

BRIEFING PAPER

Shifting the Trillions

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

Gerrit Hansen, David Eckstein, Lutz Weischer, Christoph Bals

– German Presidency Update January 2017 –

Brief Summary

The landmark Paris Agreement and the Agenda 2030 provide a new framework for transitioning to a GHG-neutral and climate-resilient future, and towards truly sustainable development. The G20 as a forum of the leading industrial nations and emerging economies provides a platform for joint action towards achieving these global goals. Shifting global investment towards green finance, sustainable infrastructure and the global transition to renewable energy is one of the most urgent tasks ahead, and can only be reached by international cooperation.

This briefing paper describes how the G20 could enable a shift of international financial flows to low-carbon and climate-resilient development, as mandated by the Paris Agreement in Article 2.1c. 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 strategies towards GHG neutrality for businesses, the phase out of fossil fuel subsidies, 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 ways forwards for and favourable outcomes of the German G20 presidency.

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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

In 2015, important international climate and development policy frameworks were forged. The G7 Elmau declaration to pursue the decarbonization of the world economy over the course of the century was followed by the adoption of Agenda 2030 by the UN General Assembly and the historic binding Paris Climate Agreement under the UNFCCC. Amidst ongoing war and terrorism, a weak global economy and the rise of right-wing populist forces many climate policy developments remained encouraging throughout 2016: Deployment of renewable energies advances steadily, global energy-related CO₂-emissions stagnate and many investors, financial institutions, companies, regions and cities are calling for long-term, ambitious climate protection. Despite the outcome of the US presidential election, Brexit and the ongoing EU-crisis, the “Action COP” in Marrakech on November 2016 gave a clear signal that the international community considers the Paris Agreement (PA) irreversible and is getting ready to finally address the climate crisis. International cooperation is crucial to solve urgent global problems – now maybe more than ever. The G20 – the group of the largest and richest states that release about three-quarters of global greenhouse gas emissions – must stand up to their responsibility. Confronting the new US administration with that expectation by way of their climate and energy agenda for the G20 is the right thing to do for the German government. The years of diplomatic stalemate in climate politics during the Bush administration must not be repeated. Intelligent climate policy is a great opportunity for sustainable development, poverty eradication and more global equity. Recognizing this opportunity, many of the world’s poorest and most vulnerable countries just pledged to go 100% renewable as soon as possible and no later than 2050 – now the G20 must follow their lead.

The PA firmly states that the rise in global mean temperature 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 – notably – to making financial flows consistent with resilient, low GHG development. The latter requires all investment – public and private – to abandon unsustainable, carbon-intensive practices and projects, and shift towards green infrastructure and low-carbon development. Public investment, and in particular the development of long-lasting infrastructure, must be guided by the long-term climate goals and Agenda 2030. This is a necessary condition if risks are to be limited and the inevitable structural change is to be organized fairly and efficiently. At the same time, Sustainable Development Goal (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 decarbonizing the global energy system by mid-century and a GHG-neutral world by 2070. Agenda 2030 emphasizes the right to development and the need to make sure that “no one is left behind”. Now multi- and plurilateral fora beyond the UNFCCC as well as bilateral transformational partnerships will play a crucial role to ensure a fast and ambitious implementation of these landmark agreements negotiated under the UN-framework.

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 important 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 econo-

mies are well suited to address competitiveness concerns related to implementation, global investment and infrastructure challenges and the need to move forward in a coordinated manner to enable global GHG neutrality.

Traditionally focused on economic growth and financial stability, the G20 also works on “green” growth and infrastructure investment since the Mexican presidency in 2012. The 2016 Chinese presidency has taken unprecedented steps to widen the scope of G20 governance by endorsing the SDGs and the PA. China and the US jointly announced ratification of the PA before the Hangzhou G20 summit on September 4th–5th, while encouraging 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” was obvious in 2016 and merits close scrutiny for the years to come. Since the first time the G20 declared their commitment to end “inefficient fossil fuel subsidies” in 2009, only few countries have made progress on that subject. But the process got new momentum through low oil prices, the mutual subsidy peer review process undertaken by China and the US, and currently by Germany, Mexico and Indonesia, and finally through the G7 setting 2025 as an end-date for subsidy phase out at their 2016 summit.

