BRIEFING PAPER

Shifting the Trillions

The Role of the G20 in Making Financial Flows Consistent with Global Long-Term Climate Goals

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– Consultation Draft –

GERMANWATCH

Brief Summary

The landmark Paris Agreement and the Agenda 2030 provide a new framework for global decarbonization and sustainable, climate-resilient development. Multilateral bodies like the G20 provide a natural focus point for governments of the leading industrial nations and emerging economies to take common action towards the achievement of these global goals. The mobilization of finance for sustainable investment, in particular the transition to a renewable energy system, is one of the most urgent but also promising tasks ahead.

This briefing paper outlines the potential of the G20 as a platform for action to shift international financial flows to low-carbon and climate-resilient development. It introduces the relevant long-term climate and Sustainable Development Goals, and outlines the current energy-, climate- and infrastructure-related work streams within the G20. It addresses the need to provide a reliable political framework for ambitious action and the important role of "long-term low greenhouse gas emission development strategies". It then explores a broad range of issues related to the mobilization and characteristics of transition finance, such as disclosure of climate-related risks in the financial markets, stress testing and decarbonization strategies for businesses, the phase out of fossil fuels and policy instruments to correct the current market distortion and set energy prices right by pricing carbon dioxide emissions, and "Paris-compatible" investment criteria for public and private finance. Directed at decision makers and policy experts, it also highlights action items and options for intervention during the incoming German G20 presidency.

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BMZ Federal Ministry for Economic Cooperation and Development

STIFTUNG MERCATOR

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List of Abbreviations

CPLC	Carbon Pricing Leadership Coalition
ESG	Environmental, Social and Governance
ETS	Emission Trading System
FSB	Financial Stability Board
G20	Group of Twenty
GCF	Green Climate Fund
GFSG	Green Finance Study Group
GHG	Greenhouse Gas
GIB	Green Investment Bank
GI Hub	Global Infrastructure Hub
ICAP	International Carbon Action Partnership
IEA	International Energy Agency
IIWG	Investment and Infrastructure Working Group
IMF	International Monetary Fund
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
LTS	Long-Term Strategies
MDB	Multilateral Development Bank
NDC	Nationally Determined Contribution
OECD	Organisation for Economic Co-Operation and Development
PA	Paris Agreement
PMR	Partnership for Market Readiness
PRI	Principles for Responsible Investment
RE	Renewable Energy
SCC	Social Cost of Carbon
SDG	Sustainable Development Goal
SE4ALL	Sustainable Energy Access for All
TCFD	Task Force on Climate-Related Financial Disclosure
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

Summary

2015 marks a turning point for international climate and development policy. Amidst growing threats from international terrorism, ongoing war, uncertain economic perspectives and the rise of nationalist parties and candidates across the world, signs of hope prevailed: After years of committed debate, the UN General Assembly adopted the 17 Sustainable Development Goals (SDGs), promising to end poverty and create a fair, green and prosperous world for all by 2030. The historic Paris Agreement (PA) was forged under the United Nations Framework Convention on Climate Change (UNFCCC), ending a long-lasting political deadlock. This new-found momentum in international climate policy is supported by changing trends in the real economy: energy-related CO_2 emissions stagnated, global investment in renewable energy generation outpaced all other energy investment, and investors withdrew a total amount of USD 230 billion from carbon-intensive companies, technologies and projects.

The PA firmly states that temperatures must be held well below 2°C, if not 1.5°C to avoid disastrous climate change and its impacts. World leaders also committed to foster adaptation and resilience, and to making financial flows consistent with resilient, low GHG development. At the same time, SDG 7 supports the access to clean and modern energy for all as a crucial prerequisite to development and human well-being. The PA has set the world on a track towards decarbonization of the global economy by mid-century, and Agenda 2030 emphasizes the right to development and ensures that "no one is left behind". But while international agreements make implementation more likely, they don't guarantee it. To ensure a fast and ambitious implementation of the PA and Agenda 2030, multilateral fora beyond the UNFCCC and bilateral transformational partnerships will play a crucial role. The G20 constitutes an important platform to address the global low-carbon transformation: it unites both the leading industrialized countries and the most important emerging and growing economies, represents two-thirds of global population, three-quarters of global greenhouse gas emissions and more than four-fifth of global GDP, the worlds' largest fossil fuel producers and users, but also those aspiring to lead the green and renewable technology transition. While the G7 countries must continue to take the lead for both mitigation and climate finance, such endeavours will be far from sufficient unless the large emerging economies such as China, India, Brazil or Indonesia also commit to base their growth and development on a low-carbon pathway. While universal participation within the UNFCCC continues to be vital to ensure the equitable and fair representation of poor and small countries and their interests, the G20 as a forum of the major economies are well suited to address competitiveness concerns, global investment and infrastructure challenges and the need to move forward in a coordinated manner to enable global decarbonization.

Traditionally focused on economic growth and financial stability, the G20 started working on "green growth" and infrastructure investment during the Mexican presidency in 2012. The current Chinese presidency has taken unprecedented steps to widen the scope of G20 governance by endorsing the SDGs and the PA. China announced its intention to ratify the PA before the Hangzhou G20 summit on September 4th–5th, and encouraged all other G20 members to follow suit. China also created the "Green Finance Study Group" (GFSG) tasked with the identification of institutional and market barriers to green finance and options to enhance the mobilization of private funds for green investment. Work within G20 continues to foster and streamline infrastructure investment through several initiatives, however the disconnect between the infrastructure work done in the finance track and the broader sustainability and climate goals mainly dealt with under the so-called "sherpa-track" merits close scrutiny. Since the G20 declared their commitment to end "inefficient fossil fuel subsidies" in 2009, only a few countries have made progress on that subject; however, the process got new momentum, through low oil prices, the mutual subsidy peer review process currently undertaken by China and the US, and soon to be followed by Germany,

Mexico and Indonesia, and finally through the 2016 G7 summit setting 2025 as an end-date for their subsidy phase out.

The newly established "Task force on climate-related financial disclosure" (TCFD) that works under the auspices of the Financial Stability Board, also reports to the G20. The TCFD came into life in response to increased awareness about the financial stability risks related to both climate change and the policies to combat it. This concerns risks presented to physical assets through impacts of climate change, material risks through liability claims and most importantly, transition risks posed by the "tragedy of the horizon", the misalignment of financial markets and instruments with the long-term strategies required to address climate change. Failure to align investment, particular for infrastructure, with the long-term climate goals, due to delayed or insufficient policy frameworks and incentives, would lock in high carbon emissions and could constitute a major risk to both the financial system and the physical economy. It has to be anticipated that politicians may have to react abruptly to climate shocks in the future – stranding a larger number of long-term assets sooner than expected. A finance industry-led group, the TCFD will produce recommendations for disclosure of climate-related risks within the financial system and corporations early 2017.

While these processes point in the right direction, the G20 remain an (informal) forum dominated by finance ministers and central bank governors that is rather intransparent and works apart from democratic control or public participation, without a dedicated implementation structure or established secretariat. As the G20 are mainly geared towards fostering global economic growth and financial stability, mainstreaming sustainability and climate concerns into all G20 work streams is extremely important but will be a challenging endeavour. Public scrutiny is essential to ensure that environmental integrity and social inclusion criteria are met across the board.

The German G20 presidency constitutes a unique chance to follow up on the success of the 2015 G7 summit in Schloss Elmau, Bavaria, and push for rapid and ambitious implementation of both the PA and Agenda 2030. One particularly important issue that should be taken up by the German presidency is a commitment of the G20 to formulate and submit ambitious long-term strategies for deep decarbonization (LTS) in time for the 2018 stocktake under the UNFCCC. LTS are essential tools to guide long-term investment and business decisions. They are also crucial to align broader development goals with a PA-compatible emission trajectory, and account for path-dependencies further down the road. At their 2016 summit, G7 leaders committed to formulate and communicate ambitious LTS well ahead of the 2020 deadline set by the UNFCCC. This timeline should be sharpened to 2018 and the scope broadened to include all G20 nations, and accompanied by an internal G20 LTS platform and review process. The German presidency should embrace and support existing green finance and disclosure initiatives, using the G20 as a forum to prepare a financial system reform that mainstreams low-carbon and sustainability issues. This would include implementing and building on the recommendations of the TCFD, with a special focus on a roadmap towards making disclosure mandatory and the introduction of stress tests for companies, continuing the work of the GFSG, building support systems for investments in the energy transformation in developing countries and reconfirming commitments to climate finance. Also, efforts should be made to install a process towards meaningful carbon pricing within the G20: first by removing negative prices through a phase out of all fossil fuel subsidies if possible by 2020, but no later than 2025, and second through a process towards steadily increasing price signals within G20 countries, based on domestic taxes, levies or minimum prices in Emission Trading Systems, to enable transformational change across sectors. All this should happen under a broader effort to align all G20 finance, development and infrastructure work streams with the Paris Agreement and the SDGs.

Zusammenfassung

2015 markiert einen Wendepunkt in der internationalen Klima- und Entwicklungspolitik. Die derzeitige Weltlage ist geprägt von Krisen, Terrorismus und Krieg, der anhaltenden Schwäche der Weltwirtschaft und dem Aufstieg von rückwärtsgewandten nationalistischen PolitikerInnen weltweit; dennoch gaben zwei historische Ereignisse 2015 Anlass zur Hoffnung: Nach Jahren engagierter Debatte verabschiedete die UN-Generalversammlung die Agenda 2030 mit den 17 globalen Zielen zur nachhaltigen Entwicklung (SDGs) – die Verpflichtung, extreme Armut und Ungleichheit zu beenden und bis 2030 eine gerechte, grüne und prosperierende Welt für alle zu schaffen. Unter dem Dach der Klimarahmenkonvention der Vereinten Nationen (UNFCCC) wurde zudem das historische Pariser Abkommen (PA) beschlossen. Diese neue Dynamik in der internationalen Klimapolitik wird durch eine sich andeutende Trendwende in der realen Wirtschaft unterstützt: Die energiebedingten Treibhausgasemissionen stiegen 2015 nicht weiter an, globale Investitionen in erneuerbare Energien übertrafen erstmals diejenigen für alle anderen Energieträger und Investoren zogen 230 Milliarden US-Dollar aus klimaschädlichen Geldanlagen ab.

Das PA enthält die Verpflichtung, die globale Erwärmung auf deutlich unter 2 °C, besser sogar 1,5 °C zu begrenzen, um gefährlichen Klimawandel zu vermeiden. Außerdem haben sich darin alle Länder verpflichtet, ihre Anstrengungen im Bereich Anpassung zu vertiefen sowie Finanzflüsse in Richtung einer treibhausgasarmen und klimaresilienten Entwicklung zu lenken. Gleichzeitig fordert das SDG 7 den Zugang zu sauberer und moderner Energie für alle als eine Grundvoraussetzung für Entwicklung und menschliches Wohlbefinden. Das Pariser Abkommen hat den Weg geebnet für eine Dekarbonisierung der Weltwirtschaft bis zur Mitte des Jahrhunderts und die SDGs untermauern das Recht auf Entwicklung, bei der niemand zurückgelassen wird. Um nun eine schnelle und ehrgeizige Umsetzung des Klimaabkommens und der Agenda 2030 sicherzustellen, spielen neben der UNFCCC auch andere multilaterale Foren sowie transformative Partnerschaften eine bedeutende Rolle. Die G20 bietet sich als Plattform an, um die Transformation zur einer treibhausgasneutralen Welt voranzutreiben: sie vereint die führenden Industrienationen und die wichtigsten Schwellenländer, repräsentiert zwei Drittel der Weltbevölkerung, mindestens drei Viertel der globalen Treibhausgasemissionen und mehr als vier Fünftel des globalen Bruttoinlandsprodukts. Die weltweit größten Produzenten und Verbraucher von Kohle, Öl und Gas sind ebenso vertreten wie jene, die um die Führung bei grünen und erneuerbaren Technologien konkurrieren. Auch wenn die Industrieländer der G7 bei Klimaschutz und -finanzierung weiterhin vorausgehen müssen, wären deren Bemühungen doch nicht ausreichend, wenn die aufstrebenden Volkswirtschaften China, Indien, Brasilien oder Indonesien sich nicht verpflichteten, bei ihrem Wachstum und ihrer Entwicklung auf treibhaugasarme Technologien zu setzen. Die UN-Klimarahmenkonvention mit ihrer universellen Beteiligung bleibt der richtige Rahmen zur Entwicklung völkerrechtlicher Regeln zur Klimapolitik, damit auch die kleinen Staaten und deren Interessen angemessen und gerecht beteiligt werden. Ergänzend dazu ist die G20 als Forum der größten Volkswirtschaften geeignet, Fragen wie Wettbewerbsfähigkeit, Infrastruktur und Investitionen anzugehen, um die globale Dekarbonisierung koordiniert voranzutreiben.

