank***
- ***Mr. Brooks Preston, Vice President for Investment Funds, U.S. Overseas Private Investment Corporation***
- ***Ms. Kaori Miyamoto, Senior Policy Analyst, Development Co-operation Directorate, OECD***
- ***Comment: Mr. Tsutomu Sato, Deputy Director General of New Energy and Power Department II and Director of Global Environmental Division, JBIC***
- ***Comment: Mr. Satoshi Shigiya, Director, Office for Climate Change, Global Environmental Department , JICA***

Private sector participation requires both direct cooperation from public actors like development banks and actions to help construct longer-term enabling environments and bankable projects through policy and technical assistance. Panellists were reminded that development banks are essentially demand-driven entities and require developers to apply for them for support. At the same time, however, public banks can clearly define institutional objectives (including by sector) and in so doing are also well placed to shift funding approaches from bilateral and individual project investments to more innovative projects (see Session 12) or increasingly impactful programmatic and aggregated investment plans.

Public financial institutions like development banks can take advantage of large leverage factors—sometimes a factor of 5 to 10—by co-financing private investment. Such ratios are made possible by the number of enabling benefits that these banks provide, such as: reputation or convening powers;

[6] See United Nations Conference on Trade and Development (UNCTAD) publication *World Investment Report 2014: Investing in the SDGs – An Action Plan*, at: http://unctad.org/en/PublicationsLibrary/wir2014_en.pdf

direct financial support with smaller-scale grants, equity to reduce early-project risk; larger scale lending at concessional (better than market) rates and tenors, or; by mitigating key risks (perceived and real) through full or partial guarantees or other risk-sharing agreements such as currency hedging or political risk coverage. Panellists expect development banks to play an important role to ensure the mobilised funds go towards green infrastructure that are in line with climate and development goals as donors become more demanding of progress, including upstream and downstream of the banks.

Data availability and case studies are critical elements to understanding investment trends, needs, barriers and opportunities, particularly in light of scaling up green public-private financing. The Forum was reminded that there have been great improvements in data gathering and knowledge, and current official development assistance suggests a growing role of private sector finance versus public funds. However, the vast majority of the (green) infrastructure funding gap is expected to be from private sources and better data is needed to define and identify best practices re mobilising these resources with public funds.

Session 12: Financing green innovation and commercialisation

Key points to session: How to corral the finances behind the ideas and companies of the future? The state and trends of early-stage finance for green technological innovation, funding for Research, Development and Demonstration (RD&D), venture and growth capital. What can we expect from Mission Innovation and the Breakthrough Energy Coalition? What policy circumstances are needed to support and catalyse early-stage financing? The emergence of "new leaders" of green finance from non-energy, non-financial sectors.

Chair (Mr. Kenneth Alston, Special Advisor to the U.S. Secretary of Energy, U.S. Department of Energy): introductory remarks

Developing the technologies to meet our climate objectives has taken decades to where we are today. Innovation will have to continue across the many stages of technology research and development (R&D) from prototype and pilot stages to the ultimate deployment of commercially viable projects. Green technologies, and the finance that supported them, has resulted in large and valuable sector-to-sector spill-overs – solar photovoltaic, for instance, was born from the space race in the 1950s but took many decades to reach where it is today.

This time horizon necessitates unique capital requirements and risk appetite from investors married with effective support from government. Government support programmes are not risk-free, yet have helped produce companies like Tesla, who is making rapid advances in many sectors beyond its original purpose, electric vehicles, to associated spaces like energy storage and other indirect fields like urban planning and infrastructure development. Private finance participation in helping innovate green finance is evolving, and a commitment was made at the Paris COP21 negotiations to support this effort called Mission Innovation,[7] where 20 countries said that they would double their clean energy R&D public budgets over the next five years. This session, therefore, explores some new green financing and innovation paradigms.

Panellist interventions and discussion

- ***Mr. Ali Izadi, PhD, Head of Japan, Bloomberg New Energy Finance***

[7] See http://mission-innovation.net

- ***Mr. Shouji Nishizawa, General Manager, Corporate Solar Energy Group, Kyocera***
- ***Ms. Teiko Kudo, Director and Unit Leader, Growth Industry Cluster Department, Sumitomo Mitsui Banking Corporation***
- ***Mr. Shigeki Miwa, General Manager, CEO Project Office, SoftBank Group***
- ***Mr. Jun Takashina, Deputy Director-General for Environmental Affairs, Ministry of Economy, Trade and Industry, Japan***
- ***Comment: Ms. Lila Musser Preston, Partner, Generation Investment Management***

Public support in research, development and deployment is an effective kick-start to private sector interest in early-stage technologies, but not for long time horizons. Currently most of clean energy investment is going to projects and less than 10% is going to R&D. Given this, Mission Innovation was seen as an important initiative that highlights the importance of increasing R&D budgets in light of climate goals, particularly in innovative energy technology. Panellists also highlighted the value of encouraging cooperation and discussion between public and private stakeholders like the Innovation for Cool Earth Forum.[8] At the same time, discussants noted that governments should find alternative methods to encourage R&D in the long-term, in light of constrained public coffers. Deployment policies, such as placing a price on carbon or priority grid access to new energy technologies, will be needed to trigger continued private sector investment interest in the wide range of possible technologies.

Green innovation comes from business opportunities. Panellists explained, providing examples, what drives investment in innovative technologies. For a bank, it is more sustainable to finance green technologies not in the context of corporate social responsibility (CSR), but as direct and tangible business activities. From a perspective of a company investing in renewable energy, if the wider investment community more accurately understood the fact that a low-carbon transformation is happening in the energy sector, it would not be as difficult to raise money as it currently is.

New business models or tools available to finance providers could generate better information management and foster better investment decision making. Panellists discussed a wide range of business models such as targeted envelopes of financing for dedicated investment funds to take additional risks in innovative sectors or projects, using information technology (or the Internet of Things) to access and build new markets and commercialise new ideas (such as pay-as-you-go mobile technology or micro-payments), diversifying company business into valuable spill-over sectors, or providing dedicated support from inception to deployment. Picking winners may be useful for signalling private sector interest and developing markets, but panellists cautioned that it was also important that this does not hamper the development of other technologies. Discussants highlighted the potential of novel financial and investment technologies ("fin-tech" or "invest-tech") to assist in investment decision making and funding processes, such as: geospatial satellite surveys to target agriculture shortages or deforestation, determining fuel levels in storage tanks; using artificial intelligence and machine learning to prepare state-of-the-art information by advanced analysis on the energy industry data; or "block-chain" linking a company needing finance directly with investors without intermediation by banks.

[8] See https://www.icef-forum.org.