The “Task force on climate-related financial disclosure” (TCFD) that works under the auspices of the Financial Stability Board was established in 2016 and reports to the G20. The TCFD came to 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 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. If delayed or insufficient policy frameworks and incentives result in a failure to align investment with the long-term climate goals in time, this could result in a lock-in of high carbon emissions and misallocation of capital, leading to 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. In 2015, a finance industry led group, the TCFD, was tasked by the financial stability board with examining options to enable a better market response to those risks. The TCFD recently published a consultation draft of their report, and will produce final recommendations on disclosure of climate-related financial risks by financial institutes and corporations around May 2017.

The G20 is dominated both by finance ministers and central bank governors (steering the so-called finance track) and heads of states. The G20 is not very transparent and works apart from democratic control or meaningful public participation, without a dedicated implementation structure or established secretariat. As the G20 has long been geared exclusively towards fostering global economic growth and financial stability, mainstreaming sustainability and climate concerns into all G20 work streams is extremely important but remains challenging. While some recent developments point in a good direction, public scrutiny will be essential to ensure that more 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 regarding climate policy 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 by the G20 to formulate and submit ambitious long-term strategies towards greenhouse gas neutral development (LTS) in time for the 2018 stock-

take 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 creating transparency with comparable data – not only regarding past emission trends but also regarding future strategies in line with Nationally Determined Contributions (NDCs) and Paris goals – and a roadmap towards making disclosure mandatory. Large companies and financial institutions should also be obliged to submit long term low-carbon strategies and report how their respective business models are compatible with the Paris goals, national long term strategies and rising CO₂ prices. Continuing the work of the GFSG, including the development of stress tests for companies and financial institutions, building support systems for investments in the energy transformation in developing countries and reconfirming commitments to climate finance are other important issues. Also, efforts should be made to install a process towards meaningful carbon pricing within the G20: by removing negative prices through a phase out of all fossil fuel subsidies if possible by 2020, but no later than 2025, and 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. Such a carbon pricing system is urgently needed to channel public and private funds into building sustainable infrastructure. Maintaining fiscal and economic stability is the core task of the G20. In times of climate crisis and increasing global inequality, the G20 needs to pay more attention to the impacts of climate change and enter into transformative partnerships with the most vulnerable countries. To extend the scope of climate risk insurance with a clear focus on the poorest and most vulnerable populations in developing countries must be part of the answer. 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 war das Jahr wichtiger Rahmensetzungen in der internationalen Klima- und Entwicklungspolitik. Auf den Beschluss der G7 in Elmau, die Dekarbonisierung der Weltwirtschaft im Laufe des Jahrhunderts anzustreben, folgte die Verabschiedung der Agenda 2030 durch die UN-Generalversammlung und das historische und verbindliche Paris-Abkommen (PA) unter dem Dach der UN-Klimarahmenkonvention (UNFCCC). Inmitten einer von Kriegen und Terrorismus, einer schwachen Weltwirtschaft und dem Aufstieg rechtspopulistischer Kräfte geprägten Welt blieben viele klimapolitische Entwicklungen auch 2016 ermutigend: Der Ausbau der Erneuerbaren Energien schreitet unaufhaltsam voran, die energiebedingten CO₂-Emissionen stagnieren und viele Investoren, Finanzinstitutionen, Unternehmen, Regionen und Städte rufen die Politik zu langfristigem, ambitioniertem Klimaschutz auf. Dem Ausgang der US-Präsidentschaftswahl, dem Brexit und der Krise der EU zum Trotz sandte die „Action-COP“, der UN-Klimagipfel in Marrakesch im November 2016, ein klares Signal, dass die Staatengemeinschaft die Pariser Beschlüsse als unumkehrbar betrachtet und endlich bereit ist, sich der globalen Klimakrise zu stellen. In der derzeitigen weltpolitischen Lage gilt mehr denn je: Wir brauchen wirkungsvolle internationale Kooperation zur Lösung drängender globaler Probleme. Die G20 – die Gruppe der größten und reichsten Staaten, die etwa drei Viertel der weltweiten Treibhausgas-Emissionen freisetzen – muss ihrer Verantwortung gerecht werden. Es ist richtig, dass die Bundesregierung mit ihrer G20-Agenda auch die neue US-Regierung mit dieser Erwartung konfrontiert. Das verlorene Jahrzehnt in der Klimapolitik während der Regierung von George W. Bush darf sich nicht wiederholen. Intelligente Klimapolitik ist eine großartige Chance für nachhaltige Entwicklung, Armutsbekämpfung und mehr globale Gerechtigkeit. Viele der ärmsten und verwundbarsten Staaten haben dies bereits erkannt und sich beispielsweise in Marrakesch verpflichtet, schnellstmöglich auf eine 100% erneuerbare Energieversorgung umzurüsten – nun muss die G20 nachziehen.