Traditionell liegt der Schwerpunkt der G20 auf Wirtschaftswachstum und Finanzmarktstabilität, doch seit der mexikanischen Präsidentschaft 2012 diskutiert sie auch „grünes Wachstum“ und Infrastrukturinvestitionen. Die aktuelle chinesische Präsidentschaft hat erklärt, dass nachhaltige Entwicklung – orientiert an der Agenda 2030 – ein Kernthema der G20 werden soll. China hat außerdem angekündigt, das PA bis zum G20-Gipfel in Hangzhou am 4. und 5. September 2016 zu ratifizieren und andere G20-Staaten ermutigt, diesem Beispiel zu folgen. Ebenso hat China die „Green Finance Study Group“ (GFSG) einberufen, um Hürden für ein „grüneres“ Finanzsystem zu identifizieren und Möglichkeiten für die Mobilisierung von privaten Mitteln für nachhaltige Investitionen zu untersuchen. Durch mehrere Initiativen unterstützt die G20 weiterhin die Förderung von

Infrastruktur-Investitionen. Jedoch erfolgt die Arbeit zur Infrastruktur – hauptsächlich im sogenannten „finance track“ der Finanzminister – bisher weitgehend getrennt von jener zu den Nachhaltigkeits-, Klima- und Entwicklungszielen im sogenannten „sherpa track“ der Regierungschefs. Seitdem die G20 im Jahr 2009 erklärt hat, ineffiziente Subventionen für fossile Energieträger beenden zu wollen, haben nur wenige Länder substantielle Fortschritte gemacht. Der Prozess hat zuletzt durch die freiwillige gegenseitige Begutachtung an Schwung gewonnen. Nach den USA und China haben sich nun auch Deutschland, Mexiko und Indonesien zu einem solchen „peer review“ bereit erklärt. Und zuletzt hat der G7-Gipfel 2016 mit der Einigung auf das Enddatum 2025 für den Abbau von fossilen Subventionen erstmal eine klare zeitliche Vorgabe gemacht, der sich die G20 anschließen könnte. Die neu gegründete Task Force für klimabezogene finanzielle Offenlegung (TCFD) arbeitet unter der Federführung des Finanzstabilitätsrates (FSB), der an die G20 berichtet. Die TCFD ist eine Reaktion auf das gestiegene Bewusstsein für Finanzstabilitätsrisiken durch den Klimawandel und Klimapolitik. Diese umfassen physische Risiken für Sachwerte durch Klimawandelfolgen, Haftungs- und Klagerisiken, sowie sogenannte „Transitionsrisiken“. Hintergrund ist das Auseinanderfallen der Investitions- und Risikohorizonte an den Finanzmärkten: Während Finanzmarktakteure sich kurzfristig orientieren, sind die Auswirkungen des Klimawandels und die notwendigen Planungshorizonte für seine Bekämpfung langfristig. Sollte hier nicht rechtzeitig durch intelligente politische Rahmensetzung für eine globale Dekarbonisierung gegengesteuert werden, könnte ein systemisches Finanzmarktrisiko entstehen. Die TCFD, eine von der Finanzindustrie getragene Gruppe, wird zu Beginn des Jahres 2017 Empfehlungen für die (freiwillige) Offenlegung von Klimarisiken für Unternehmen und das Finanzsystem vorlegen.

Die deutsche G20-Präsidentschaft bietet eine einmalige Gelegenheit, an den Erfolg des G7-Gipfels 2015 auf Schloss Elmau in Bayern anzuknüpfen und die Grundsteine für eine rasche und ehrgeizige Umsetzung des PA und der SDGs durch die G20 zu legen. Ein besonderer Fokus sollte dabei auf einer Verpflichtung liegen, ehrgeizige langfristige Strategien für treibhausgasneutrale Entwicklung (LTS) zu formulieren und rechtzeitig zur ersten Überprüfungsrunde der Pariser Klimaziele 2018 einzureichen. LTS sind erforderlich, um langfristige Investitionen und Unternehmensentscheidungen zu lenken. Sie ermöglichen es, Entwicklungs- und Klimaziele zu vereinbaren und drohende Pfadabhängigkeiten zu identifizieren und zu vermeiden. Auf dem G7-Gipfel in Japan 2016 verpflichteten sich die vertretenen Industrieländer, ihre LTS deutlich vor 2020 zu erarbeiten. Diese Erklärung sollte auf 2018 präzisiert und auf alle G20-Staaten ausgeweitet werden, begleitet von einer G20-LTS-Plattform und einem Verfahren zu gegenseitigen Begutachtung. Die deutsche Präsidentschaft sollte die G20 als Forum für globale Reformen der Finanzmärkte nutzen, die Klima- und Nachhaltigkeitskriterien im Mainstream etablieren. Dafür sollten bestehende grüne Finanz- und Offenlegungsinitiativen unterstützt und ausweitet werden. Unter anderem sollte auf den Empfehlungen der TCFD aufgebaut werden, insbesondere mit einem Fahrplan zu verpflichtender Offenlegung und einer Einführung von Stresstests für Unternehmen. Außerdem sollten die Arbeit der GFSG fortgeführt, Unterstützungsmechanismen für Investitionen in die Energiewende in Entwicklungsländern geschaffen und die Verpflichtungen der Industrieländer zur Klimafinanzierung bestätigt werden. Zudem sollte ein Prozess initiiert werden, um in allen G20-Staaten die Bepreisung von CO_2 einzuführen: Zunächst durch den Abbau negativer Preise, also einer Abschaffung von Subventionen für fossile Energieträger, wenn möglich bis 2020, aber nicht später als 2025; dann durch einen Prozess in Richtung kontinuierlich ansteigender Preissignale, um einen transformativen Wandel über Sektorengrenzen hinweg zu ermöglichen. Diese Preissignale können national unterschiedlich ausgestaltet – als Steuern, Abgaben oder Mindestpreise – und zunächst auch in der Höhe differenziert sein. Die deutsche Präsidentschaft sollte es sich als Ziel setzen, die gesamte Arbeit der G20 zu Finanzen, Entwicklung und Infrastruktur mit den Zielen der Agenda 2030 und des Pariser Abkommens in Einklang zu bringen, und diesem Prozess eine institutionelle Gestalt zu verleihen.

1 Introduction

The current global situation is characterized by multiple crises: Armed conflict in Syria and elsewhere, terrorist attacks, strained relationships between major global powers, growing inequalities, record-low interest rates and a bleak outlook for the global economy. Amidst these crises, two remarkable events yielded hope that the international community is still able, through multilateral diplomacy, to agree on global frameworks that could help to address the root causes of many crises. In September 2015, the United Nations (UN) General Assembly adopted Agenda 2030, encompassing 17 Sustainable Development Goals (SDGs) that formulate universal goals for all countries. In December, the Paris Agreement (PA) was adopted under the UN Framework Convention on Climate Change (UNFCCC), setting ambitious objectives and obligations for all countries to address global climate change. These multilateral documents set a clear framework for sustainable development and a just transition away from fossil fuels.

Now the obligation for all nations is to deliver on these commitments, and the world's largest economies bear a particular responsibility. Implementing the three overarching goals of the PA must be of the highest priority: to hold the increase in the global average temperature to well below 2°C and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels; to increase the ability to adapt to the adverse impacts of climate change and foster climate resilience; and to make finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development. Climate action has to be pursued within a broader sustainable development context, as outlined by the Agenda 2030. In particular, access to affordable, reliable, sustainable and modern energy for all by 2030, as enshrined in the SDG 7 and supported by the Sustainable Energy for All Initiative (SE4ALL) forms a prerequisite for social and economic well-being and is a central enabling condition for many other SDGs.

Innovations in technology, policy and business models already show a real-world impact. The price of renewable energies is falling, while the outlook for fossil fuels is becoming less and less certain. Annual global investments in renewable energy-based electricity generation have been growing for years and reached USD 265.8 billion in 2015, which is more than double the amount invested in fossil fuel-based capacity in the same year. Renewable energy (excluding large hydro) made up 53.6% of the new power generating capacity installed in 2015, outpacing conventional generation for the first time[1]. According to the International Energy Agency (IEA), global energy-related CO_2 emissions have not increased the second year in a row[2].

These are signs of a trend reversal in global energy systems that is urgently needed to achieve the ambitious objectives set in Paris. Still, global decarbonization by 2050 entails far reaching requirements to re-think and re-model almost every area of modern day life, including potentially disruptive consequences for the current business model of fossil fuel producing industries and countries. The G20 group unites the world's most powerful industrialized countries and the most important emerging economies. Combined, the group accounts for 75%–80% of global greenhouse gas emissions[3], 80% of world trade and almost 90% of global GDP[4]. Traditionally focused on global financial stability, the G20 is an appropriate platform to address one of the most urgent questions concerning the zero-carbon transition: How to mobilize the finances for a just transition to a zero-carbon economy and the necessary measures to build resilience and adapt to a changing climate, "shifting the trillions" from polluting and climate-damaging investments to a clean, green and sustainable economy.

This briefing paper outlines the potential of the G20 as a platform for action to shift international financial flows to low-carbon and climate-resilient development. It introduces the relevant long-term climate and Sustainable Development Goals, and outlines the current energy-, climate- and infrastructure-related work streams within the G20. It addresses the need to provide a reliable

political framework for ambitious action and the important role of "long-term low greenhouse gas emission development strategies". It then explores a broad range of issues related to the mobilization and characteristics of transition finance, such as disclosure of climate-related risks in the financial markets, stress testing and decarbonisation strategies for businesses, the phase out of fossil fuels and policy instruments to correct the current market distortion and set energy prices right by pricing carbon dioxide emissions, and "Paris-compatible" investment criteria for public and private finance. Directed at decision makers and policy experts, it also highlights action items and options for intervention during the incoming German G20 presidency. This consultation draft is published in the run-up to the Hangzhou summit to provide background, but also to stimulate discussion and invite feedback. We will publish an updated version, incorporating reviews received and the outcomes of the 2016 G20 summit, in time for the beginning of the German G20 presidency in December 2016.

2 Long-Term Climate Goals

The SDGs and Agenda 2030 provide a new framework for sustainable development across the world. To ensure universal access to affordable modern energy by 2030 investment in clean energy sources such as solar, wind and geothermal has to be ramped up significantly. During the G7 meeting in Schloss Elmau world leaders committed to the decarbonization of their economies in the second half of this century. Half a year later in Paris the international community's ambition to seriously address climate change was cast into a legally-binding agreement with global scope. The following sections will briefly summarize the key decisions of the Paris Agreement and unravel the related challenges and opportunities in the area of finance and investment.

2.1 The Paris Agreement

The Paris Agreement (PA) is a legally-binding framework to collectively tackle climate change and its consequences and was adopted in December 2015 by 196 Parties to the UNFCCC. The PA represents an historic turning point in international climate change negotiations on the way towards a zero-carbon and climate resilient world, because it sets clear global objectives and contains universal obligations for all countries. For its entering into force, 55 or more Parties representing at least 55% of global greenhouse gas emissions must ratify the Agreement. The PA comprises three long-term goals which aim to strengthen the global response to the risk of climate change in the context of sustainable development and efforts to eradicate poverty.

The first long-term goal is to ensure that the global average temperature stays well below 2°C above pre-industrial levels and to pursue efforts to limit the increase in temperature to 1.5°C above pre-industrial levels[5] (Art. 2.1a). To achieve this, all countries need to peak their emissions at the earliest possible date and reach net zero emissions (a balance between anthropogenic emissions by sources and removal by sinks of greenhouse gases) in the second half of the 21st century, while at the same time recognizing that peaking will take longer for developing country Parties (Art. 4.1). This goal encompasses not only CO_2 emissions from the energy sector, but all greenhouse gases from all sectors. Emissions scenarios that are compatible with the temperature objectives of the PA show that energy-related CO_2 emissions will need to be reduced faster and reach zero in the middle of the century. The objectives set in the Paris Agreement therefore imply global decarbonization – the phase out of all fossil fuels (coal, oil and gas) – by mid-century.

The second long-term goal is to strengthen the ability to adapt to the adverse impacts of climate change and foster climate resilience (PA Art. 2.1b). Developing country parties will receive support for planning, implementing and communicating their adaptation activities. Moreover, the Agreement clearly acknowledges the issue of loss and damage as separate from adaptation.

The third goal is to make all financial flows consistent with a pathway towards low emissions and climate-resilient development (PA Art. 2.1c), which will be discussed further in section 2.2. The PA also clearly emphasizes that industrialized countries need to continue efforts regarding their commitment to mobilize USD 100 billion climate finance annually by 2020 until 2025, with voluntary contributions from emerging economies and to adopt new and higher collective goals thereafter. Follow-up commitments need to be negotiated, but are expected to exceed this sum and to integrate contributions from emerging economies. Donor countries are obliged to report on financing and renew pledges biannually. The industrialized countries' commitment to mobilize finance is to be supplemented by the provision of capacity building and technology transfer.

The PA invites all Parties to the Agreement to formulate long-term low greenhouse gas emission development strategies (LTS) and communicate them to the UNFCCC secretariat by 2020 (Art. 4.19, Decision Paragraph 35). A central piece of the PA is the so-called "ambition mechanism" (see Figure 1). All countries are legally required to submit so-called "nationally determined contributions" (NDCs), containing national reduction targets and the instruments and measures to reach these goals every five years. Beginning in 2023, and every 5 years thereafter, a global stock-take within the UNFCCC will assess the level of common ambition, and national contributions will have to increase their ambition accordingly. The first stage of this process is the 2018 facilitative dialogue which will discuss the aggregate effect of the intended nationally determined contributions (INDCs) submitted so far, informed by the "IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-industrial Levels and related Global Greenhouse Gas Emission Pathways" (due in September 2018). It will compare ambitions set forth in the combined INDCs or NDCs with the global long-term goal, in order to facilitate the submission of more ambitious NDCs.

