

SUMMARY

Workshop on Financing green infrastructure

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Introduction

Over 150 participants attended the recent Workshop on Financing Green Infrastructure, organised back-to-back with the G20/OECD Task Force on Long-term Investment, this workshop, in the context of the OECD project on *Growth, Investment and the Low-carbon Transition: Constructing a Climate-resilient Future for the G20*. The workshop brought together a group of private sector stakeholders, policy experts and government officials, representing pension funds, insurance companies, governments, banks and corporations from around the world, including non OECD G20 countries such as South Africa, Brazil, India, and Argentina.

Meeting the ambitious objectives of the Paris Agreement, including limiting global warming to well below 2°C and increasing the ability of countries to adapt to the impacts of climate change, will require all countries to embark on long-term decarbonisation pathways. Achieving such pathways will require significant investment in low-emission infrastructure and a reallocation of capital away from carbon-intensive assets. Existing and new infrastructure will also need to be resilient to climate impacts, requiring additional investment.

The OECD project is an in-depth study of the economic and development implications of low-emission and climate-resilient pathways and the policy packages required to meet them. Understanding the role of the financial sector in the transition will be crucial: despite the abundance of capital available globally, private financing of and investment in infrastructure – and especially low-emission and climate-resilient infrastructure – remains limited. A better understanding of the expectations and roles of different financial actors for infrastructure finance, and low-emission infrastructure, is needed. This will help both to guide policymaking and to ensure that government infrastructure pipelines are attractive to investors and conducive to private financing.

A survey looking at the financing environment of infrastructure, including climate-resilient infrastructure and clean energy, was launched at the workshop with a view to developing further policy analysis. The questionnaire seeks information on expectations of returns across a spectrum of investments, and also risk categories associated with climate change and due diligence practices, taking into account the perspectives of a diverse set of private investors including institutional investors, banks, and corporates. A separate section tailored to the specific financing conditions for each major investor type is also included, to better understand investment capabilities to finance further investment in climate-resilient infrastructure, and to serve as a basis for the workshop agenda.

The Workshop was organised in the context of the OECD Long-Term Investment Project (www.oecd.org/finance/lti) and the newly launched OECD Centre on Green Finance and Investment (<http://www.oecd.org/cgfi/>), and is one in a series of events planned for the OECD project on *Growth, Investment and the Low-carbon Transition: Constructing a Climate-resilient Future for the G20*.

This document includes speeches (as prepared for delivery), a summary of the discussion for each panel, including presentations and any relevant background notes. The day's agenda is at the back of this document.

Key Take-aways

The workshop began by looking at financing trends and recent changes in infrastructure, with a focus on different sectors important to the low-carbon transition (looking beyond renewable electricity). It examined the expectations and evolving roles of different actors in infrastructure financing, ranging from banks, utilities and corporates to institutional investors. The discussion also turned to the importance of innovation in low-emission technologies, investigating the reasons why early-stage financing of green innovation remains rather limited. For each session, speakers and panellists were invited to address a specific set of questions to frame the discussion and to move the agenda forward.

Among the main take-aways from the discussion:

Session I: Green infrastructure financing: main investment trends and attractiveness for the private sector

- Regarding the transition to low-carbon energy, new investment in renewable energy generation has reached all-time high levels while public investment in road and rail transportation has decreased
- There remains a huge need to scale up investment in new technologies and electricity networks and in the near term there are opportunities to improve efficiency in transport and energy
- Renewable electricity projects provide attractive return profiles: Existing wind farms in Europe do not remunerate returns above 6 percent. For higher returns, it is necessary to be involved in the construction phases of projects (8-11% stable returns for off-shore wind farms in the North Sea, for example, with limited leverage)
- Electric vehicle technologies are gaining significant momentum as manufacturers are announcing cars with significantly higher autonomies than ones currently in the market, at a significantly lower price point.
- Blended finance models are a potential solution in order to mobilise pension fund capital for green infrastructure in emerging markets. The Danish Climate Investment Fund recently invested in the Lake Turkana Wind Power Project in Kenya, the largest wind farm in Africa, providing 25 percent of Kenya's electricity demand.

Session II: The role of banks, utilities and equity sponsors in financing green infrastructure

- There is a shift towards a business model where utilities act as construction companies, building projects through joint ventures with other public or private sector actors, and then selling a significant part of the projects equity and securitising the debt component.
- High-tech company involvement in renewable energy becoming more mainstream as illustrated by the situation in the United States where more than half of off-take contracts in the market were directly purchased by corporations last year
- The dominating risk-averse posture of banks' risk management departments is limiting their ability to support innovative low-carbon technologies. However a French bank pointed to their recent decision to divest from coal and to expand investment in renewable energy.

- The role of DFIs in crowding in the private sector in emerging markets: In Brazil where BNDES, the national development bank, has been largely dominating infrastructure investments there is a will to gradually reduce its participation in favour of the private sector.