Das Paris-Abkommen enthält die ausdrückliche Verpflichtung, die globale Erwärmung auf deutlich unter 2 °C zu begrenzen und Anstrengungen für eine Begrenzung auf 1,5°C zu unternehmen, um gefährlichen Klimawandel zu vermeiden. Außerdem haben sich darin alle Länder verpflichtet, ihre Anstrengungen im Bereich Anpassung zu vertiefen und insbesondere die Finanzflüsse in Richtung einer treibhausgasarmen und klimaresilienten Entwicklung zu lenken. Letzteres bedeutet nicht weniger als dass alle Investitionen, öffentliche wie private, aus fossilen bzw. klimaschädlichen Projekten und Verfahren abgezogen und in Richtung grüner Infrastruktur und treibhausgasneutraler, nachhaltiger Entwicklung umgelenkt werden müssen. Öffentliche Investitionen und insbesondere die Entwicklung langlebiger Infrastruktur müssen sich an den langfristigen Klimazielen und der Agenda 2030 orientieren.

Gleichzeitig fordert das globale Ziel für nachhaltige Entwicklung (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 Energiesektoren bis zur Mitte des Jahrhunderts und für eine treibhausgasneutrale Weltwirtschaft bis 2070. Die SDGs untermauern das Recht auf eine 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 multi- und plurilaterale 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 einen treibhausgasarmen Pfad 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 chinesische Präsidentschaft hat nachhaltige Entwicklung – orientiert an der Agenda 2030 – zu einem Kernthema der G20 gemacht. China und die USA haben kurz vor dem G20-Gipfel in Hangzhou am 4. und 5. September 2016 gemeinsam die Ratifizierung des PA verkündet, und andere G20-Staaten zur Ratifizierung ermutigt. 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 wechselseitigen „peer review“ bereit erklärt. Und zuletzt hat der G7-Gipfel 2016 mit der Einigung auf das Enddatum 2025 für den Abbau von fossilen Subventionen erstmals eine klare zeitliche Vorgabe gemacht, der sich die G20 anschließen könnte.

Die 2016 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 – neben negativen Auswirkungen auf die Wirtschaft und Wachstum. Die TCFD, eine von der Finanzindustrie getragene Gruppe, hat ihren vorläufigen Bericht zur öffentlichen Kommentierung im Dezember veröffentlicht und wird voraussichtlich im Mai 2017 Empfehlungen für die (freiwillige) Offenlegung von Klimarisiken für Unternehmen, Investoren und Finanzinstitute vorlegen.

Die G20 ist ein (informelles) Forum, das auf der einen Seite von FinanzministerInnen und ZentralbankpräsidentInnen, auf der anderen Seite von den Regierungschefs und -chefinnen dominiert wird. Sie ist eher intransparent und arbeitet abseits von demokratischer Kontrolle oder der Beteiligung der Öffentlichkeit, ohne klare Ausführungsstrukturen oder ein festes Sekretariat. Da die G20 traditionell vor allem darauf ausgerichtet ist, das globale Wirtschaftswachstum und die Finanzstabilität zu fördern, ist die Berücksichtigung von Nachhaltigkeit und Klimaschutz in allen G20-Arbeitsströmen ebenso schwierig wie wichtig. Während einige der jüngsten Entwicklungen in eine gute Richtung weisen, ist zivilgesellschaftliche Begleitung von wesentlicher Bedeutung, um sicherzustellen, dass Kriterien für Umweltverträglichkeit und soziale Integration deutlich besser als bisher erfüllt werden.