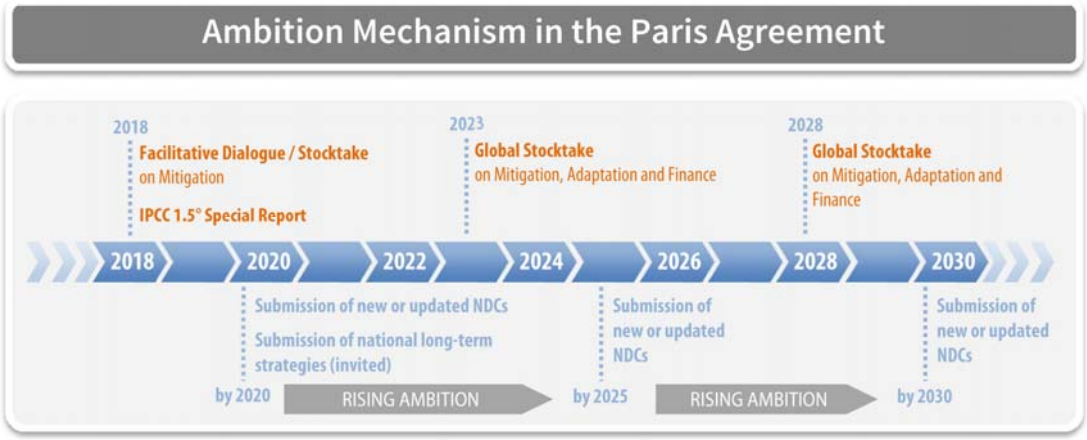

Figure 1:The Paris Agreement ambition mechanism. Source: own illustration, based on the Paris Agreement[5]

2.2 Implications for Finance and Investment

The Paris Agreement has set important goals for finance that now have to be carried forward by other institutions and actors, such as the G20. Climate finance has become more reliable and foreseeable, though a hefty post-2025 debate concerning climate finance volume and the role of emerging economies can be anticipated. Also, important aspects of a "Paris-compatible" financial architecture need to be addressed. While neither the phase out of fossil fuel subsidies nor the

establishment of a price signal for carbon are mentioned in the PA, both are important stepping stones to facilitate financial flows for the global transformation.

Article 2 of the PA spells out the intent to "strengthen the global response to the threat of climate change", including by "making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development" (Article 2.1c) [5]. Art. 2.1c not only addresses the provision of appropriate funds to vulnerable countries to increase resilience and finance low-carbon development. It also requires investment into new, clean technologies and divestment from fossil fuels and other GHG-intensive practices to be mainstreamed across all bodies that deal with investment and finance, including capital markets, development banks and public procurement. In its consequence, Article 2.1c may lead to large new investments e.g. in energy efficiency and renewable energies, to the retirement of assets and the change of development models of entire nations.

Apart from the "shifting the trillions" paradigm – divesting from fossil fuels and mobilizing finance for clean and resilient development – financial stability and risk constitutes another important issue to consider. First, there is a risk of devaluation of existing assets: fossil fuel reserves and resources rendered "unburnable" by the remaining carbon budget[6,7]. Also, with fossil fuels being the dominant energy strategy across the world, many of the stock market's most valuable assets depend on it directly or indirectly. Oil, gas and coal companies are one side of that coin; in their current form, other sectors such as the automotive industry, air carriers, heating and cooling system design, the chemical industry are built on the use of fossil fuels, and need to revise their business models to be consistent with a low-carbon development path. Ambitious climate policy, in line with global objectives, is a very serious risk for the financial well-being of these companies and of those who have invested in them. A systemic risk stems from carbon-intensive long-term investments done in spite of the universal political will to decarbonize: if the necessary framework to phase out fossil fuels and invest in low-carbon alternatives is implemented too late, a hard landing could be the consequence in response to sudden shifts in environmental policy[8,9].

"In other words, an abrupt resolution of the tragedy of horizons is in itself a financial stability risk. The more we invest with foresight; the less we will regret in hindsight" (Marc Carney)

The business and financial communities increasingly realize that climate change is inevitable, and that its impacts, as well as abatement policies, may present material risks and opportunities. In the run-up to Paris, 350 investors representing more than USD 24 trillion in assets under management called on world leaders to forge a meaningful and ambitious climate agreement. The Montreal Carbon Pledge, with 120 investors representing over USD 10 trillion in assets, commits investors to undertaking and disclosing the carbon footprint of their investment portfolios[10]. Beyond such static disclosure, companies are increasingly challenged to publish decarbonization plans, and risk assessments related to both physical climate change impacts and the effect of climate policies (see Chapter 5).

There is a need for a wider financial system reform to address both the risks posed by climate change and the financial requirements of achieving the SDGs and the Paris climate goals, and break the "tragedy of the horizon"[8]. In their recent report on the design of a sustainable financial system[11], UNEP Inquiry defines the tasks for financial system reform in the face of climate change as the 4Rs of capital raising, enhanced responsibilities, strengthened risk management and systematic reporting (see Box in Chapter 7). The UNEP Inquiry report also addresses more general concerns within the financial system. They identify short-termism and excessive leverage as significant drivers of instability and reasons why longer-term sustainability-related risks are being sidelined in financial decision making. As over-sized, over-complex financial systems can negatively impact economic growth and income equality, they stress that to replicate current financial systems is not a sustainable answer for developing nations. Mapping such a far-reaching reform of

the global financial architecture is beyond the scope of this paper. However, it should definitely be a part of the G20 agenda, given their primary objective is to foster a stable and effective financial system, ensure economic stability and provide intervention in the case of a crisis. In 2016, sustainable development and climate challenges form an inherent part of this task.

3 The Group of 20

The G20 was formed in 1999 as a forum for the Bretton Woods Institutions, International Monetary Fund (IMF) and World Bank, and finance ministers and central bank governors representing the G7 countries (Canada, France, Germany, Italy, Japan, the United Kingdom and the United States), the EU, Argentina, Australia, Brazil, China, India, Indonesia, South Korea, Mexico, Russia, Saudi Arabia, South Africa and Turkey. Today the G20 provides an international forum for these 20 major economies to coordinate on issues related to global financial stability and economic development. Since 2008, regular G20 summits have been convened on heads of government/state level, as a response to the financial crisis of 2007–2010, but also to the growing weight of key emerging economies in global governance.

As an informal body the G20 does not have its own secretariat or administrative organs. It collaborates closely with other international organizations such as the OECD, IEA or UNEP which often facilitate longer-term work streams. Its annual work program is laid out by the presidency under two general work streams: the finance track focuses on the core issues of the G20 (financial stability and economic growth), and the sherpa track with a broader work program, often depending on the short-term initiatives by the current presidency (see Figure 2). In addition to the regular G20 finance ministers and central bank governors meetings, other ministerial meetings, such as for energy, trade or agriculture are also convened, and civil society is increasingly being involved through the establishment of so-called “engagement groups”.

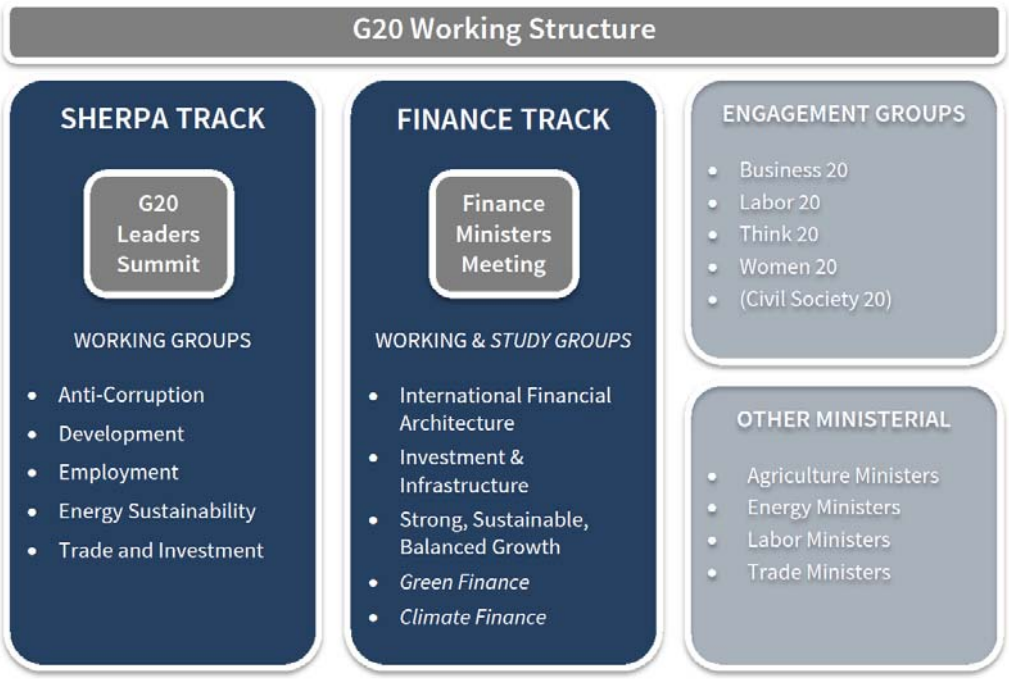

Figure 2: Governance structure of the G20, including working and study groups related to energy, climate and infrastructure. Source: own illustration.

3.1 G20 Initiatives on Energy, Infrastructure and Climate

Since the G20 has a focus on economic development and financial stability, climate change has only recently emerged as a key area. Energy security and (fossil) energy governance have been taken up within the G20 for some time, e.g. through efforts to curb excessive volatility in oil and gas prices and increase transparency in those markets by way of the Joint Organisations Data Initiative[12]. Another important issue, the phase out of inefficient fossil fuel subsidies, has been reiterated since its first adoption in the Pittsburgh Summit 2009, however little progress has been made. Green investment, renewable energy, energy access and climate change have been prominently on the agenda since the 2012 Mexican Presidency where "Inclusive Green Growth" was established as a priority area for the G20 development agenda. At the Los Cabos Summit, the "GreenInvest platform" was mandated under the development working group with the aim to facilitate investment into renewable energies in emerging economies[13]. The Climate Finance Study Group (see Box) was established by G20 finance ministers with a view to consider ways to effectively mobilize resources taking into account the objectives, provisions and principles of the UNFCCC[14]. In 2013, the G20 Energy Sustainability Working Group was established, and in 2014 the G20 Leaders' Summit endorsed the **G20 Principles on Energy Collaboration**, committing to work together "to ensure access to affordable and reliable energy for all". In 2015, the first ever G20 energy ministers meeting adopted the **G20 Energy Access Action Plan**: Voluntary Collaboration on Energy Access, the first phase of which focused on enhancing electricity access in Sub-Saharan Africa[13]. The G20 also announced close collaboration with the UN SE4ALL initiative, which aims to ensure universal access to modern energy by 2030, as well as the doubling of global rate of improvement in energy efficiency and the share of renewable energy in the global energy mix.

In November 2014, G20 Leaders agreed a "Global Infrastructure Initiative" to lift quality public and private infrastructure investment, including the establishment of the Global Infrastructure Hub (GI Hub). The GI Hub works to address data gaps, lower barriers to investment, increase the availability of investment-ready projects and improve project and policy environments for infrastructure.

Infrastructure includes all installations required for the functioning of modern societies. Due to its high capital intensity and long life spans, infrastructure plays a decisive role in shaping future societies. Infrastructure development carries both a high transformative potential – if investments are steered towards clean energy, low-carbon transport and sustainable cities – and a high risk to lock-in carbon-intensive pathways, if investments support fossil energy production and high-emission growth patterns. Due to the path-dependency created by today's infrastructure investment, the "greening" of infrastructure planning and investment is of crucial importance; achieving real coherence between the PA and Agenda 2030 ambitions and the traditionally growth-oriented, fossil fuel dominated G20 infrastructure work stream might be the most important task ahead.

3.2 The Chinese Presidency

The Chinese Presidency leads the G20 under the headline **"Towards an Innovative, Invigorated, Interconnected and Inclusive World Economy"**. The four I's address four priority areas: breaking a new path for growth, more effective and efficient global economic and financial governance, robust international trade and investment, and inclusive and interconnected development. China acknowledges the widening gap between rich and poor and is calling for inclusive global growth and development to lessen inequalities. It also makes a direct reference to sustainable development and the UN 2030 Agenda, highlighting the mobilization of climate finance as key to realizing

that agenda. However, with its economy slowing and a global recession looming, growth remains the top priority for the Chinese presidency[15,16].

China established a Study Group on Green Finance (GFSG) under the finance track, tasked with the identification of institutional and market barriers to green finance and, based on country experiences and best practices, the analysis of options on how to enhance the ability of the financial system to mobilize private green investment, thereby facilitating the green transformation of the global economy. Its synthesis report was embraced by the finance ministers and central bank governors meeting in July, however, its future has not been decided.

The G20 Climate Finance Study Group

The Mexican G20 presidency established the Climate Finance Study Group (CFSG) in 2012. The G20 leaders tasked the CFSG "to consider ways to effectively mobilize resources taking into account the objectives, provisions and principles of the UNFCCC". Other than the GFSG, the scope of CFSG is clearly linked to the UNFCCC framework. The CFSG started its work by reviewing lessons learned on options for effectively mobilizing resources and climate finance and exchanging views on these options. Basically, the CFSG serves as a forum for sharing national experiences based on the expertise of finance ministries, without duplicating the work under the UNFCCC. The study group also receives support from relevant international organizations as well as stakeholders from the private sector and covers not only national and international policies and instruments to increase public finance, but also private finance.