Session III: Establishing a secondary market for green infrastructure: the role of institutional investors

- 70 percent of future emissions will come from infrastructure that is yet to be built, so investment in low-emission infrastructure is important in order to avoid locking-in future GHG emissions.
- The resilience aspect is also important since the future performance of an asset can be negatively impacted by climate factors. Hence the importance of questioning the extent to which access to climate risk insurances influences the cost of capital for infrastructure projects.
- Innovative approaches to mobilise institutional investors' capital for renewable energy projects: institutional investors invest (*pari passu* to the lead lender) in infrastructure through project finance loans along with commercial banks, acting as a sponsor and taking advantage of the bank's origination resources and experience.
- Institutional Investors still hesitant on Emerging markets. OECD surveys of pension funds show minimum exposure in emerging markets, including some of the most sophisticated funds that have a lengthy track record and experience in infrastructure investment.
- Partnership models, co-investment, and development finance assistance are promising business models to encourage investment in emerging markets.

Session IV: Unlocking investment and financing for green innovation and energy efficiency

- Importance of energy efficiency in reducing carbon footprints: in 2015 alone, efficiency gains in the OECD region avoided the equivalent yearly energy consumption of Japan.
- New technologies have the potential to revolutionise the way that energy is generated and delivered to customers, as well as transform transportation and industry. In the transport sector for example, the carbon footprint of urban road infrastructure could be much lower with a massive adoption of car-sharing models or driverless car technologies.
- Role of Government and Innovation policy: policy should first address the market failure in the area in terms of environmental impact, knowledge gaps, imperfect competition and financial markets failure.
- Policy should also ensure that market structures are aligned, as well as the returns on investment for infrastructure such as grid, transport and broadband; those being the cornerstone of other types of infrastructure

Session Summaries

Session I: Green infrastructure financing: main investment trends and attractiveness for the private sector

In the first session the International Energy Agency (IEA) and the International Transport Forum (ITF), both affiliated organisations to the OECD, provided an overview of international trends in low-emission and climate-resilient infrastructure financing, focusing on energy and transportation sectors, respectively. This was followed by a panel discussion including pension funds, venture capitalists, and investor associations.

The session highlighted the need to reduce costs through new technologies, the importance of market signals (i.e. carbon pricing), the roles of the public sector and private sectors, along with expectations ahead of the COP 22 in Marrakesh, Morocco.

Investment in energy and transport

Regarding the transition to low-carbon energy, **new investment in renewable energy generation has reached all-time high levels; however, low-carbon investment in heating and other key components of the global energy value chain has lagged.** There remains a huge need to scale up investment in electric cars (including electricity infrastructure), and to transform single-occupancy vehicle travel in order to realise energy efficiency of vehicular transportation, while also reducing traffic and the demand for new roads. Investment and business models for carbon capture and storage remain challenging.

Since 2008, public investment in road and rail transportation has decreased, while private investment has increased, although benefiting from a great deal of public support. A major part of decarbonising transport is in the freight sector, particularly in sea transport as this sector is projected to grow tremendously in the future. In the near term, there are opportunities to optimise and improve efficiency of road transportation through digital technologies.

The risk profile of green infrastructure investments depends on business model considerations such as the project's revenue stream. The panellists noted that the correct allocation of risk where it can best be managed and priced will be pivotal to drive down the future cost of funding. It was noted that ultimately funding has to come from the public sector (payments and incentives), or directly from user charges, while financing can be from the private sector providing that a feasible business model is presented.

Supply and Demand and the Risk- Return profile

The panel discussion at many occasions pointed out the paradoxical situation in the market where large amounts of capital are chasing a small number of projects with a low-medium level of returns, while at the same time a large amount of project financing remains unfulfilled. This asymmetry is explained by the limited pipeline of investable projects (presenting a suitable business model), the legislative gaps, the regulatory and policy risks, and the limited data available on infrastructure. The discussion particularly focused on the priority of collecting data on financial performance of green infrastructure investments in order to have adequate benchmarks.

One panellist opined that there is a large spectrum of investments in climate-resilient infrastructure available for investors with different risk appetites, from government- or utility-backed green bonds to

venture capital investment. Institutional investor capital, from pension funds in particular, is a key catalysing element of the low-carbon transition. From the perspective of pension funds, renewable electricity projects provide attractive return profiles – five years ago some of the first direct investments were being made in new wind and solar projects. Now, a considerable amount of institutional investment has occurred in renewable energy. As well as attractive returns, investment in the renewable energy sector has been driven by the ethical stand of investing in a cleaner future for its contributors.

For brownfield investments it was noted that prices have gone up and yields have gone down; investments such as **existing wind farms in Europe do not remunerate returns above 6 percent. For higher returns, it is necessary to be involved in the construction phases of projects (8-11% stable returns for off-shore wind farms in the North Sea, for example, with limited leverage).** Examples of such projects have been launched through joint ventures with institutional investors, utilities or other private sector actors.

Policy signals and role of technology in reducing costs for consumers

Many panellists pointed out the importance of the signals sent by governments to the private sector, and that the pathway for investment must be clear in order to mobilise private capital – “finance follows, it doesn’t lead”. Therefore it is paramount to design robust and quality policies that enable long-term allocation, with the goal of limiting future policy uncertainty. However, policy should not emphasise investment security over the promotion of innovation and the development of new solutions.