Die deutsche G20-Präsidentschaft bietet eine einmalige Gelegenheit, an den klimapolitischen 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 zur gegenseitigen Begutachtung der 2050-Pläne. 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 ausweitert 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. Große Unternehmen und Finanzinstitute sollten dazu verpflichtet werden, klimaneutrale Langfristpläne vorzulegen. Mittels eines Stresstestes wäre zu prüfen, ob ihre Geschäftsmodelle mit den Klimastrategien der Länder, den Vorgaben des Paris-Abkommens und steigenden CO₂-Preisen kompatibel sind. 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 CO₂ einzuführen: Einerseits durch den Abbau negativer Preise, also einer Abschaffung von Subventionen für fossile Energieträger, wenn möglich bis 2020, aber nicht später als 2025; andererseits 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. Dieser Abbau von Subventionen für fossile Energien und die Einführung von ansteigenden Mindestpreisen für CO₂ ist auch dringend notwendig, damit öffentliche und private Gelder in den Aufbau nachhaltiger Infrastruktur gelenkt werden.

Die Wahrung der finanzpolitischen und wirtschaftlichen Stabilität ist eine Kernaufgabe der G20. In Zeiten des Klimawandels und zunehmender globaler Ungleichheit muss sich die G20 hierfür auch stärker mit den Folgen des Klimawandels beschäftigen und transformative Partnerschaften mit den verletzlichsten Ländern eingehen. Eine Ausweitung des Konzepts der Klimarisikoversicherung – mit einem klaren Fokus auf die ärmsten und verletzlichsten Bevölkerungsgruppen in Entwicklungsländern – muss hier Teil der Antwort 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. The election of Donald Trump as next president of the United States in December 2016 just marked the latest peak in the rise of populist politicians with nationalistic, protectionist agendas worldwide. In 2015, 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. The extremely fast signing and ratification of the Paris Agreement, which entered into force on November 4th 2016, less than one year after its adoption, underscores the unwavering will of the international community to finally counter the global climate crisis. At COP22 in Marrakesh, uncountable initiatives and pledges were announced in support of near-term, ambitious climate action, by non-state actors as well as states and supranational bodies.

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 (see Figure 1). 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. Renewable energy prices continue to drop, 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 time¹. According to the International Energy Agency (IEA), global energy-related CO₂ emissions have not increased the second year in a row².

These are signs of a trend reversal in global energy systems which is urgently needed to achieve the ambitious objectives set in Paris. Still, decarbonizing the global energy system 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 more than 80% of global CO₂ emissions³, 80% of world trade and almost 90% of global GDP⁴. 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 financial means for a just transition to

a GHG-neutral 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.

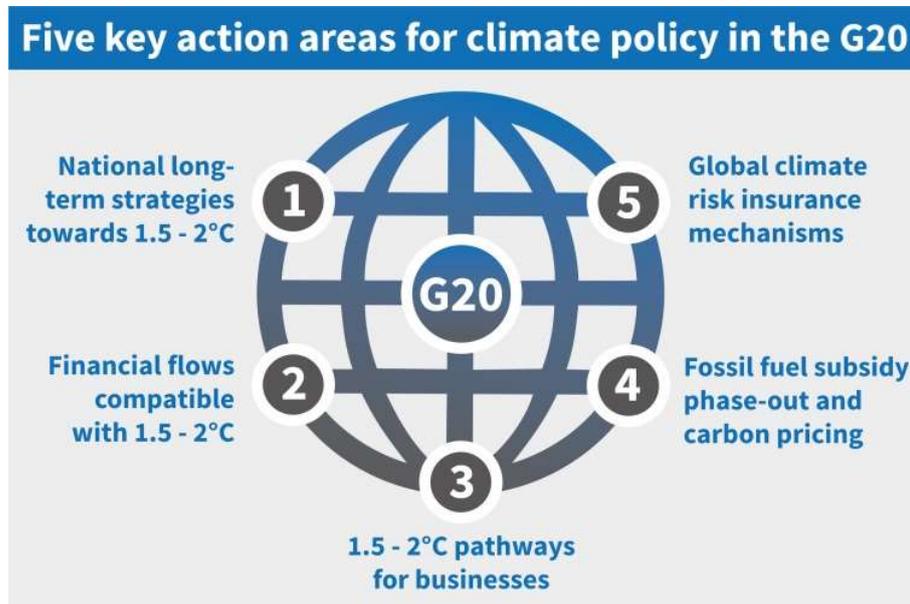


Figure 1: Key action areas for climate policy in the G20.

Source: own illustration

This briefing paper describes how the G20 could serve as a platform to enable a shift of international financial flows to low-carbon and climate-resilient development, as mandated by the Paris Agreement in Article 2.1c. 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” (LTS). 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 strategies towards GHG neutrality for businesses. It introduces policy instruments to correct the current market distortion and set energy prices right, such as pricing carbon dioxide emissions and the phase out of fossil fuel subsidies, and “Paris-compatible” investment criteria for public and private finance. Directed at decision makers and policy experts, it also highlights ways forwards for and favourable outcomes of the German G20 presidency.