In 2014 the CFSG identified four main policy options: (1) Financing for adaptation, (2) Alternative sources and approaches to enhance climate finance and its effectiveness, (3) Enabling environments in developed and developing countries to facilitate the mobilization and deployment of climate finance, and (4) examining the role of relevant financial institutions and MDBs in mobilizing climate finance. At the 2015 summit in Turkey the CFSG reaffirmed the group's general focus "*on sharing national experiences between G20 countries",* stressing that *"there is no 'one-size fits all' policy and that country ownership is a key element to guide the enhancement of climate finance*" while work continued on similar focus areas. In their 2016 communiqué, finance ministers welcome the CFSG report "Promoting Efficient and Transparent Provision and Mobilization of Climate Finance to Enhance Ambition of Mitigation and Adaptation Actions" and take note of the "Outlook on Mainstreaming Climate Change Considerations into Development Assistance and Climate Finance Programs" prepared by the CFSG. Looking forward "to further discussions on the toolkit prepared by invited international organizations for the CFSG on promoting efficient and transparent provision and mobilization of climate finance", the finance ministers agreed to continue their work on climate finance in 2017[14].

The Communiqué of the energy ministers' Meeting in June 2016 adopted the G20 Voluntary Action Plan on Renewable Energy with the aim to substantially increase the share of renewable energy by 2030, improve the frameworks for enabling the scale up of renewable energy investment and continue to support the strengthening of international cooperation[17]. It also adopted the G20 Energy Efficiency Leading Programme[18] and agreed on Voluntary Pillars for Energy Efficiency Cooperation. A second phase of the Energy Access Action Plan will focus on Enhancing Energy Access in Asia and the Pacific.

In the Communiqué of their July meeting, the finance ministers and central bank governors call for timely implementation of the Paris Agreement and commitments made on climate finance and announce to keep working on climate finance during 2017[19]. They also reiterated their commit-

ment to phase out "inefficient" fossil fuel subsidies, stressing the importance of the voluntary peer review process. Germany, Mexico and Indonesia have already announced to follow after the US-China peer review currently underway, and the Communiqué encourages all other G20 countries to also participate in such reviews

Within the Investment and Infrastructure Group (IIWG), the Global Infrastructure Connectivity Alliance was launched with a Vision Statement drafted by the World Bank Group, who also serves as a secretariat for this Alliance. The Alliance is meant to enhance synergy and cooperation among various infrastructure connectivity programs, and should work closely with the Global Infrastructure Hub, OECD, other multilateral development banks (MDBs), and interested G20 members to support its activities[19].

Under Chinese leadership of the G20 IIWG in 2016, the MDBs unanimously endorsed a Joint Declaration of Aspirations on actions to support infrastructure investments [20], which includes "quantitative ambitions for high quality projects" from each MDB. The Global Infrastructure Hub was tasked to work with the MDBs to assess internal incentives with regard to crowding in private finance and to report to the IIWG in December 2016.

3.3 The Incoming German Presidency

During the 2015 G7 process and the summit in Schloss Elmau, German leadership contributed significantly to the landmark statement on "a decarbonization of the global economy over the course of this century" and a global energy transition by 2050, generating momentum for the UNFCCC later that year. The German G20 presidency presents a chance to build on that legacy, and push for strategic climate and energy action that facilitates the implementation of the Paris Agreement.

The internal organization of the G20 is built on a Troika of the former, current and next presidency, giving Germany the chance to work with two important emerging economies, China and Argentina, that will take over 2018. The German presidency won't state their strategic foci before they formally take over on December 1st, though it is expected that chancellor Merkel might give some indications during the Hangzhou summit. During her speech at the Petersburg dialogue, chancellor Merkel announced that international climate policy would be on the agenda of the German presidency. She also highlighted the role of long-term strategies, the G7 carbon pricing platform, climate finance and mobilizing private investment. Of course, the G20 addresses a broad range of issues beyond energy and climate, and the agenda of the leaders' summit is often dominated by ongoing crises and critical events. Still, the implementation of the Paris Agreement must rank high on the international agenda, and be complimented by strong national action. The G20 also presents a great opportunity for chancellor Merkel to implement strategies which emphasize the credibility of the international commitment to the Paris Agreement and ambitious pre-2020 action. However since the G20 summit on July 7th–8th 2017 in Hamburg will happen only months before the next general elections in Germany, action on the presidency's side will also be influenced by the electoral race and national campaign considerations.

4 Setting a Clear Policy Framework for Decarbonization

A stable and reliable policy framework and clear long-term orientation are essential for decarbonizing the world economy. The international aspiration to keep global warming well below 2°C if not 1.5°C above pre-industrial average temperatures has to be followed by ambitious national legislation, embedded in long-term strategies for low-carbon development and combined with transformational international partnerships. Ultimately, what will shift investments is a changed risk-return perception by investors. That is, if they perceive the risks to be growing and the potential returns to be falling for fossil fuel investments, they will reduce these investments. If on the other hand, risks are lowered for low-carbon investments and/or the returns are increasing, investments are going to flow in this direction. One of the most important tools for policy makers to influence the risk-return profile of different investments is to set clear long-term strategies. These strategies then need to be underpinned by effective and binding policies to be credible. The best mix of policy instruments will vary according to national circumstances, and over time.

4.1 The Rationale for a Long-Term Policy Framework

Short-term strategy has to be informed by long-term strategy. For example, a carbon price signal – produced by ETS, tax, levy or other policy instruments – will only deliver on long-term decarbonization if it is consistent with a long-term plan and guided by a clear policy framework. A carbon price signal alone lacks a mechanism to incentivize change beyond the incremental reactions to current and anticipated near-term price adjustments. Large-scale, fundamental shifts have to be prepared for on a different level. For example, while it is relatively straightforward to achieve the first 30% of emissions reductions in the power sector by a fuel switch from coal to gas, it might be unwise to invest into a massive new natural gas infrastructure knowing that 20 years down the road, the last 30% need to be tackled – and the remaining emissions of a gas fired power system are too high to deliver. The dynamic impact of policy decisions on political constraints over time is an additional key consideration[21], e.g. if low-carbon technology support schemes help create a low-carbon industry that will provide political support for more ambitious policies later in the process (see 6.3).

Stand-alone pricing strategies are also insufficient because even cost competitive low-carbon technologies are prevented from making their full contribution because of structural barriers such as regulatory rules, legacy infrastructures, and undeveloped complementary technologies (e.g. renewables require grids that are flexible, with rules that facilitate interconnection). Policies that ignore the question of how structural environments need to be changed to incorporate low-carbon technologies will therefore not be successful[22]. Also, while high carbon prices within an ETS may drive investment out of fossil fuels, they do not automatically create a corresponding inflow into renewable energy and energy efficiency, as high carbon prices also enhance the volatility risk of such investments due to potential fluctuations in future carbon prices.

Reliable long-term strategies are also essential to address the path dependency within development choices. Not only will they be needed to see whether, collectively, the world can reach the Paris climate goals, but they also help individual countries to align their emission trajectories with their Sustainable Development Goals. Greater certainty from governments on their long-term economic development and emission trajectories will enable the private sector to plan their investment strategies and business development models appropriately. By developing national

roadmaps towards the end of a global economy built upon fossil fuels, countries will create a positive policy framework for businesses to make informed decisions for shifting financial flows to climate-friendly investments, thereby reducing the risk of locking in high-carbon infrastructure[23]. At the same time this creates the basis for finance institutions to stress test carbon-intensive companies to what extent they are prepared for the envisaged change (see Chapter 5.2).

4.2 Designing Long-Term Strategies

Long-term low greenhouse gas development strategies (LTS) should explicitly address the domestic and international challenges of deep and rapid decarbonization, such as ensuring a just transition to renewable energy, including developing new jobs and ensuring support for displaced workers. Long-term strategies will contribute to identifying the challenges for the transformation ahead, open a space for democratic consultation, and secure a just transition for workers and communities which depend today on a fossil fuel-based economy.

Long-term strategies should be based on sectoral mitigation analysis and resilience assessment and should spell out how the pathway towards long-term decarbonization will be integrated into a country's legal framework. The strategies should aim to maximise their contribution towards wider sustainable development objectives such as poverty alleviation, access to clean energy and adaptation to climate impacts, and ideally be intertwined with individual countries' Agenda 2030 national strategies for sustainable development. They should aim to maximise economic, environmental and social co-benefits such as improved health through better air quality and greater energy security. The strategies should outline the frameworks, policy decisions and collaboration that will be put in place, such as budgetary provisions, private sector regulations and investment policy frameworks, to ensure that financial flows are consistent with Article 2.1c of the Paris Agreement and the 1.5°–2°C temperature limit.

Preparing the (intended) nationally determined contributions (NDCs) has shown the potential, but also the challenges that lie in low-carbon planning. Current pledges may limit future warming to around 3°C. In addition, most businesses and governments base their decarbonization strategies on outdated scenarios that result in 2°C warming by the end of the century with only 50% probability, consequently allowing for fossil fuel use to continue for decades. To hold global warming "well below 2°C" must result in even higher levels of ambition. The same is true for the aspirational goal of 1.5°C, though the latter will hardly be met without overshooting and subsequent withdrawal of large amounts of CO_2 from the atmosphere[24].

Currently there are only very few scenarios available that explore pathways to 1.5°C. The IPCC is working on a "Special Report on the Impacts of Global Warming of 1.5°C above Pre-industrial Levels and related Global Greenhouse Gas Emission Pathways", due in 2018. The result will provide much needed clarity about the remaining carbon budget, carbon cycle feedbacks, and how much of our known fossil reserves are unburnable.

In the meantime, however, interim strategies have to be developed based on the information available in order to move towards global peaking as soon as possible. The "deep decarbonization pathways" developed by the Deep Decarbonization Pathways Project, a global collaboration of energy research teams charting practical pathways to deeply reducing greenhouse gas emissions in their own countries, provide a starting point for most G20 countries[25]. The strategies should provide decadal benchmarks within a clear trajectory. However, given a steep learning curve and the high potential for technological innovation, the strategies will need to be reviewed and revised in regular intervals in order to reflect latest scientific findings, technological improvements as well as economic trajectory of the country.

While all countries and regions are different, and will have to develop their own pathways towards decarbonization, there is huge potential in mutual learning and exchange of best practices across sectors. Representing the major world economies, the G20 constitute a great forum to institutionalize such learning processes with a focus on industrialized nations. Such a platform would also establish trust, and help ratcheting up ambition, as actors will be inspired by the progress they see by their peers. Germany has just announced a NDC partnership helping developing countries with the preparation of their mitigation contribution and long-term climate-compatible development plans. However, in order to keep the Paris climate goals in reach, it is the world's largest economies that need to move forward as fast as possible. This could be facilitated by a LTS platform within the G20 and transformational partnerships between G20 countries or with developing countries.

While we have stressed that low-carbon development needs reliable political action, it is also essential that the political will to go through with the Paris Agreement becomes apparent across the board. G20 could enhance credibility by sending a strong message that there will be no sliding-back behind the PA, both through progress towards early ratification by its members, but also by decisive action on developing long-term deep decarbonization strategies.

The Paris Agreement mandates Parties to "strive to formulate and communicate long-term low greenhouse gas emission development strategies, mindful of Article 2, taking into account their common but differentiated responsibilities and respective capabilities, in the light of different national circumstances." Decision 1/CP.21, para 35 invites Parties to communicate their long-term strategies by 2020. At their 2016 summit, G7 leaders committed to "formulate and communicate ambitions mid-century long-term low greenhouse gas (GHG) emission development strategies well ahead of the 2020 deadline."[26] The G20 should follow and strengthen that commitment, by pledging to come forward with their interim plans by mid-2018, in time for assessment of their collective impact before the UNFCCC's 2018 facilitative dialogue, and to present their revised plans by 2020.

5 Reducing Climate Risk for Financial Markets

As the 2007–2009 financial crisis has shown, unanticipated risks can considerably jeopardize the stability of international financial markets. Following the widespread economic and social turmoil caused by the global crisis, the G20 summit in London 2009 established the "Financial Stability Board" (FSB), in order to monitor and mitigate risks to the global financial system.

Besides traditional risks like sovereign defaults or currency crises, the impacts of climate change to the international financial markets have recently received increased attention in international policy debates. In this context, the incumbent chairman of the FSB and governor of the Bank of England, Mark Carney, delivered a much-noticed speech in September 2015. Based on an analysis by the British Prudential Regulation Authority[27], he addressed the insurance market Lloyd's on challenges currently posed by climate change[8]. According to Carney, climate change entails a "tragedy of the horizon": the great deferment between cause and impact of climate change leads to disastrous consequences for future generations, as momentarily there are hardly any incentives to effectively fight its causes. This also translates to the financial sector, since the greatest impacts of climate change transcends the rather short-term planning horizons of financial market actors, providing investors with limited incentives to consider risks and impacts of climate change in their

current investment decisions. Once climate change becomes a serious problem for investors, it will be too late to effectively curb its impact and prevent harm.

Three types of risks exist that are amplified by climate change and pose a threat to the stability of financial markets: physical risks, such as damages to assets caused by floods and storms; liability risks that could arise if those suffering climate change losses sought compensation from those they held responsible; and transition risks due to the revaluation of assets caused by the adjustment to a lower-carbon economy. About one third of the world's financial assets belong to asset classes that are particularly sensitive to the effects of stringent climate policy: fossil fuel producers and users, e.g. extractive industries, and energy- and emission-intense businesses who would be indirectly affected through increasing energy costs[27]. An abrupt devaluation of this group of assets would constitute a systemic risk, and create substantial amounts of "stranded assets"[28].