According to one panellist, it is important to frame the current policy discourse around value-for-money and low-carbon investment as a way to create better and cheaper products, and to determine the optimal solutions for climate-resilient infrastructure finance. The application of new technologies, for instance the use of artificial intelligence in the mining industry (as a means to increase efficiency of resource gathering) can drastically change the carbon intensity of operations, making technology and innovation a critical input in the low-carbon transition across all parts of the economy.

The importance of consumer preference was also made during the discussion as ultimately, most services will be sold to consumers, who may view sustainability and efficiency as added costs. For example, **electric vehicle technologies are gaining significant momentum as manufacturers are announcing cars with significantly higher autonomies than ones currently in the market, at a significantly lower price point.** The projected mainstreaming of the electric car will be mainly driven by the quality and the price of the products, and in changing consumer perception and preferences.

Blended Finance in Emerging markets

Panellists pointed out the role of the Multilateral Development Banks (MDBs) in mitigating some country specific risks. One panellist noted the level of perceived political risk is much higher in developing countries, even though infrastructure investments can also bear high levels of political risks in developed countries. Blended finance models are a potential solution in order to mobilise pension fund capital for green infrastructure in emerging markets. Using this model, a joint venture was launched two years ago with the Danish government and private investors called the Danish Climate Investment Fund where the government invested 25 percent of capital, assuming also the first-loss position. This fund recently invested in the **Lake Turkana Wind Power Project in Kenya, the largest wind farm in Africa, providing 25 percent of Kenya’s electricity demand.**

Session II: The role of banks, utilities and equity sponsors in financing green infrastructure

The second session focused on factors driving the changing nature of banks and corporates and their roles in financing the low-carbon transition. Among issues discussed were the impacts of energy market transformation on electric utilities, the drivers of new investment demand from other corporates such as high-tech companies, and the state of bank finance and lending activities in developed and developing countries.

First and foremost, panellists agreed that transforming the energy sector will require strong political will and backing, citing the example in France where the energy mix was transformed from fossil fuels to mostly nuclear over a twenty year period, through strong government support.

Changing Business models for Utilities

Utility business models are challenged by a more competitive environment driven by changes in electricity demand and the rising share of decentralised generation in the electricity generation mix. Nevertheless, investment in networks is still essential, and, according to a comment in the first session, there is evidence that emerging countries may not bypass centralised power transmission in favour of decentralised (using India as an example). As a result, and in response to market calls for more clarity on their strategy to adapt to a changing marketplace, many utilities created renewable energy arms and put energy efficiency at the centre of their strategies.

According to one panellist, the changing landscape of competition within electricity markets is further pushing for shifts towards creative business models. A possible response to this competitive environment can be a shift towards **a model where utilities act as construction companies, building projects through joint ventures with other public or private sector actors, and then selling a significant part of the projects equity and securitising the debt component.**

Another driver of the shifts in utilities business models is instability in the organisation of markets. In some countries energy markets are not delivering the right price signals, while emissions markets and carbon pricing mechanisms need important adjustment. This situation of uncertainty is pushing utilities' preference towards Power Purchase Agreements or fully regulated businesses such as networks, in order to guarantee returns over a known period.

An intervention from the floor from a utility representative brought up the subject of green bond issuance, and that green bonds and regular corporate issuance with similar tenors and identical credit profiles have similar yields. This seems to support the notion that labelled green bonds and non-green bonds from the same issuer should theoretically have the same price, and that a "green premium" does not exist. A further OECD study on comparing green bond yields to credit benchmarks could help shed light on the cost of financing for green projects.

New Corporate actors in Renewable sector

A panellist opined that high-tech company involvement in renewable energy generation is an important trend that was initially driven by the will to lower the emissions profile of core business operations which are responsible for the majority of company-wide energy consumption. Criteria for investment consist mainly of the cost competitiveness energy source, but also its proximity to the end-use location and its contribution to the penetration rate of renewables. **The corporate direct participation in the energy sector is becoming more mainstream as illustrated by the situation in**

the United States where more than half of off-take contracts in the market were directly purchased by corporations last year.

Non-utility corporates can also bring a lot of value to the energy sector through spreading their in-house technologies and innovations. An example is the use of machine learning algorithms to optimize energy use in computing-intensive processes (such as datacentres for internet companies).

New approach needed for Banks facing new Challenges

A panellist pointed to a required shift in the banking sector's mind set. **The dominating risk-averse posture of banks' risk management departments is limiting their ability to support innovative low-carbon technologies.** Bank financing covers the spectrum of renewable energy technologies; however the aftermath of the financial crisis pushed the banking sector to be more stringent in its evaluation of renewable energy projects, focusing on projects with higher stability over the long run.

Sizeable exposures in one country were discussed, in this example the Spanish renewable sector, and described an enhanced focus on country risk, the stability of the fiscal and regulatory framework, and the reliability of the renewable energy technologies. In addition, the business model of renewable projects is of high importance as banks prefer models where costs are supported by the end-users. Finally it was mentioned that the uncertainty related to the forthcoming banking regulation (Basel IV) could impact banks' lending capacities.