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 transformation of their energy systems until 2050 and the decarbonization of the global economy 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. On November 4th 2016, the PA entered into force and by the end of the COP22 it had been ratified by more than 100 countries representing over 70% of global greenhouse gas emissions⁵. 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 levels⁶ (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 CO₂ 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 CO₂ emissions will need to be reduced faster and reach zero in the middle of the century. The objectives set in the Paris Agreement thus call for global decarbonization of the energy system 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, and highlights the importance of food security.

The third goal is to make all finance 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 2). 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 be ratcheted up 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.

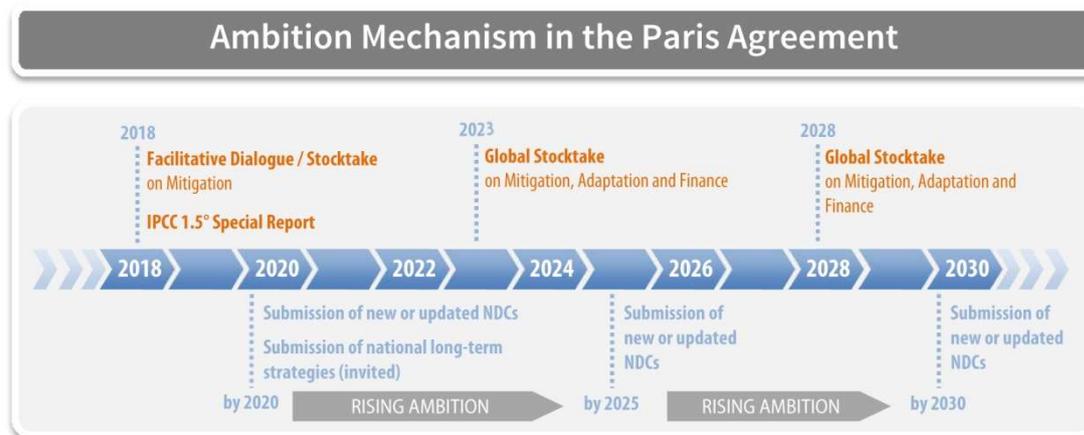


Figure 2: The Paris Agreement ambition mechanism.

Source: own illustration based on the Paris Agreement⁵

At COP22 in Marrakesh, the **2050 pathways platform** was established by the High Level Climate Champions as a platform to exchange expertise, experiences and resources towards developing long-term deep decarbonization strategies.⁷

2.2 Implications for Finance and Investment

The Paris Agreement has set important goals for finance that now have to be carried forward by further 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 explicitly 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)⁶. 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. Consequently, 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. This process could be intensified if countries were obliged to report to the UNFCCC on their progress against Art. 2.1c.

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 consider⁸. First, there is a risk of devaluation of existing assets: fossil fuel reserves and resources rendered “unburnable” by the remaining carbon budget^{9,10}. 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^{11,12}.

"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 portfolios¹³. 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"¹¹. In their recent report on the design of a sustainable financial system¹⁴, 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 side-lined 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 traditional core issues of the G20 (financial stability and economic growth), while the sherpa track usually has a broader portfolio, depending on the priorities of the current presidency, but also continuing earlier initiatives (see Figure 3). In addition to the regular G20 finance ministers and central bank governors meetings, other ministerial meetings, such as energy, trade or agriculture are also convened, and the private sector and civil society is increasingly being involved through the establishment of so-called “engagement groups”.



Figure 3: G20 Governance structure during the German presidency, 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 Initiative¹⁵. Another important issue, the phase out of inefficient fossil fuel subsidies, has been re-iterated 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 set forth 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 green technologies in emerging economies¹⁶. 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 UNFCCC¹⁷. In 2013, the G20 Energy Sustainability Working Group was set up, 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 Africa¹⁸. 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 led the G20 under the headline “Towards an Innovative, Invigorated, Inter-connected 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 called for inclusive global growth and development to lessen inequalities. It also made 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 remained the top priority for the Chinese presidency^{19,20}.

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, and key conclusions were integrated into the Communiqué of the Hangzhou summit. The GFSG is continued under the German presidency.