In order to address the risks to the financial markets, Carney posits several interlinked options and recommendations: (i) a tightening of disclosure requirements for companies to allow adequate risk assessments, by providing necessary transparency on the carbon intensity of different assets, complemented by the formulation of decarbonization strategies; (ii) conducting climate stress tests to simulate economic shocks, e.g. through abrupt government abatement action, and their impacts; as well as (iii) encourage governments to stimulate the introduction of a CO_2 price signal (see Section 6).

These approaches, if well-conceived, provide a useful tool-set to enable investors and financial markets to make provident and informed investment decisions. At the same time, they could stimulate a greening of the financial system and initiate a low-carbon transition (see Section 7). In the meantime, existing divestment strategies of companies and institutional investors create momentum and may anticipate what needs to happen on a broader base to address the aforementioned challenges (see 5.4).

5.1 Disclosure

In order to adequately assess the exposure to climate risks, a transparent disclosure of the carbon intensity of assets is key. As the Green Finance Study Group states, "capital markets work best when there is sufficient information disclosure and transparency for investors, financial service providers, and regulators to make informed decisions"[29].

Currently, the financial and corporate sector is ill-equipped in reporting on climate risk and climate performance disclosure. Based on findings from UNEP Finance Initiative (UNEP FI) and the Bloomberg climate risks initiative reports, of the world largest investment funds (worth over USD 40 trillion), only 7% could calculate the GHG emissions within their portfolio, with few of them knowing their exposure to climate risk. Such reporting needs to be increased to minimize both climate and investment risk[30]. Of the G20 countries 15 of 19 have a GHG corporate reporting in place[31]. Nevertheless this data is insufficient and stricter targets of what should be disclosed and how need to be set for the future.

Following Carneys speech in September 2015 and in response to the increased awareness about financial stability risks related to both climate change and the policies to combat it, a "Task Force on Climate-Related Financial Disclosures" (TCFD) was established in December 2015. The newly established body, serving under the auspices of the Financial Stability Board, seeks to develop recommendations for voluntary climate-related financial disclosures that are consistent, comparable, reliable, clear, efficient, and provide decision-useful information to lenders, insurers, and investors, in order to enhance how climate-related risks are assessed, priced, and managed[10].

While it is important that companies calculate and disclose the necessary information on the carbon intensity of their assets, the development of decarbonization strategies (see 5.3) for their business model is a fundamental prerequisite for a complete and comprehensive assessment of current and future risk exposure.

5.2 Stress Testing

The conduction of stress tests permits the simulation of economic shocks and their impacts on the financial market. According to Carney, dedicated climate stress testing can be an efficient tool to assess the potential extent of climate change risks to the financial system and for making future climate-related risks visible[8]. Specific climate stress tests should be undertaken to understand the impact of various policy pathways equivalent to scenarios that limit global warming to 1.5°C and 2°C, but also to sudden abrupt changes in international climate policy that can influence financial stability. Furthermore climate stress tests should include an assessment of the impacts of different climate change scenarios on investments, exposing climate risks with the view to enabling investments to become "climate-proof"[32].

Conventional stress testing in the traditional finance domain (e.g. for commercial banks etc.) takes place in a short-term logic with a 1–5 years margin. Due to the fact that climate change impacts manifest within a longer time period, and are often non-linear, common stress testing tools are not sufficient and adequate instruments for long-term stress testing need to be developed.

5.3 Decarbonization Strategies for Companies

Similar to the national long-term strategies discussed in the previous chapter, companies need to develop a long-term vision for their business-model in a decarbonized world economy. A central aspect is to integrate information gathered from the above mentioned tools, for instance the outcomes of climate stress testing, into the development of decarbonization strategies with the aim to successfully tackle climate risks within financial markets[8]. The integration of shadow-carbon pricing into investment decisions could be a suitable approach in order to manage climate-related physical and transformational risks in their investment portfolios, as well as enhance future business and investment decision making processes and planning[33].

Decarbonization strategies for companies should focus on reducing CO_2 emissions, for instance through the adoption of renewable energy targets. At the same time, emission reductions through increased energy efficiency measures represent a considerable share of the global GHG mitigation potential, and energy efficiency should play a prominent role in decarbonization strategies.

In recent years, companies have started to engage in the process of developing decarbonization strategies. For instance, the "RE 100", a collaborative global initiative was launched at the New York Climate Week in 2014, consisting of 69 companies that committed to 100% renewable electricity – working to massively increase demand for and delivery of renewable energy[34]. On the same note, the Non-State Actor Zone for Climate Action (NAZCA) Platform – launched at COP 20 in Lima – registers commitments to action by various actors, including companies to address climate change. As of now, commitments from 2090 companies engaging in action throughout the sectors of energy access and efficiency, renewable energy and emission reductions have been recorded[35]. Such or further expected landmarks can give companies orientation for pledges to be included in their long-term decarbonized business model.

5.4 Divestment

The fossil fuel divestment movement has rapidly increased its scope over the past years. According to a recent report, 436 institutions from 43 countries representing USD 2.6 trillion in assets have committed to divest from fossil fuels[36]. Especially institutional investors are engaged in the process, such as the French insurance and assets management group AXA or the Norwegian sovereign wealth fund.

On the UN level, the UNEP-led Portfolio Decarbonization Coalition was launched at COP 21 in Paris, a multi-stakeholder initiative striving to "drive greenhouse gas emissions reductions by mobilizing a critical mass of institutional investors committed to gradually decarbonizing their portfolios"[37]. At the climate summit, the coalition announced that it achieved a decarbonization of a total amount of USD 230 billion (with their original goal set at USD 100 billion) by withdrawing capital from carbon-intensive companies, technologies and projects for the reinvestment in carbon efficient sectors[38].

While the commitment and dedication shown by citizens and corporations is encouraging, divesting from fossil fuels can only serve as a complementary tool for enabling the low-carbon transition of the business sector. Current divestment strategies are often limited to selling shares of the "top 200" fossil fuel companies[39]. While this strategy has material effects and provides important signals to the market, the global transformation will also need investors to stay with a company through the transition process. Therefore, credible and ambitious decarbonization strategies for companies (see Section 5.3) should constitute an important criterion.

By setting up the TCFD, the FSB has initiated an important process to develop a toolset to tackle the risks of climate change to the financial market. While this marks a good first step, more work is needed to increase and ensure stability on the way towards a decarbonized world economy. The final report of the TCFD is expected to be delivered in early 2017. The German presidency should push for the timely and stringent implementation of their recommendations. Risk disclosure could initially be implemented on a voluntary basis, creating lessons learnt along the way, with the longer-term perspective of making disclosure mandatory within the next 2–5 years. Also, further work by the TCFD should be encouraged and supported, including an outreach to non-industry actors and the mainstreaming of the TCFD recommendations across relevant G20 work streams.

6 Getting Carbon Prices Right

Transformational change needs transformational policy instruments. A rising, cross-sectoral carbon price – implemented through a tax, levy, ETS or hybrid system – constitutes such an instrument: If the design is right, carbon pricing incentivizes low-carbon investments and disincentivizes the use of fossil fuels. It also creates revenues in a way that is economically more efficient than other tax schemes, and those revenues can be used in beneficial ways: to cushion regressive effects, to finance research and development into low-carbon technology or new social business models, to invest into sustainable infrastructure or lower other taxes[40], or as a contribution to the GCF or more generally to meet the climate financing commitments of the PA.

However, historic record for the transformational effect of carbon markets, in particular the EU ETS, has been rather poor. In the real world, the interaction of multilevel climate policies, strong opposition to stringent caps and competitiveness concerns have led to low prices that did not unfold their transformational potential. On average, direct subsidies and the lack of internalization

of external environmental and health damages currently lead to a net-negative global price on carbon. Eliminating such wrong incentives and getting effective carbon pricing mechanisms in place should be priority items on the G20 agenda.

6.1 Eliminate Fossil Fuel Subsidies

Estimates of the worldwide fossil fuel subsidies vary according to the methodology used in measuring, the type of subsidy and the country[41]. According to the International Energy Agency (IEA), worldwide fossil fuel subsidies amounted to USD 493 billion in 2014[42]. Almost 50% was allocated to oil products, with a regional focus on the Middle East/North Africa, Central/Eastern Europe and Emerging and Developing Asia[43] (see Figure 3). In comparison, subsidies to assist the deployment of renewable energy technologies are four times lower, estimated at USD 112 billion in 2014[44]. Hence, although many OECD countries have increased their financial backing for the expansion of green energy supplies in recent years, overall support for fossil fuels across the world continues to exceed that for renewables by more than four-fold.

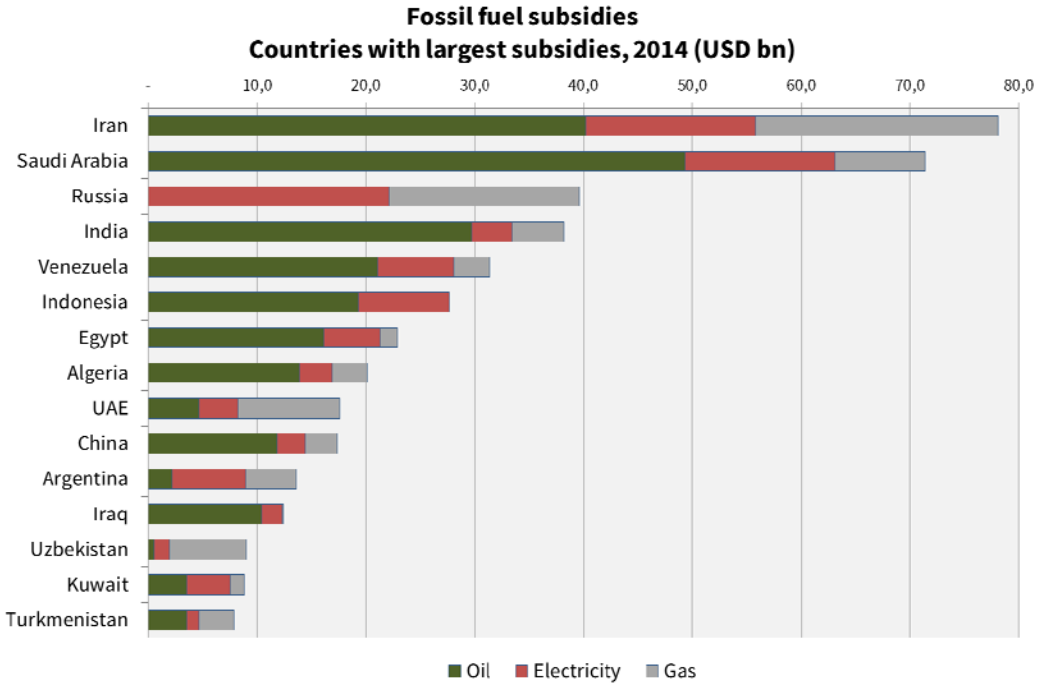

Figure 3: Countries with the largest subsidies for fossil fuels in 2014. Own illustration, data source:[45]

The magnitude of fossil fuel subsidies directly challenges the objective of the Paris Agreement. Fossil fuel subsidies constitute a negative carbon price: By lowering costs of production and consumption, they set wrong incentives and present a substantial obstacle to the development of renewable energy sources, which are faced with competitive disadvantages in many countries.

In addition to direct subsidies, fossil fuels also cause indirect costs through negative externalities, such as environmental, climate change and health impacts, raising total (direct and indirect) subsidies to a staggering USD 5.3 trillion[46].

On the global scale, the G20 plays an important role when tackling the issue of eliminating fossil fuel subsidies. The G20 countries supported fossil fuel production (including exploration, extraction, and development) by USD 444 billion on average per year in 2013 and 2014[47]. With oil prices at historical lows, many countries have seized the opportunity to lower subsidies for consumption. For instance, Indonesia eliminated a large amount of diesel and gasoline subsidies in 2014, reallo-

cating subsequent savings (also from lower world oil prices) of USD 15.6 billion to investments in people and infrastructure[48]. India ended diesel price regulation in 2014, providing a good example of the effectiveness of a phased price increase in limiting political opposition and economic disruption[49]. However, although individual countries have gradually begun to reduce their subsidies rhetorical commitments by the G20 have so far not been translated into sufficient policy action.

The 2009 Pittsburgh Summit marked the first time the G20 addressed a potential removal of fossil fuel subsidies (see also Chapter 3.1). In their summit declaration, the G20 committed to "rationalize and phase out over the medium-term inefficient fossil fuel subsidies that encourage wasteful consumption". Although finance and energy ministers were tasked to deliver implementation strategies and timeframes, subsequent G20 summits did not add any substantial commitments let alone a roadmap for a timely implementation. Instead, the previous commitment from Pittsburgh was merely reaffirmed, whereas voluntary peer reviews currently spearhead the G20 efforts in this area.

For the upcoming G20 summits in China and Germany, it is important that the group rekindles and reinforced its commitment to tackle an incremental elimination of fossil fuel subsidies. The G7 summit in 2016 already constitutes an important step, by setting a deadline for the ending of support for fossil fuels in 2025. Now, the G20 needs to follow suit by defining a clear and specific timeline at which to achieve the phasing out of fossil fuel subsidies, beginning with subsidies for coal production and fossil fuel exploration. Furthermore, phasing out of domestic and international public finance for gas, oil and coal production needs to be elaborated, while bearing in mind the special circumstances of countries where there is no alternative for ensuring energy access for the most vulnerable people and communities.