There are also signs of change in the banking sector. A panellist explained that environmental considerations are fully embedded in project appraisal processes as part of the integration of the Equator Principles. **A French bank pointed to their recent decision to divest from coal** (one of the first reported instances from a bank) and to expand investment in renewable energy, extending a broader trend that has been observed most notably in some institutional investment portfolios such as endowments, foundations, and a few pension funds. **The bank is also expanding their approach to sustainable infrastructure beyond renewable energy including also transport, water and telecommunication.**

One panellist explained that the Indian banking sector has not been able to provide funding at lower costs to the infrastructure sector for two main reasons. First, there is a gap between what is decided at a governmental level during the planning phase of a project and what is actually in place during the start of the construction phase and the project appraisal process by banks; this gap had the effect of increasing the costs of funding. Second, Power Purchase Agreements did not include pass-through clauses. Learning from these challenges, the banking sector is today fully part of the design of the Indian renewable energy strategy along with the Indian government.

Crowding in the private sector in emerging markets: Role of DFIs

Development Financial Institutions (DFIs) are an important source of support to the commercial banking sector in emerging markets. On the one hand, DFIs can involve commercial banks in the co-financing of green infrastructure projects in developing countries as a way to share experience and knowledge of these markets. On the other hand, the Indian experience shows that DFIs can provide credit lines to local banks in order to encourage them to take construction or refinancing risks.

Another panellist mentioned that the role of DFIs can also become a challenge in countries where they are the main source of financing for infrastructure projects. This is the case in Brazil where BNDES, the national development bank, has been largely dominating infrastructure investments and where the

will is to gradually reduce its participation in in favour of the private sector. To help address the crowding out of private finance, the use of project bonds allowed local capital markets to participate in the financing of projects in the road, rail and transmission sectors, effectively mobilising investor capital.

Special Session: OECD Project on Investment Governance and the Integration of ESG Factors

This panel session presented highlights from the OECD's research on how pension funds, insurance companies and asset managers approach ESG risks and opportunities, and discussed how current regulatory, practical and behavioural obstacles to integrating ESG might be addressed by policymakers and the private sector.

ESG: Regulations incentivising or requiring institutional investors' reporting of the Environmental, Social and Governance (ESG) performance of their assets under management can be key drivers of investment in green infrastructure. The OECD Project on Investment Governance and the Integration of ESG Factors, as well as work of the French government's Treasury, provide examples of policies that aim to encourage the adoption of ESG factors in institutional investors' allocation decision-making process. However, a panellist also noted **the existing knowledge gap when it comes to assessing the ESG performance of infrastructure assets.**

Another panellist expressed the opinion that for some time the "G" and "E" factors have been addressed in dialogues, and have received policy attention, yet the "S" factors are often overlooked. Institutional investors need to develop policies, along with governments and other stakeholders in order to address the social factors of investment, financing, and the broader economy in order to build a more inclusive and sustainable society.

There are a number of ESG initiatives currently underway, over 30 in total, according to a panellist. There is therefore a need to convene and to align initiatives and to collaborate where possible in order to reduce redundancies and to achieve global standards regarding climate change risk, ESG practices, and disclosure of risks.

Session III: Establishing a secondary market for green infrastructure: the role of institutional investors

The third panel addressed some of the major themes influencing institutional investor demand for green infrastructure investment, identifying potential obstacles that policy makers could address.

Institutional investors (i.e. pension funds, insurance companies, sovereign wealth funds) are a growing source of finance for green infrastructure. Investment characteristics of sustainable energy projects align well with those required by institutional investors. Today's low interest rate environment and weak economic growth prospects has fuelled a search among institutional investors for "real asset" classes that can deliver steady, long-term, inflation-linked income streams with low correlations to the returns of other investments. Sustainable energy projects and climate-resilient infrastructure can possess these characteristics.

Innovative approaches to mobilise institutional investors' capital for renewable energy projects

Asset Managers play a critical role in matching investor demand with investable projects in renewable energy and climate-resilient infrastructure. Besides the fact that many large infrastructure investors are able to deploy capital directly into projects, many investors lack the resources and skills necessary to make such investments. Investment funds are therefore essential to help channel investment into green infrastructure. There are already examples where asset managers are investing in new projects during the construction phase. In terms of product offering, the proportion of funds dedicated to green infrastructure is low and investment is mainly channelled through existing funds, which suggests that new product offerings and strategies may be needed in order to better align investor demand with green infrastructure.

A panellist shared a financing structure where **institutional investors invest (*pari passu* to the lead lender) in infrastructure through project finance loans along with commercial banks, acting as a sponsor and taking advantage of the bank's origination resources and experience.** This is an increasingly important financing model as individual banks may not be able to finance the entire debt portion of a project. Using such a mechanism, construction risk is no longer a barrier for institutional investors for European assets and mature technologies. Investors have also shown appetite for non-investment grade projects. The main investment barriers remain the stability of the regulatory framework, as well as the residual merchant risk – hence the need for long-term PPAs in renewable energy projects (see session II summary above).

Climate-resilient infrastructure

According to one panellist, **70 percent of future emissions will come from infrastructure that is yet to be built, so investment in low-emission infrastructure is important in order to avoid locking-in future GHG emissions.** However, the resilience aspect is also important since the future performance of an asset can be negatively impacted by climate factors. Hence the importance of questioning the **extent to which access to climate risk insurances influences the cost of capital for infrastructure projects.**

Catastrophe risk transfer, of which climate risk could be a sub-category, is usually structured using catastrophe-bonds (cat-bonds). Building on this familiar risk transfer model, and responding to the resilience question, the insurance industry is studying the possibility of combining capital raising and risk transfer operations through the issuance of resilience bonds. The development of a resilience

bond market is currently limited by cities' ability to autonomously issue debt, amongst other challenges.