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 cooperation²¹. It also adopted the G20 Energy Efficiency Leading Programme²² 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 2017²³. They also reiterated their commitment 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, and the Communiqué encourages all other G20 countries to also participate in such reviews.

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” the finance ministers agreed to continue their work on climate finance in 2017²³, however the CFSG has been discontinued.

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 activities²³.

Under Chinese leadership of the G20 IIWG in 2016, the MDBs unanimously endorsed a Joint Declaration of Aspirations on actions to support infrastructure investments²⁴, 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, however, the IIWG is currently considered dormant.

3.3 The German Presidency

During the 2015 G7 process and the summit at Schloss Elmau, German leadership contributed significantly to the landmark statement on achieving “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 German Government decided to put climate change and the global energy transition

prominently on the G20 agenda, and aims at developing a joint action plan on climate and energy. They also stress the importance of the G20 as a multilateral forum that contributes to prosperity, stability and security worldwide by ensuring international cooperation and openness. Given the recent changes in the international political landscape, the outcome of this years' G20 is regarded highly uncertain. A strong statement supporting the implementation of both the Agenda 2030 and the PA would be a valuable first step in reassuring the global community about the future course of the major economies.

The German G20 Agenda

The German G20 Presidency has chosen the official motto “Shaping an interconnected world” and addresses a broad range of topics under the three pillars “Resilience, Sustainability, Responsibility” (see Figure 4). The implementation of the Paris Climate Agreement is a key component of the German G20 agenda. The newly formed working group on sustainability, comprising the energy sustainability working group and a new climate sustainability working group, is working on a G20 action agenda for climate and energy. The work of the Green Finance Study Group in the finance track continues, with a focus on disclosure of climate and environmental financial risks, and the development of instruments to evaluate and control such risks. What remains to be seen is whether sustainability and climate goals are integrated across the board, for example into the investment initiative “Compact for Africa”, led by the finance track. Similarly, the continuation of the G20 Action Plan for Agenda 2030 and the implementation of the Hangzhou Action Plan for strong, sustainable and balanced growth can create either synergies or incoherencies.

Building Resilience	Improving Sustainability	Assuming Responsibility
World Economy Global Trade Employment Financial Markets/ International Financial Architecture Tax Cooperation	Climate and Energy The 2030 Agenda Digitalisation Health Empowering Women	Tackling the causes of Displacement Partnership with Africa Fighting Terrorism Anti-Corruption Agriculture / Food Security

Figure 4: The three pillars of the German G20 presidency.

Source: own illustration based on¹¹³

During her speech at the 2016 Petersburg dialogue, chancellor Merkel highlighted the role of long-term strategies, the G7 carbon pricing platform, climate finance and mobilizing private investment¹¹⁴. In the priority statement for the German presidency¹¹³, climate change is named explicitly as a threat to development, health, food security and a major global risk. The document also stresses technological innovation and employment in future-oriented industries, provision of long-term direction and certainty through common framework conditions for the economy, and a closer link of climate and energy policy with the aim of ensuring a reliable investment climate and a better management of climate risks. *“A secure, economically efficient and greenhouse gas neutral energy supply accessible to everyone is a fundamental prerequisite for economic growth and prosperity, and one of the main priorities of the G20. The aim of discussions in the G20 is to foster appropriate political frameworks, financing instruments, and economic incentives for investments in climate-resilient infrastructure and to boost technological innovations.”*¹¹³

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. At COP22 in Marrakesh, China already announced its willingness to continue leadership in climate policy without the US. The new regime in Argentina has changed the long-term antagonist stance of the country on international climate policy and is keen to assume a more prominent role internationally²⁵, providing the opportunity for continuity regarding the climate and green finance agenda in the G20.

The G20 presidency presents an important 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 apart from the difficult international landscape, the G20 outcome will also be influenced by the electoral race and national campaign considerations, given that the G20 summit on July 7th–8th 2017 in Hamburg will happen only months before the next general elections in Germany in September. There is also a real possibility for not only a massive mobilization of civil society accompanying the visit of the G20 leaders, but also of street protests turning violent.

4 Setting a Clear Policy Framework towards Greenhouse Gas Neutrality

A stable and reliable policy framework and clear long-term orientation are essential for decarbonizing the world energy system and building a Greenhouse-Gas neutral 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 (LTS) 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 greenhouse-gas intensive investments such as fossil fuels, 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 consideration²⁶, 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 successful²⁷. 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 infrastructure²⁸. 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).