6.2 Put a Price on Carbon

Putting a price on carbon is the economic application of the polluter pays principle. In theory, the optimal carbon price – in form of a tax, a levy or imposed via a cap and trade system – would equal the "social cost of carbon" (SCC), the estimate of the incremental damage associated with one additional ton of carbon in a given year. A recent US-EPA study estimates the SCC at around 37 USD/t CO_2, (the average of USD 11–56, with the low end based on a higher discount rate), rising to around USD 50 (USD 16–73) in 2030[50], however new research suggests the real SCC is much higher[51,52]. The latest IPCC Working Group III report concluded that the damage functions used within the current model generations used to derive such numbers were not appropriately representing the influence of future climate damage on the world economy[53]. Most estimates of efficient carbon prices from integrated assessment models in line with a 2°C pathway range between USD 80 and 120 in 2030[54].

However, with very few exceptions (that are almost exclusively set in Scandinavia), existing (explicit) carbon pricing schemes have much lower price levels than even conservative estimates of the SCC, with more than half of them being below 15 USD in 2015[21]. According to a market survey by the International Emissions Trading Association IETA the global carbon price estimated to achieve the objectives of the Paris Agreement has risen from €30 to €40, which is significantly higher than the current price expectations for the major markets, but still way below efficient prices predicted by models[55]. Many corporations use shadow pricing to "climate-proof" their business model or certain investments. The price levels used vary and reflect what the company anticipates to be politically viable over the short- to medium-term, rather than the full SCC. Shell, for example, uses a price of USD 40 per tonne of CO_2e, Statoil ASA USD 50, and ExxonMobil USD 80[50].

The reason for such low carbon prices is not purely economic, but lies in the political economy: institutional structures, power, and influence pose political constrains on carbon pricing that may

not be easily overcome in the short run[56]. For the foreseeable future, (entry) carbon prices will likely remain well below the SCC, however there are many advantages of introducing carbon pricing schemes even at lower levels: capacity building, raising awareness, fostering political credibility, and last but not least: creating a stream of revenues that can be used by governments to foster desirable outcomes and thereby increase the political support that might ultimately lead to carbon prices that are closer to the SCC (see 6.3).

By the end of 2015, about 40 national jurisdictions and 20 subnational entities such as cities, states or regions had some form of carbon pricing initiatives in place, covering roughly 13% of global GHG emissions, with carbon prices ranging from < 1 to > 130 USD/t CO_2e [57]. With the expected launch of the Chinese emission trading system in 2017, the share of global emissions subject to a carbon pricing scheme will rise to roughly one quarter. The World Bank's Carbon Pricing Leadership Coalition (CPLC) has set the goal to double this share to half of global emissions by 2050. Various multilateral platforms and coalitions support the establishment of carbon pricing and help developing countries to gain the required capacity for carbon pricing and participation in carbon market mechanisms (see Table 1). While ICAP is focused purely on ETS, all other initiatives and platforms explicitly support all forms of carbon pricing.

Table 1: Overview of important international carbon pricing initiatives

Name	Initiators/Institution	Scope and Focus
ICAP – International Carbon Action Partnership	founded by California and Germany, 2007	Focus on Emission Trading Systems (ETS) Technical experts, capacity center Network of practicioners ~40 members, both states and subnational levels
Partnership for Market Readiness (PMR)	Worldbank, 2011	Donor-recipient structure, targeting developing countries, grant funding Capacity development and establishment of Best practice concerning carbon pricing mechanisms and market readiness tools UNFCCC oriented, technical expert level
Carbon Pricing Leadership Coalition (CPLC)	Worldbank, September 2014	High level agenda setting Business/policy/finance networking Platform for exchange of best practice
Carbon Pricing Panel	Worldbank and IMF, October 2015	Heads of states level, supporting CPLC
G7 Carbon Market Platform	Launched by German G7 presidency, October 2015	Rules and guidelines for carbon markets (Article 6 PA) All carbon pricing instruments, not only ETS Support and supplement to UNFCCC
Transformative Carbon Asset Facility	Paris Initiative by Germany, Sweden, Norway and Switzerland, December 2015	Results based payments for large-scale programmes or RE, EE, waste management and low-carbon cities in developing countries Enabling clean technology, cutting fossil fuel subsidies Initial finance to be leveraged by World Bank funds

Over the recent years, international climate policy has seen a shift from centralized, top-down approaches of the Kyoto system to a bottom-up regime relying on domestic action, voluntary

contributions, regional cooperation and a mix of instruments. Recent economic publications tend to favour carbon taxes and hybrid systems (e.g. cap-and-price-collar, or floor prices) over the purely quantity-based ETS, a shift that can be observed also in many existing carbon pricing systems[54,58]. While ultimately a global carbon price might be the most cost-efficient abatement option, it is neither politically feasible nor fair without large-scale transfer payments to developing and also emerging economies.

On the long-term, harmonized or converging carbon prices are important to reduce carbon leakage and address competitiveness concerns in particular for industries that operate in globalized environments. In addition, cost efficiency gains can be realized through linking domestic or regional systems, enabling governments to set more ambitious mitigation targets.

International Carbon Pricing – Options for Linking

Linking existing ETS, that is the acceptance of allowances generated in one ETS for compliance in another, offers the potential for maximum cost-efficiency gains and could eventually lead to a uniform global carbon price. However, harmonisation of key design elements is needed in order to ensure efficiency and environmental integrity, in particular concerning the stringency of the measuring, reporting and verification system, offset and price containment provisions. Linking can also be indirect, via the mutual acceptance of third-party allowances within two systems. If a carbon tax is designed in a way that allows the generation of tradeable units, ETS and tax regime can be linked through trading allowances and tax credits, both within a jurisdiction and between different jurisdictions. However one of the key challenges here is that an inflow of tax credits would inflate the cap set within the ETS, and therefore undermine the price-building mechanism. The most plausible scenario for linking ETS and tax-regimes would pose a limit on the inflow of tax credits to prevent that the ETS turn into a de facto carbon tax, and also to limit the budgetary impact. Another option consists in converging prices through political coordination. Several parties could agree on a comparable price of carbon, through similar tax rates or a price band in the respective ETS. Continuous negotiations and review is likely necessary to reach agreement on a converging price path, especially if more than two parties are involved. The complexity of this challenge may require the establishment of an institution dedicated to overseeing and controlling this process[93].

Linkage will bring both merits and concerns in most applications. Potential advantages include cost savings, improvements in the functioning of individual markets by reducing market power, and reduced price volatility, although it should be recognized that price volatility will also be transmitted from one jurisdiction to another by linkage. Finally linkage can allow for the UNFCCC's important principle of Common but Differentiated Responsibilities without sacrificing cost-effectiveness. The possibility of linkage also has challenges, including distributional impacts within jurisdictions, the automatic propagation of design elements such as cost-containment mechanisms (e.g. banking, borrowing, and price collars), and more generally, raises concerns about decreased autonomy[59].

Under Article 6.2, emissions reductions occurring outside of the geographic jurisdiction of a Party to the Agreement can be counted toward achieving that Party's NDCs via Internationally Transferred Mitigation Outcomes, thus enabling the formation of carbon clubs or other types of coalitions, as well as bottom-up heterogeneous linkage beyond government trading [59].

Multilevel climate policies, floor prices and the EU ETS

Since 2008, the European Union's cap-and-trade Emissions Trading System (ETS) accumulated an astonishing surplus of 2 Gt emission allowances in the market. Prices are about an order of magni-

tude lower than the estimated price signal needed to motivate investments necessary to achieve the European Union's long-term emission reduction target of 80–95% until 2050, bearing a high risk that a lock-in will occur in the EU and EU candidate states. The EU has reacted to this by introducing a market stability reserve: the availability of allowances will be made flexible to adjust the liquidity, thus influencing the allowance price path[60].

The allowance surplus and low prices are partly due to lower emission levels resulting from the economic downturn, and design features such as the influx of credits from international offsets, or banking and early auctioning of allowances. Another important factor that is not addressed in the EU ETS design is the influence of complementary policies in member states on the (federal) EU system. National policies such as the feed-in tariff in Germany, the carbon tax in Sweden or the carbon price floor in the UK, but also reductions and exemptions from taxes and levies on member state level have led to unilateral tightening or weakening of the EU policy, but never had a tightening EU-wide effect. The EU ETS reform has again failed to account for relevant member state policies such as energy efficiency or renewable energy targets in its set-up, despite the important role such policies have proven to play for technological innovation, driving down prices of renewable energy technology and increasing public acceptance and participation. Under the current design, stringent national climate polices can undermine the goals of the EU ETS by weakening its price and reallocating emissions to member states with lower ambitions[61]. The equalizing effect on marginal abatement costs achieved by the EU ETS ignores the differences in income-structure and abatement preferences of member states expressed through parallel, multi-tier policies. Therefore, it produces suboptimal outcomes in both economic and environmental terms[62]. The equalized marginal abatement costs are not necessarily efficient, as gains in consumption add relatively more welfare in poorer compared to richer states, an effect that needs to be addressed by some form of transfer[63,64]. To a limited extent, this is currently achieved through allocation rules, especially the initial allocation of allowances[65].

A minimum price, with a rising price path over time, would help re-establish confidence in the functioning of the ETS, reduce volatility and stabilize price expectations[66], and allow to utilize the member state policies as companion policies[67]. Combined with appropriate transfers it would allow the benefits of the EU ETS, such as coordination on EU level and dynamic cost efficiency, with national ambitions and preferences in an efficient way. If successful, this approach may serve as a role model for international pricing and transfer schemes. In the meantime, the UK introduced a rising domestic floor price in 2013 and France recently announced it will set a carbon price floor of about €30 per tonne in its 2017 finance bill as the government seeks to kick-start broader European action to cut emissions and drive forward last year's landmark international climate accord[68].

Broadening and deepening – a G20 path forward?

In the run-up to Paris, leading economists called for a common price commitment as the focal point of a future agreement, stressing its fairness, consistency with climate policies already in place, relatively easier enforcement and reduced risks compared with a quantitative commitment[58,69,70]. While the PA has not delivered on such a common commitment, its design encourages negotiations and voluntary cooperation in other fora, such as the G20. International cooperation requires credible reciprocal commitments and stable incentive structures. In this regard, a strong national carbon price – via taxes, levy, ETS or other policy instruments – with a clear, rising trajectory constitutes an appropriate policy instrument. It is comparable, reflects a country's abatement costs and ambition, and is straightforward to implement. In existing ETS, it could be installed via a binding minimum or floor price (see above).

The G20 should agree to a roadmap towards the installation of (national) carbon prices. At start, prices could be differentiated between industrialized and emerging economies. A global harmoni-

zation and coordination of carbon prices will however require substantial transfer payments between rich and poor countries. Donor nations would equally benefit from such conditional payments through the overall rise in ambition[58].

International climate finance needs to be used to support developing countries in implementing carbon pricing, including support for assessing needs, potentials and appropriate price levels, policy design, capacity building and institutional strengthening as well as support measures to avoid disproportionate impact on the poor and increase clean energy access. Supporting the design and providing funds for the implementation of transformational policy instruments in developing countries should become an important part of the GCF Agenda[71].

6.3 Carbon Revenues and Co-Benefits

Even in the absence of an international coordinated climate price signal, there is a case to be made for unilateral pricing of CO_2: besides correcting for the environmental externality of climate change, carbon pricing also constitutes an economically efficient sources of public finance, enabling governments to lower other distortionary taxes, as is well established in the "double-dividend" literature, and correcting misallocated investment behavior[40]. Thus raising revenue at low macro-economic cost, even moderate carbon pricing could be used by governments to foster desirable outcomes, which – by increasing political support – may ultimately lead to carbon prices closer to the social costs of carbon. Revenues could provide much-needed funds for investment into clean energy generation, but also for sustainable basic infrastructure, such as water, sanitation, telecommunication, transport or health.

For example, a uniform carbon price of just USD 10 would create revenues of USD 400 billion in 2020, whereas the additional investment (beyond business as usual) providing global energy access by 2030 (SDG 7) is estimated at USD 36–41 billion annually[72]. Recent research shows that in a scenario consistent with 2°C warming above pre-industrial levels, domestic carbon pricing has substantial potential to close existing infrastructure investment gaps across sectors [73]. Similarly, revenues from GHG pricing would be in the same order of magnitude as the "clean-energy investment gap", the global investments in the power sector including transmission, distribution and storage required for an ambitious mitigation scenario, estimated at around USD 800 billion[40,74].

Apart from climate change abatement considerations, there are various additional advantages from pricing carbon: the benefits of a low-carbon energy system transition triggered by carbon pricing to create additional employment and green growth, more efficient resource use and technological innovation are well-established[75]. Also, GHG-emission abatement has substantial co-benefits in other public domains, air pollution control and associated health benefits being the most prominent one [76]. For example, around 6.5 Million premature deaths are currently linked to air pollution. The recent IEA report on energy and air pollution states that a small increase in energy investment could cut premature deaths from air pollution in half by 2040[77]. Further co-benefits include decreased congestion and noise-levels in cities, increased energy access for the poor, especially in off-grid areas, and energy-security considerations[40].