Need for analytics in climate change and Labelling and tagging of assets

There is also the potential role of insurance analytics in climate change, where models have been used and have been evolving for close to two decades, to assist in the due diligence process and scenario modelling during various stages of asset financing. For example, these models could be used in corporate M&A transactions by running catastrophe risk and climate change risk models on individual assets. In this way, investors can analyse the potential failure of an asset due to climate change factors, evaluating also which risks are systemic and difficult to insure/hedge, using also tail-risk analysis.

An issue was raised regarding the labelling of assets on insurance company and bank balance sheets that meet certain climate resiliency standards. Panellists were generally supportive of such initiatives but hesitant about the potential regulatory burden and difficulty of a continuous process of labelling assets as climate-compliant. One panellist also mentioned that asset owners may not always have access to the right information, for instance regarding the physical characteristics of a building or real asset, and its exposure to climate change risks. There is also a risk as to whether or not today's technologies will still be considered green over a long period of time (as in twenty years).

Institutional Investors still hesitant on Emerging markets: Many institutional investors located in developed markets have been reluctant to invest in infrastructure in emerging countries. OECD surveys of pension funds show minimum exposure in emerging markets, including some of the most sophisticated funds that have a lengthy track record and experience in infrastructure investment. This is, despite the fact that many of the risks in infrastructure investment are similar in emerging countries compared to developed, particularly on the operational side of assets. Partnership models, co-investment, and development finance assistance are promising business models to encourage investment in emerging markets.

Session IV: Unlocking investment and financing for green innovation and energy efficiency

The last session looked at how the historical decline in government funding for energy research and development may finally be reversing, but early-stage finance for green technological innovation remains limited, relative to venture capital, R&D, and growth capital financing in other sectors.

Role of Government and Innovation policy

According to one panellist, policy plays a key role in driving innovation and attracting private investment, in particular through investment in R&D. In particular, policies need to be ambitious, flexible, precise, have sufficient depth, and be predictable – predictability should not be conflated with certainty, meaning that policy action triggered by information that is equally available to policymakers and investors. Policies should also be assessed for their incidence – are they really delivering the specific outcome intended? **In the case of green infrastructure, policy should first address the market failure in the area in terms of environmental impact, knowledge gaps, imperfect competition and financial markets failure.** Policy should also ensure that market structures are aligned, as well as the returns on investment for infrastructure such as **grid, transport and broadband; those being the cornerstone of other types of infrastructure.**

This coherence in the vision of policymakers was also stressed by a panellist speaking on the private equity market. The panellist mentioned the difficulties of monetising investment in technologies such as storage even though the development of this technology is essential for the large scale adoption of renewable energy generation. In a coherent and comprehensive framework, policymakers should equally support all the components necessary to achieve their vision.

Need for Technology and the case of Energy Efficiency

Innovation is needed to ensure the low carbon transition. This includes financing and business-model innovation as well as technological progress. However, more than innovation, a significant amount of value could be unlocked through the use of already mature technologies. An example could be the use of big data analytics for a proactive management of costs. A panellist suggested that the two priority policy measures to move energy efficiency ahead are carbon pricing and the development of standardised measurement and verification frameworks.

As investment is **difficult to monetise, financing for energy efficiency may also not be happening at the scale needed due to difficulties in capturing the financial value of the investment.** Innovation in business models and financing would be needed in order to increase uptake of efficiency investment. This could also include accounting standards that effectively capture the long-term value of energy efficiency investment. To put this into perspective, in 2015 alone, **efficiency gains in the OECD region avoided the equivalent yearly energy consumption of Japan.** Regarding efficiency, there is massive potential in buildings, infrastructure, and to a lesser extent in industry.

Impact of the sharing economy and Innovative Financial Instruments in Emerging markets

New technologies have the potential to revolutionise the way that energy is generated and delivered to customers, as well as transform transportation and industry. In the future, according to one panellist, it is investment in new services as opposed to hard assets that will make this change possible. The sharing and on-demand economy is service based innovative business models that could drive the low-carbon transformation. **In the transport sector for example, the carbon footprint of urban**

road infrastructure could be much lower with a massive adoption of car-sharing models or driverless car technologies.

The panel also discussed innovative financial mechanisms to support climate aligned projects in developing countries. The discussed mechanisms included a Fund of Funds structures designed to invest at the development, construction and refinancing stage of large scale solar, wind and hydro projects in Rwanda and Zambia. This structure has the potential to channel institutional investment, while also freeing up equity capital to reinvest in new projects. Additionally, loans denominated in local currencies that are backed by governments could attract private investors. In particular, one panellist discussed a water finance facility designed to enhance the credit worthiness of local utilities through long-term, low-cost loans to public and private water utilities – the financing is linked to a specific infrastructure project. The vehicle has a blended finance structure and issues investment-grade bonds to domestic institutional investors. The structure includes a debt reserve fund that can be backed by national government in order to mitigate credit risk.