Long term strategies are also vital to ensure that the inevitable structural change our economies and societies will undergo over the course of the next decades will happen in a just and socially responsible way²⁹, taking into account the effects of other major changes such as digitization, urbanisation and the 4th industrial revolution. A recent special report by the German Advisory Council on Global Change for the German G20 presidency highlights how development and justice could be served through the low-carbon transformation by inspiring innovation, channelling investment into sustainable infrastructure and at the same time combatting inequality and promoting inclusion within societies and globally³⁰.

4.2 Designing Long-Term Strategies

Maybe the most important ingredient for a 2050 strategy is the positive political vision. While technical plans are important, they do not constitute a political roadmap for change. Especially in the developing world, the emphasis of LTS must be on how they contribute to sustainable development rather than emphasizing least cost abatement options³¹. The scale of the benefits associated with cleaner development is extraordinary – for example, improved public health, better transportation, liveable cities, job creation and the economic gains that come with them³². Quantifying and communicating the benefits of decarbonizing the energy system is crucial to win the political support needed for the great transformation ahead.

2050 strategies should be linked to non-climate objectives, notably social and economic development. Creating synergies between the national sustainable development plans to 2030 that are to be developed for the Agenda 2030, and the long-term climate strategies “invited” by the Paris Agreement is crucial. G20 member states could take the lead by formulating implementation plans that consider both the SDGs and the PA.

At COP22 in Marrakesh, the USA, Mexico, Germany and Canada were the first to present their national LTS³³⁻³⁶, most recently followed by France. Highlighting the important role of preparing LTS, the high level climate champions announced the **2050 pathways platform** supported by 22 countries, 32 cities, states and regions and 196 businesses⁷. Also, the 48 countries of the Climate Vulnerable Forum (CVF) pledged to prepare and submit their LTS as soon as possible before 2020, and committed to ramp-up domestic renewable energy production as fast as possible, with the aim to reach 100% renewable energy supply between 2030 and 2050.

While only a few nations have finalized and submitted their LTS to the UNFCCC, a lot more is happening across administrative levels. For example, the governments of China, Brazil, Chile, Colombia, Peru, and South Africa have developed long-term planning scenarios³¹. The European Commission developed a 2050 energy roadmap for EU countries, and 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 countries³⁷ could provide technical guidance.

Long-term low greenhouse gas development strategies (LTS) should explicitly address the domestic and international challenges of deep and rapid decarbonisation of the energy system, such as ensuring a just transition to renewable energy, including developing new high quality 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 GHG neutrality will be integrated into a country’s legal framework. The strategies 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 the 1.5°–2°C temperature limit (Article 2.1c of the Paris Agreement).

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 above pre-industrial levels. Strengthening pre-2020 ambition would offer a more solid foundation for implementing the NDCs from 2020 onwards as well as for continuously strengthening their ambition³⁸. In addition, most businesses and governments base their long term strategies on outdated scenarios that result in 2°C warming by the end of the century with only 50% probability, consequently allowing for unabated 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 CO₂ from the atmosphere³⁹.

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 the known fossil reserves are unburnable.

In the meantime, 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” provide a starting point for most G20 countries³⁷. 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 GHG neutrality, 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. By taking decisive action on developing long-term strategies towards GHG neutrality, the G20 could enhance credibility by sending a strong message that there will be no sliding-back behind the PA.

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.”⁴⁰ 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.

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 financial 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 and transition risks on 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 Authority⁴¹, he addressed the insurance market Lloyd’s on challenges currently posed by climate change⁴¹. 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-intensive businesses who would be indirectly affected through increasing energy costs⁴¹. An abrupt devaluation of this group of assets could constitute a systemic risk, and create substantial amounts of "stranded assets"⁴². So far it is not transparent whether and if so to what extent those climate risks are already priced in. Many observers fear – due to the tragedy of horizon – the high risk of large amount of stranded assets in case of rapid implementation of climate policy.

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 CO₂ 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*"⁴³.