Programs and investments funded by the revenue will be more popular with voters than a new tax or levy. Careful determination of the right mix of revenue use and intelligent communication would help maximise the benefits of carbon pricing and enable rising prices. Instead of devoting all revenues to a single purpose, carbon pricing programs should involve some mix of clean energy investments, protection for low-income households and trade-exposed businesses, tax reductions, and direct payments or dividends. Getting the mix right requires close attention to the political economy of particular jurisdictions[56]. A recent report from Canada's Ecofiscal Commission shows how this can be done in a thoughtful and participatory way[78]. Table 2 outlines how the federal

government acknowledged that each province has their own priorities, resulting in different sets of uses for carbon tax revenues. The costs of a clean energy transition will inevitably create winners and losers, however, through measures summarized in Table 2 costs could be smoothed over time, gradually nudging the possible in the direction of the optimal.[21]

Table 2: Example of differentiated revenue-recycling priorities at subnational level. Source: Ecofiscal Commission, Canada[78]

Possible Revenue-Recycling Priorities for Five Canadian Provinces					
	British Columbia	**Alberta**	**Ontario**	**Quebec**	**Nova Scotia**
Household Transfers	++	+++	+	+	+++
Personal and Corporate Income Tax Cuts	+	+	+	+++	+++
Investments in Low-Carbon Technology	+++	+++	+++	++	++
Investments in Infrastructure	++	++	++	+++	++
Reduction of Public Debt	+	+	++	++	+
Transitional Support to Industry	++	+++	+	+	++

+ Lower priority / ++ Moderate priority / +++ Higher priority

7 Mobilizing Transition Finance

Aligning the financial system with sustainable development requires a systematic approach. A wider financial system reform is required to address both the risks posed by climate change and the financial requirements of the Agenda 2030 and the Paris climate goals. In their recent report on the design of a sustainable financial system[11], UNEP Inquiry outlines a framework and requirements towards a sustainable financial system (see Box on next page).

As shown above, mobilizing finance for the low-carbon transition requires a clear policy framework based on ambitious and consistent long-term strategies, (mandatory) disclosure of climate-related financial risks, a phase out of fossil fuels and a meaningful and rising carbon price signal in the form of carbon taxes, levies or ETS. In addition, instruments and measures that facilitate investment flows into low-carbon projects and "green" finance products have to be developed and implemented. This includes standards that ensure the environmental integrity of capital market instruments (such as green bonds), the development of mechanisms to de-risk investments by corporations, investors and international financial institutions, and last but not least making the energy policies and actions of both national and development banks and commercial banks and financial institutions compatible with 1.5°C and the Sustainable Development Goals.

As a forum of finance ministers and central bankers, aka regulators and heads of development banks, the G20 is the perfect place to address not only the risks that emerge from ambitious climate policy and distortive effects of subsidies, but also the institutional requirements for financing low-carbon transition and a more sustainable financial system. The current environment with record-low oil prices and zero to negative interest rates provides a unique chance to create a win-win situation for both the world economy and the environment; as custodians of global financial stability, the G20 are obliged to act in order to create a safe and enabling environment for low-carbon investments.

A Sustainable Financial System

The recent UNEP Inquiry report "The financial system we need: aligning the financial system with sustainable development"[11] outlines a broad system reform towards sustainability, based on 10 key principles (see Table 3), and states that "what is needed is a package of measures that trigger broader changes in the behavioural, cultural and market dynamics of the financial system."

Table 3: Possible principles for a sustainable financial system; Source: UNEP Inquiry[11]

Possible Principles for a Sustainable Financial System	
OVERARCHING PRINCIPLE	
1 The purpose of the financial system	… is to serve the needs of society by facilitating payments, aggregating, protecting and allocating savings to the most productive uses and managing risk in ways which support an inclusive and sustainable real economy.
CORE MEASURES LINKED TO PURPOSE	
2 Pricing of risk and reward	…internalises the value of human, natural and social capital to deliver sustainable development.
3 Access to the value of finance	… is available to all.
4 System stability	…support sustainable development across time.
WHO PAYS AND IS REWARDED	
5 Reward earned by the sector	…is commensurate with the value it creates.
6 Public finance	…only supports public interest outcomes that should not be delivered through private means.
MARKET INTEGRITY	
7 Market composition	…encourages healthy diversity and innovation.
8 Impacted stakeholders	…are empowered through rights, information and capacities.
9 Culture, values and norms	…are aligned to purpose, supported by appropriate incentives.
GOVERNANCE	
10 System governance	…is aligned to purpose, with appropriate transparency of decision making, performance and redress.

Key areas of international cooperation identified by UNEP Inquiry that could be taken up within the G20 concern for example the development of principles for the advancement of sustainable development within the global financial system and a corresponding performance framework; measures to increase convergence in sustainability disclosure standards; the development of sustainability stress test methodologies; or the optimization of fiscal measures in the financial system, for example through the establishment of a review process of the sustainability impacts of public finance.

The report also stresses the role monetary policy and financial stability regulations by central banks. Besides their influence on finance horizons and distributional issues through the key interest rate, central banks exercise large influence as prudential authorities and regulators. To support a transition towards a sustainable financial system, they could

- Impose sustainability-related risk management and reporting requirements,
- Incorporate impacts of natural disasters and climate change consideration into financial institutions stress tests,
- Require sustainability-related director and trustee capabilities and skill requirements of certified financial professionals
- Adjust capital provisioning to account for under-priced risks and in some instances policy objectives
- Initiate prudential reviews of the impact of sustainability factors on stability

In the context of monetary policy operations, central banks can also provide refinancing at below market rates to encourage targeted lending, stimulate markets for specific assets through purchases, and invest in bonds of public bodies that pursue sustainability objectives.

7.1 What's Green?

Socially responsible investment has a long tradition especially within religious constituencies with a focus on development issues, human and labour rights, and takes many forms such as sustainable investment funds and dedicated banks, or micro-crediting. Albeit growing, it still remains a niche market for intrinsically motivated investors. In 2006, the UN-supported Principles for Responsible Investment (PRI) were developed by an international group of institutional investors with the goal of mainstreaming environmental, social and corporate governance (ESG) issues within investment practices. By now, the PRI have more than 1,400 signatories from over 50 countries representing USD 59 trillion of assets[79]. While the guiding principles for more responsible investment are clear, definitions are lacking of what actually constitutes responsible or "green" investment and subsequently, how the progress should be measured. The OECD reports 400 sustainability disclosure regimes in use by industry groups, NGOs, stock exchanges, regulators, and international organizations relating to climate alone, yet no single common definition of green finance exists[31]. According to the GFSG, the current landscape of working definitions and sets of criteria, such as China's Green Credit Guidelines, the World Bank's Sustainability Framework or the UK Green Investment Bank Policies show significant overlap within the areas of energy efficiency, green buildings, sustainable transport, water and waste management and clean energy. However they also identified controversial areas such as nuclear energy and large-scale hydropower, biofuels and efficiency gains in conventional (fossil) power generation[29].

Facilitation of international green capital flows requires clearer definitions and indicators for measuring progress on green finance activities, setting policy targets, and designing and implementing policy incentives[29]. It is of utmost importance that those definitions and indicators be environmentally stringent and also include social and governance standards, in order to make sure that the "green" development paradigm is consistent with the broader sustainability agenda. While the "greening finance" initiatives within the G20 constitute an important step into the right direction, greenwashing constitutes a real threat. Also, many countries that start subscribing to the green growth paradigm are reluctant to embrace civil liberty and social justice issues. Large infrastructure developments are often accompanied by conflict with local stakeholders and human rights abuse, and sadly feature very prominently on the record of activist's killings[80].

7.2 Criteria for 1.5°C-Compatible Finance

As explicitly stated in the Paris Agreement, financial flows have to be made consistent with pathways towards low greenhouse gas emissions development. Taking pathways consistent with the Paris objectives, i.e. scenarios that achieve net greenhouse gas neutrality in the second half of the century and keep global warming well below 2°C with a reasonable chance of even limiting it to 1.5°C, as a starting point, it is possible to develop criteria that can be used to determine whether certain infrastructure investments are consistent with such pathways or nor. Given the long lifetime of infrastructure, and the urgency of decarbonization over the coming decades, such criteria should begin to inform all investment decisions as soon as possible.

In many areas, different scenarios for "well below 2°C" or 1.5°C warming are sufficiently aligned to allow the identification of projects and technologies that are unambiguously Paris-compatible, and those that are clearly misaligned. For many technologies, however, compatibility with the PA depends on what happens at the sector-wide level. For example, scenarios allow determining that certain types of power sector infrastructure, e.g. new coal-fired power plants, are not consistent with the Paris objectives. For other types of investments, e.g. gas-fired power plants, the country and sector context matters and more complex conditional criteria have to be developed. A study

for the German G7 presidency in 2015 has shown how such criteria could be developed for the power, building and transport infrastructure sectors[32] (see Box).

2°C-Compatible Investment Criteria

In the context of the German G7 presidency in 2015, a research consortium consisting of New Climate Institute, Germanwatch and the 2°C Investing Initiative analysed the development of criteria for assessing the compatibility of financial investments with the international goal to limit global temperature increase to below 2°C above pre-industrial levels, agreed in 2010[32]. The study focused on investments in projects and physical assets, i.e. infrastructure investments, and on development banks and similar public finance institutions with an implicit or explicit climate mandate. The internationally agreed temperature limit has since been strengthened to well below 2°C if not 1.5°C. Though the underlying analysis would have to be updated accordingly, the study's current results can provide guidance as to how such criteria can be developed and what they might entail. The study found that investments can be classified into those that are clearly aligned or misaligned with 2°C scenarios and those that are conditional or ambiguous (see table 4). Conditionality/ambiguity mainly stems from the fact that multiple pathways with different technology choices can lead to 2°C, and assumptions about technological and price development differ between models. Also, other sustainability factors are considered to a varying degree.

Table 4: Proposed 2°C investing criteria for transport infrastructure. Source:[32]

Sub-sector	2°C-compatible (positive list)	Conditional		Misaligned (negative list)
		Qualitative conditions (example)	Quantitative conditions	
Air, Water, Rail	Inland waterways Rail network and assets (passenger and freight) Mass rapid transit/ Light Rail Transit	Airports with transport interconnectivity plan/bio-fuelling stations	*Quantitative criteria for transport infrastructure are difficult to set given the indirect link of infrastructure to GHG emissions, but may be set for vehicles (e.g. fuel efficiency, penetration of electric/hybrid vehicles) and linked to infrastructure investments as a sub-condition.*	Rail networks dedicated to fossil fuel transportation New airports in developed regions
Road	Non-motorised infrastructure High quality Bus Rapid Transit	Road renewal to include strategic plan Electric vehicle charging infrastructure linked to RE plan		New road network in developed regions

The analysis also found that the majority of international financial institutions already integrate climate considerations into their finance decisions to some degree, and are familiar with different types of criteria, including positive and negative lists, qualitative and quantitative benchmarks, and the use of shadow carbon pricing. In order to link to a temperature limit and ensure climate-compatible decision making, 1.5–2°C investment criteria could be integrated into these existing approaches. Those investments that are clearly misaligned or generally compatible with 1.5–2°C trajectories could be reflected in an initial screening, using positive and negative lists. For investments classified as conditional or ambiguous, qualitative and quantitative benchmarks would have to be used. The analysis considered three sectors in detail – electricity, buildings and transport infrastructure. In the electricity sector, the formulation of clear-cut criteria was easier than for example in the transport sector, where a more systemic approach is needed. For the latter, it is recommended to apply positive and negative lists in combination with a requirement to demonstrate how the planned infrastructure investment fits into a low-carbon transport strategy.

The G20 have the opportunity to promote the use of such criteria for different groups of investors. The easiest step would be to develop and implement such criteria for those financial institutions the G20 governments own and control, including national, bilateral and multilateral development banks as well as other publicly owned financial institutions. The G20 could agree on climate-compatible investment principles and require development banks to develop and apply 1.5°C-compatible investment criteria in all infrastructure investments. Such criteria should become a binding requirement in all infrastructure investment initiatives and commitments promoted by the G20.

Beyond public development finance institutions and development banks, criteria could also be developed for other kinds of investors and forms of investment (e.g. investments in bond or stock portfolios rather than in infrastructure projects). The G20 could encourage the development and use of such criteria. As a first step towards understanding the extent to which current global capital flows are aligned with the objectives set in Paris, the G20 could request an annual monitoring report on this issue. This would then allow an assessment in which market segments capital misallocation is greatest and thus, where the development of criteria and incentives needs to be prioritised.

7.3 Greening Infrastructure Investment

Recognizing that a functioning, modern infrastructure is a key prerequisite for economic growth and human well-being, the first target of SDG 9, the ninth of the universally agreed Sustainable Development Goals, is to *"Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all"*. Highlighting the crucial importance of energy for development, SDG 7 calls to *"Ensure access to affordable, reliable, sustainable and modern energy for all"*, a task that has been taken up within the G20 Energy Access Action Plan, which focuses on global hot-spots of energy poverty in Sub-Sahara Africa and South- and South-East-Asia (see Chapter 3).

A large infrastructure investment gap currently exists in both developing and industrialized countries. The worldwide need for infrastructure investment, encompassing structures for transport, sanitation and waste, water supply, electricity generation and distribution, telecommunication and health, is estimated at about USD 89 trillion between 2015 and 2030. According to the New Climate Economy report "Better growth, better climate", a low-carbon pathway requires incremental infrastructure investment approximately USD 4 trillion between 2015 and 2030, an increase of less than 5% on baseline levels[81]. This figure results from additional capital expenditure for energy efficiency and low-carbon power generation, and reduced up-front costs in fossil fuel-based generation and supply chain; hence the additional cost could be offset by resulting energy and fuel savings[82].