Speeches

Gabriela Ramos, OECD Chief of Staff, G20 Sherpa and Special Counsellor to the OECD Secretary-General

Introductory remarks

The climate change challenge

It is my pleasure to open the OECD Workshop on Financing Green Infrastructure, part of the OECD project on Growth, Investment and the Low-carbon Transition: Constructing a Climate-resilient Future. In anticipation of next year's G20 agenda and priorities, I would like to first thank our German colleagues for recognizing the importance of climate change in the international economic agenda – it is truly a global issue where success relies on multi-lateral cooperation, making the G20 stage an important forum for this discussion.

The Paris Agreement will enter into effect today. This is remarkable – and requires some reflection. In comparison, it took 8 years for the Kyoto Protocol to come into force.

Kyoto was ambitious – but the top-down approach meant that many countries simply didn't know how they would meet their commitments. It's a very different story today. The bottom-up approach of the Paris Agreement means that many countries know – more or less – how they can achieve their mitigation pledges. So there's no excuse to delay implementation.

But of course, countries also know that collectively they haven't pledged sufficient action to achieve the 2 degree goal. So we know from the very first day that there will need to be new commitments and higher ambition.

That lends particular urgency to the principal subject of today's workshop, described under Article 2 of the Paris Agreement, which is aimed at “making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development”.

Investment needs

To be clear, zero net emissions by the century's end will require the systematic transformation of power generation, industry, transport, buildings and land-use. It will take decades to re-engineer our infrastructures and decarbonize the global value chain... so we need to get started immediately to limit these future climate risks.

This requires the mobilisation of investment capital. An estimated USD 93 trillion will be needed across sectors in the next 15 years, to meet global infrastructure needs while ensuring the low-carbon transition.

On an absolute basis, meeting these investment needs is not unattainable, given the currently high amounts of investment capital in global markets – a recent read on global bond markets shows USD 97 trillion outstanding. Institutional investor assets under management have also reached new high levels: worldwide private pension funds held USD 25.6 trillion at the end of 2015. Global insurers held over USD 28.2 trillion assets under management in 2014.

While institutional investors have been increasingly interested in infrastructure investment, levels of investment are still quite low. Amongst large pension funds surveyed by the OECD, direct equity

investment in unlisted infrastructure projects of all types accounted for only 1% of their asset allocation in 2015, and green infrastructure accounted for only a fraction of that 1%.

Institutional investors alone are just one piece of the puzzle, the greening of banking, utilities and power producers, and the global industrial complex will also need to contribute to reducing global GHG emissions, not to mention the finance of new innovation and technology for the future – this is why, today, we have brought together many different stake holders and investors.

The green infrastructure investment agenda

As we will explore together, green investment presents a major opportunity for both long-term investors and macroeconomic policy makers seeking to jump-start growth – and this move will rely to a large extent on good policies and enabling environments to mobilise private investment in low-carbon infrastructure, as well as a concerted focus on risk reduction and transaction enablers.

There is also increasing attention to the need for investors to take climate-related risk factors into consideration in their investment decisions, not just for environmental and ethical reasons but because these risks can be financially material.

We are already seeing “decarbonisation” of portfolios and “divestment” from carbon-intensive assets happening among the world’s investors and further scrutiny and disclosure of climate change risks.

Some items to be discussed today include:

- Exploring policy frameworks that create attractive opportunities for investment in low-emission, climate-resilient infrastructure; and the ability of the financial sector to match the demands of investors with the profile of investments. This will include analysing the profitability of infrastructure assets –in general- and in the low-carbon sectors such as renewable energy, and the conditions that make investment attractive including improving the risk profile of infrastructure assets
- The role of commercial banks as sources of finance for low-carbon and climate-resilient investment, including sustainable banking practices, and bank lending capacities to further support climate-resilient investment;
- The changing role of utilities as sources of finance for renewable energy, along with other corporate investors in low carbon infrastructure and renewable energy; the evolution of traditional utility business models and investment priorities of utilities and power generation to meet lower emissions targets;
- The need to facilitate the development of capital markets for financing instruments (such as for debt in the form of green bonds, listed equity instruments, and unlisted equity investment) and supportive investment frameworks for institutional investors;
- And the financing of innovation and green technologies, recognising the need for early stage finance, public support of innovation and R&D, and private sector investment, research, and the commercialisation of new technologies.

Moving forward, all infrastructure investments need to align with each country’s commitments under the Paris Agreement, connecting also with national economic strategies, development, and industrialisation. We have invited all of you here today to weigh in on these important topics and we look forward to working with all of you and other stakeholders as we pursue these next steps in developing policies for the greening of investment and capital markets.

Adrian Blundell-Wignall, Special Advisor to the OECD Secretary-General on Financial and Enterprise Affairs and Chair of the Advisory Board of the OECD Centre on Green Finance and Investment

Closing remarks

OECD Centre on Green Finance and Investment

The workshop today has highlighted the urgency of addressing climate and other sustainability challenges and the importance of scaling up green investment and its financing to ensure that we can achieve the goals of the Paris Agreement and broader Sustainable Development Goals (SDGs).

Recognising the scale and urgency of the challenge, the OECD recently launched a Centre on Green Finance and Investment.

The Centre will serve as an effective conduit between policy makers, regulators and market participants dealing with green finance and investment: it will bring together those seeking to catalyse investment in the transition to a clean, low-emission, and climate-resilient global economy. The OECD is the only international organisation that has systematic reach across all branches of government and is thus uniquely positioned to bring all the relevant strands together and promote coherent strategies and actions.

It is clear that unless we are able to join up our efforts in a systematic way, progress will be very slow. The Centre responds to this imperative. Internally, the Centre will help join up our own thinking and our own policy communities. Externally, the Centre will provide a mechanism for coordinated engagement and action across governments, industry and stakeholders, and for improved information flows and analysis.

The Centre will:

- First, provide a global platform for knowledge exchange and engagement. The Centre will work with governments and regulators in developed, emerging and developing economies, institutional investors, the private sector, international organisations, think-tanks, philanthropies, academia and civil society.
- Second, produce high-quality, policy-oriented research and analysis. It will leverage the OECD's policy and economics expertise and the knowledge of the private sector and other stakeholders. The objective is to provide research and analysis which delivers a public good to both governments and the private sector.
- Third, initiate and foster collaboration to address knowledge gaps and market challenges.

We have structured the Centre to maximise internal and external linkages and opportunities for external inputs and productive collaboration. As a starting point, the Centre will draw on, and enhance linkages across, relevant OECD bodies and groups of policymakers.

To help guide the Centre and ensure the relevance and quality of OECD work, we have established an Advisory Board composed of experts from a range of sectors who will provide advice and support the activities and work of the Centre. One of our Board members, Torben Pedersen from PensionDanmark, was present earlier today at the workshop. We are thankful for his interest and support.

We are also currently reaching out to prospective "Knowledge Partners" to ensure that research is shared and opportunities for productive collaboration are pursued. Knowledge Partners are organisations that are conducting analysis on green finance and investment and engaged in advancing

the agenda in these areas. We have collaborated with a range of such organisations in the past; the Centre provides an opportunity to expand the set of collaborations.

The key platform for dialogue and engagement will be the OECD's annual Green Investment Financing Forum (GIFF), which brings together policymakers, industry, and other stakeholders. But all opportunities will be pursued, such as the workshop today on green infrastructure investment.

Finally, we will continuously engage with relevant stakeholders in the course of our work and activities.

The Centre will cover a range of issues in relation to green finance and investment linked to the OECD's work programme in these areas, namely

- Strengthening institutions, markets, and instruments for financing green investment, including green infrastructure investment, and the role of institutional investors
- Identifying policies and framework conditions that support green investment
- Ensuring proper governance, disclosure, and transparency on environmental matters,
- Promoting climate resilience
- Empowering ambitious city climate action and finance
- Ensuring effective cooperation and development finance with emerging and developing economies

The work will seek to be collaborative where possible and will look to push the frontier. We are currently considering a number of projects that could be pursued, some of which would represent follow up from existing work, while others would be new and potentially more path-breaking. To name a few:

- *Ensuring the availability of investment flows to achieve a low-carbon electricity sector:* In many countries the electricity sector is undergoing fundamental changes. Having a better understanding of the factors driving these changes, and of the obstacles to investment in renewable energy, would yield valuable insights for regulators and policy makers. This project would analyse how investment policy can stimulate improved electricity system flexibility (including regional markets, interconnectors, demand response and management of distributed resources) while maintaining the security of supply. It could also look more deeply at changing business models for utilities and new financing techniques where institutional investors are playing an expanded role.
- *OECD Low-Carbon Investment Attractiveness Index:* To meet increasingly stringent emission reduction targets and accelerate low-carbon investment, countries need to provide an "investment grade" policy framework and investors need to know where to invest. The OECD could develop a "Low-Carbon Investment Attractiveness Index" for this purpose. The Index would quantify and compare countries' attractiveness with respect to their framework and conditions for green, low-carbon investment, starting with renewable technologies, strengthening the evidence base to inform policy decisions and low-carbon development planning as well as investment decisions.

As Special Advisor to the Secretary-General on financial and enterprise issues for the next year, I have been asked to chair the Advisory Board on behalf of the Secretariat. I look forward to this challenge and hope that those present today will be able to guide, and contribute to, future OECD work under the Centre.

Annex: Agenda

9:00-9:20	Welcome address and Introductory Remarks
	<p>Gabriela Ramos, OECD Chief of Staff, G20 Sherpa and Special Counsellor to the OECD Secretary-General</p> <p>Introduction to the OECD project on Growth, Investment and the Low-carbon Transition, with a focus on G20 countries: Anthony Cox, Deputy Director, Environment Directorate, OECD</p>
9:20-10:40	Session 1: Green infrastructure financing: main investment trends and attractiveness for the private sector
	<p>Leading Presentations:</p> <ul style="list-style-type: none">• Laszlo Varro, Chief Economist, International Energy Agency• Dejan Makovsek, Economist, International Transport Forum <p>Moderator: André Laboul, Directorate for Financial and Enterprise Affairs, OECD</p> <ul style="list-style-type: none">• Andrew Rose, Chief Executive Officer, Global Infrastructure Investor Association• Torben Möger Pedersen, Chief Executive Officer, PensionDanmark• Wal van Lierop, President and Chief Executive Officer, Chrysalix Venture Capital• Eugene Zhuchenko, Executive Director, Long-term Infrastructure Investors Association <p>In order to transition to a well below 2°C emissions trajectory, global investment in low-emission infrastructure needs to be massively scaled up. Investment also needs to be resilient to the effects of climate change. This session will provide an overview of international trends in low-emission and climate-resilient infrastructure financing, including across regions, institutions and financial instruments.</p>
10:40-11:00	Green Infrastructure Survey: Preliminary results and discussion
	<p>A new survey seeking to enlarge data available from private stakeholders on investment and financing of green infrastructure beyond renewable energies will be presented. The results of the survey will be critical in developing further policy analysis looking at risk and returns of investment in green infrastructure projects.</p> <p>Speakers: Raffaele Della Croce and Joel Paula, Financial Affairs Division, Directorate for Financial and Enterprise Affairs, OECD</p>
11:00-11:15	<i>Coffee break</i>