For the G20, the Allianz Climate Monitor (based on data from the IEA) estimates that the power sector will require additional investments of USD 790 billion per year by 2020, and thereafter approximately USD 2.3 trillion per year until 2035, to advance on a trajectory which may hold the global increase in average temperature to less than 2°C[83]. Their estimate includes Infrastructure for low-carbon electricity and climate resilience, and also clearly indicates the higher relative and absolute needs of the emerging economies. India, South Africa, Indonesia, China and Brazil represent 50% of the investment gap due to their market size, development needs and the overall vulnerability of their energy infrastructure to climate change. In addition, the report finds that none of the G20 countries is currently taking sufficient action to combat the investment gap in the power sector[83].

Apart from its important role in combating climate change and alleviating poverty, infrastructure investment is increasingly perceived as a way to foster economic growth and a promising venue to revitalize the world economy. Within the G20, infrastructure development is a key area (see also Chapter 3.1) – however, the infrastructure work stream does not account for climate risks and low-carbon development across the board. Several major initiatives exist within the G20 framework to promote infrastructure development and foster the flow of (private) capital towards national and trans-regional infrastructure projects, such as the Global Infrastructure Initiative, the Global Infrastructure Hub (GI Hub), and most recently, the Global Infrastructure Connectivity Alliance. Also, under the 2012 Mexican Presidency the "GreenInvest platform" was mandated within the development working group in order to facilitate investment into renewable energies in emerging economies. The platform will initially be funded by Germany. On a similar vein but outside the G20 framework, the Green Infrastructure Investment Coalition aims to provide a platform of investors, multilateral development banks (MDBs) and analysts to countries seeking to finance their green infrastructure investments needs.

However, the broader climate and sustainability agenda and the work of the infrastructure and investment group remain disconnected[84]. Significant work streams in the G20 such as the adoption of G20/OECD Principles on Long-Term Investment Financing by Institutional Investors and effective approaches to them, the updated G20/OECD Principles of Corporate Governance, and World Bank-designed Model PPP Contractual Clauses, are parallel to G20 Commitments on energy access and green infrastructure developments, and have the potential to undermine their implementation and the restructuring of the financial sector to promote pro-poor, clean energy infrastructure[30].

Therefore, we subscribe to the recommendation by the Global Commission on the Economy and Climate that the G20 and other governments and development finance institutions should adopt, and encourage the private sector to adopt, two key high-level principles for ensuring that climate change is mainstreamed into infrastructure investment decisions:

1. All infrastructure policies, plans and projects should build in resilience to the risks of climate changes projected during their lifetimes.

2. All infrastructure policies, plans and projects should be consistent with countries' adopted climate targets and policies and long-term ambitions, and able to be justified in the context of the international long-term goal of holding average global warming to under 2°C (if not 1.5°C).

These principles should be included in the G20 Global Infrastructure Initiative, as well as used to guide the investment strategies of public and private finance institutions, particularly multilateral and national development banks. Governments, development banks and the private sector should cooperate to share experience and best practice in mainstreaming climate into infrastructure policies, plans and projects[85].

7.4 Greening Finance

The financial flows required by the low-carbon transition can only be mobilized through the private sector, especially given the constraints on public finance. The banking sector manages assets of about USD 140 trillion; institutional investors, such as pension funds over USD 100 trillion; and capital markets including bonds and equities manage over USD 100 trillion and USD 73 trillion respectively[11]. Shifting these funds towards low-carbon economy requires three main steps: establishing political credibility and confidence in the Paris Agreement; pricing carbon in order to create a long-term, reliable market signal and level the playing field for low-carbon businesses. And last

but not least, developing the financial instruments that facilitate the shift of private finance into the transition: measures to align the (perceived) risk-adjusted return expectations of different actors, instruments for risk-mitigation and credit-enhancement, development of bankable project pipelines and regulatory reforms that address wider sustainability of the financial system are key.

The regulatory framework of the financial system and investment practices and tools at capital markets can constitute barriers to low-carbon investment. Some studies even find a "carbon-bias" within the financial system, for example through regulation that favours short-term investments over longer investment horizons. Also, widely-used benchmarks comprised of capital-weighted indices have a built-in preference for (existing) carbon-intensive sectors, lowering the exposure of institutional investors to the green economy and ultimately leading to suboptimal diversification and misallocation of capital in the face of the low-carbon transition. Not only does this constitute a barrier to low-carbon transition, but it may also be a challenge with regard to fiduciary duty [86].

Challenges for institutional investors are mainly tied to risk management and fiduciary duty regulations. Traditionally, institutional investors have only very small shares of their portfolio in equity, and even less in direct investments, such as renewable infrastructure projects. These asset classes are perceived as too high-risk, a fact that is also mirrored by high capital charge for infrastructure requested by regulators. McKinsey finds that regulations on investment limits, capital adequacy, reserve requirements, the valuation of assets and liabilities, and limits on foreign investment can discourage investors from making longer-term and cross-border investments. Unfavourable and uncertain regulations and policies can also constitute barriers. Other risks include uncertainty around tax policies, particularly in middle- and low-income countries, inadequate risk-adjusted return, and lack of viable business models for basic infrastructure services[87].

Bonds, especially to finance infrastructure, offer long-term maturities and are well aligned with the investment needs of institutional investors. Non-government bonds provide diversification and often higher yields, especially in markets with a high concentration of investments in government securities. At the same time, bond returns are relatively stable and predictable when compared to equity[88]. The bond market is therefore an essential tool to finance the transition to a low-carbon economy. The green bond market is growing rapidly: USD 36 billion of labelled green bonds were issued in 2014, up from 11 billion in 2013[89]. At USD 44.2 billion labelled green bonds issuance in the first six month, 2016 has already surpassed the total issued volume of USD 42 billion in 2015[90]. However, there is still no binding definition of what constitutes a "green" bond, giving rise to concerns over greenwashing in this rapidly growing market. While these have been addressed by the issuance of the Green Bond Principles, external reviews and the Climate Bonds Standard Scheme[91], the lack of transparency and doubt over stringency of criteria remains an important issue for all green investments.

Another way to leverage the impact of relatively limited public resources is through the establishment of "green investment banks" (GIB). As of December 2015, 13 national and sub-national jurisdictions had created public GIBs or similar entities such as national green funds[92]. A GIB is a public entity established specifically to facilitate private investment into domestic low-carbon, climate-resilient infrastructure. GIBs are often focused on urban areas and facilitate investment in commercial and residential energy efficiency retrofits, rooftop solar photovoltaic systems and municipal-level, energy-efficient street lighting. They can tailor risk mitigants, such as guarantees, loan-loss reserves or debt-subordination, and transaction-enablers, such as on-bill financing or co-investing, specifically to local circumstances. To mobilize investment on broader scales, governments need to mainstream green criteria and investment objectives in existing financial structures, including national and multilateral development banks (see box next page). An important first step towards climate-compatible investment criteria would clearly be to blacklist investments in coal-fired generation and other high-GHG projects and activities, halting all public finance and political support. However, the green bank approach is better suited to channel funding towards smaller-

scale, locally anchored projects that often perform particularly well with regard to social inclusion and environmental integrity. Such projects are crucial for public acceptance and the pioneering of innovative concepts, and addressing their financial needs will be a crucial part for a just transition.

Leverage Private Finance by Public Investment

In their 2016 report "Financing change: How to mobilize private-sector financing for sustainable infrastructure"[87], McKinsey identified the following action items in order to leverage large-scale private and institutional finance by public investment:

- Improve the capital markets for sustainable infrastructure by encouraging the use of guarantees. Increase development bank guarantee programs for sustainable infrastructure by expanding access to guarantees. Insofar as these guarantees price in sustainability benefits, they could help to overcome the policy-sensitivity of these investments, reducing risks for private investors;
- Encourage the use of sustainability criteria in procurement. Governments should strengthen sustainability criteria in both public procurement processes and public private partnerships;
- Increase syndication of loans that finance sustainable infrastructure projects. Encourage development banks to expand loan syndication and create a larger secondary market for sustainable infrastructure-related securities. This would increase institutional investor familiarity with the asset class, reduce transaction costs, and allow the recycling of development capital;
- Scale up investment in sustainable project preparation and pipeline development. Governments and development banks should focus investment on project-preparation facilities and technical assistance to increase the "bankability" of project pipelines for those that have an attractive economic profile. This is the highest risk phase of the project life cycle; it is critical to get right; and it is subject to significant rent-seeking conduct. Given a chronic shortage in many developing countries of the right developer equity/expertise, this is an arena in which the right financing facilities could have disproportionate returns;
- Use development capital to finance sustainability premiums. Encourage development banks and bilateral aid organizations to provide financing for the incremental up-front capital spending required to make traditional infrastructure projects sustainable, in economic, social, and environmental terms. Attract private sector financing by demonstrating that risk-adjusted returns can be competitive with those of traditional infrastructure, even if the policy settings and prices do not fully reflect the total benefits of greater sustainability.

As a forum of finance ministers and central bank governors, the G20 would be well-suited to address many of the issues mentioned above, and to initiate and oversee a wider system reform towards a financial system governed by sustainable development considerations. Given its recent focus on infrastructure development, it is crucial that all G20 finance, development and infrastructure work streams be aligned with the Paris Agreement and the SDGs, including by implementing stringent investment criteria for development banks.

8 Outlook and Recommendations

The global transformation towards full decarbonization and climate-resilience is an unprecedented task. The historic agreement in Paris marks a turning point – however it is just the start of long and challenging path. The ambitious implementation of the Paris Agreement and the SDGs would not only safe humankind from catastrophic climate change developments and provide a chance for many people and species at risk but also offer the opportunity of truly sustainable development and stable, green world economy. However, such a drastic change does always create winners and losers. To what extent fossil fuel assets will be stranded depends crucially on both near-term action and reliable long-term planning and an appropriate mix of policy instruments including a carbon price signal consistent with empirical and scientific evidence. Without decisive action to better represent climate and abatement policy risks within the financial system, severe disruptions of the world economy become a real and near-term possibility.

Many existing enterprises will have to change their business models, and both emerging economies and developing nations fear to be left behind without relying on domestic fossil fuel reserves. A just and smooth transition will only be possible if the economic superpowers agree to move forward in a coordinated, ambitious and timely manner. The G20 is the global forum where such questions can be raised between economic competitors that are all to a certain degree invested in the fossil economy. Joint energy security in times of global warming can only be organised in co-operation.

The global decarbonization until mid-century is inevitable to reach the goals of the Paris Agreement. The G20 is a unique forum to create the political leadership, the mutual trust and not least – step by step – the level playing field that can deliver on the pledge to keep global warming to well below 2°C if not 1.5° C. The German presidency in 2017 will have to throw in all its diplomatic skills, economic and political weight to help make Paris a success through an ambitious implementation strategy within G20. The German “Energiewende” has inspired millions, and the steep drop in renewable generation costs is largely seen as Germany’s gift to the world. However, now we need to develop ambitious long-term strategies in order to keep momentum and create the trust that Paris will not and cannot be redeemed; that the industrialized world is willing to take the lead towards decarbonization by mid-century. International leadership will not work without domestic ambition – and the whole world is watching Germany to see whether the Energiewende can be taken to the next level.

Within the G20, the German presidency should therefore work towards

- Submission of long-term deep decarbonization strategies (LTS) by all G20 members until 2018;
- Creating a LTS platform for mutual review and exchange of experiences leading to a first revision of strategies before 2020, followed by biannual reviews later;
- Reconfirming the climate finance commitments of Paris;
- Implementing and strengthening the recommendations of the Task force on Climate-Related Financial Disclosure, with a special focus on a roadmap towards making disclosure mandatory;
- Extending the fossil fuel subsidy review process and negotiate a date – if possible 2020, but definitely not later than 2025 – to end all fossil fuel subsidies;

- Initiating a process towards carbon pricing in the G20: a steadily increasing price signal – based on a domestic tax, levy or minimum prices in ETS – is needed to enable transformational change;
- Introducing a stress test for companies how they are prepared for a decarbonization strategy and a steadily increasing carbon price;
- Requirements for all big companies to annually submit their decarbonization plans until mid-century as a basis for finance market rating;
- Continuation of the work of the study group on green finance, using the G20 as a forum to prepare a financial system reform that mainstreams low-carbon and sustainability issues;
- Aligning all G20 finance, development and infrastructure work streams with the Paris Agreement and the SDGs, including by implementing stringent investment criteria for development banks;
- Building support systems for investments in the energy transformation in developing countries;
- Increasing the transparency of the G20 process, and the inclusiveness of transformation processes in all G20 countries, including through a strong role of civil society in planning and review processes.

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Germanwatch

Following the motto “Observing, Analysing, Acting”, Germanwatch has been actively promoting global equity and the preservation of livelihoods since 1991. In doing so, we focus on the politics and economics of the North and their worldwide consequences. The situation of marginalised people in the South is the starting point of our work. Together with our members and supporters as well as with other actors in civil society, we intend to represent a strong lobby for sustainable development. We attempt to approach our goals by advocating for the prevention of dangerous climate change, for food security, and compliance of companies with human rights.

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