11:15-12:45

Session 2: The role of banks, utilities and equity sponsors in financing green infrastructure

Moderator: Raffaele Della Croce, Lead Manager, Long-term Investment Project, OECD

- **Deepak Kumar**, Chief General Manager, Credit Policy & Procedure Department, State Bank of India
- **Thierry Lemaigen**, Deputy General Manager, Head of Structured Finance Department, Sumitomo Mitsui Banking Corporation
- **César Ortiz Sotelo**, Deputy Director, ENGIE
- **François Sterin**, Director, Global Infrastructure, Google
- **Mauricio Tolmasquim**, Senior Fellow, Harvard Kennedy School, formerly CEO and President, Empresa de Pesquisa Energética

This panel will review the investment appetite of different types of private investors in financing infrastructure, especially in green projects, and the main challenges that they face. The discussion will particularly focus on factors driving the changing nature of banks and corporates (i.e. changing business model of utilities and banks), a changing regulatory environment, and disclosure of climate change risks, including the materiality of those risks. As financial institutions and corporates are the traditional sources of private sector finance for infrastructure, it is important to understand their appetite for investment and their ability to support further investment in green infrastructure.

12:45-13:45

Lunch break

13:45-14:15

OECD Project on Investment Governance and the Integration of ESG Factors

This panel session will present highlights from the OECD's research on how pension funds, insurance companies and asset managers approach ESG risks and opportunities, and discusses how current regulatory, practical and behavioural obstacles to integrating ESG might be addressed by policymakers and the private sector.

Presentation: Emmy Labovitch, Senior Private Pensions Expert, Financial Affairs Division, Directorate for Financial and Enterprise Affairs, OECD

Discussants:

Jean Boissinot, Head of Banking and Financial Sector Analysis, Finance Department, Direction Générale du Trésor de France

Pierre Hubbard, Senior Policy Advisor, TUAC

14:15-15:30

Session 3: Establishing a secondary market for green infrastructure: the role of institutional investors

Moderator: Joel Paula, Policy Analyst, Long-term Investment Project, OECD

- **Richard Abel**, Managing Director, Macquarie
- **Jane Ambachtsheer**, Partner and Global Head Responsible Investment, Mercer
- **Sara Bonesteel**, Chief Investment Officer, Retirement Business, Global Portfolio Management, Prudential Insurance
- **Stéphane Dubos**, Executive Director, Power & Renewables, Global Infrastructure & Projects, Natixis
- **Greg Lowe**, Global Head of Resilience and Sustainability, Aon plc

Institutional investors (i.e. pension funds, insurance companies, sovereign wealth funds) are a growing source of finance for green infrastructure. The long-term investment horizon of such investors makes them theoretically well suited for long-term investment in green infrastructure, especially when investment processes incorporate climate-change scenarios as part of the decision making process. This panel will address some of the major themes influencing institutional investor demand for green infrastructure investment, and identify effective policies to encourage higher levels of investment by institutional investors.

15:30-16:00 *Coffee break*

16:00-17:30 **Session 4: Unlocking investment and financing for green innovation and energy efficiency**

Moderator: Andrew Prag, Policy Analyst, Investment Division, Directorate for Financial and Enterprise Affairs, and Environment Directorate, OECD

- **Philippine de T'Serclaes**, Head of Thought Leadership & Strategic Partnerships, Schneider Electric
- **Nick Johnstone**, Head of Division, Structural Policy Division, Directorate for Science, Technology and Innovation, OECD
- **Massimo Resta**, Partner, Zouk
- **Jane Wilkinson**, Director, Climate Policy Initiative

Large scale uptake of new technologies will be key to a successful low carbon-transition. A historical decline in government funding for energy research and development may finally be reversing, but early-stage finance for green technological innovation remains limited relative to venture capital, R&D, and growth capital financing in other sectors. Financing for energy efficiency may also not be happening at the scale needed due to difficulties in capturing the financial value of the investment. However energy efficiency finance is seeing significant innovation.

17:30-17:45 **Closing session**

Closing Remarks: Adrian Blundell-Wignall, Special Advisor to the OECD Secretary-General on Financial and Enterprise Affairs and Chair of the Advisory Board of the OECD Centre on Green Finance and Investment

17:45-19:00 **Cocktail (George Marshall Room)**

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