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 risk⁴⁴. Of the G20 countries 15 of 19 have a GHG corporate reporting in place⁴⁵. Nevertheless, this data is insufficient and stricter targets of what should be disclosed and how need to be set for the future. While it is important that companies calculate and disclose the necessary information on the GHG-intensity of their assets, a complete and comprehensive assessment of current and future risk exposure requires the development of decarbonization strategies (see 5.3) for their business models in line with NDCs and Paris goals. Also, there may be merit in considering a proportionate approach that scales the granularity of disclosures to the risks faced by firms⁴⁶. In order to track the progress of the private sector on its path towards a low carbon economy, disclosure on investors level would also be important⁴⁷.

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 managed¹³. Following a stock-taking report in phase I¹³, the TCFD published its preliminary report for consultation in December 2016 (see below) and is expected to submit final recommendations to the G20 around May 2017. The most important next step to be taken is providing clear follow-up and assessment mechanisms regarding the implementation of the taskforce’s recommendations.

The FSB Task Force on Climate Related Financial Disclosure Report

The Task Force’s recommendations apply to financial-sector organizations, such as banks, insurance companies, asset managers and asset owners, but also to non-financial industries. Here, the TCFD specifically targets large companies in sectors most susceptible to climate risk, such as energy, transport, material and buildings, and agriculture, food and forestry products. The TCFD developed supplemental disclosure guidance for the financial and the non-financial industry⁴⁸ and presents four key recommendations supported by sector specific guidance (Figure 5).

Governance	Strategy	Risk Management	Metrics and Targets
Disclose the organization's governance around climate -related risks and opportunities.	Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategies, and financial planning.	Disclose how the organization identifies, assesses, and manages climate -related risks.	Disclose the metrics and targets used to assess and manage relevant climate -related risks and opportunities.

Figure 5: Four key recommendations of the TCFD.
Source:⁴⁹

The most important recommendation is that climate risk disclosure should be included in financial filings rather than as a part of sustainability reporting. By moving climate risk reporting into mainstream financial reporting, disclosure practices, techniques and data analytics are hoped to rapidly evolve, and lead to more adequate climate-related financial disclosures, ultimately supporting more appropriate pricing of risks and allocation of capital in the global economy.

General recommendations include

- to disclose what the organization considers to be the relevant short-, medium-, and long-term horizons, *taking into account the lifetime of assets*
- to take into account geographical differences and to distinguish between physical and transition risk (including liability)
- to provide information on the climate-related implications on operational expenditure (OPEX), capital expenditure (CAPEX) and Cost of Capital.

The TCFD recommendations call on financial actors to disclose the methods via which risks are assessed. The guidelines also ask for an assessment of climate risk in comparison with other relevant risks, and to disclose how the management of climate-related risks fits into the general risk management plan. The TCFD recommends to disclose metrics used for both climate-related risks and opportunities. The latter may include resource efficiency, new markets, new sources of energy and

services and resilience. It also calls on asset owners and managers to disclose the GHG intensity of their investment.

The TCFD asks to list the organisations targets that are “in line with anticipated regulatory requirements or market constraints or other goals”, enabling investors and stakeholders to assess how an organisation estimates it is contributing to the PA and SDGs. The report stresses the role of scenario-analysis, and calls on organizations to base their assessment on different sets of scenarios, “a 2°C scenario in addition to two or three other scenarios most relevant to their circumstances, such as scenarios related to Nationally Determined Contributions (NDCs), business-as-usual scenarios, or other challenging scenarios”. The Table below summarizes key areas for future work identified by the Task Force.

Table 1: Key areas of future work regarding climate related financial risk, Source: ⁴⁹Figure 8

Key Areas for Further Work
RELATIONSHIP TO OTHER REPORTING INITIATIVES
Encourage standard setting organizations and others to actively work toward greater alignment of frameworks and to support adoption
CORE MEASURES LINKED TO PURPOSE
Undertake further research and analysis to better measure and understand how climate-related issues translate into potential financial impacts
WHO PAYS AND IS REWARDED
Develop methodologies for allocating emissions in asset classes beyond equities, including non-corporate bonds, property/ real estate, infrastructure, private equity, and alternative assets
Improve data quality, increase understanding of climate-related risks and opportunities, and enhance risk measurement methodologies broadly
MARKET INTEGRITY
Further develop applicable 2° (or lower) transition scenarios and supporting outputs and tools/user interfaces
Develop broadly accepted methodologies, datasets and tools for scenario-based evaluation of physical risk by organizations
Make datasets and tools publicly available and provide commonly available platforms for scenario analysis

5.2 Stress Testing and Strategies towards Greenhouse Gas Neutrality for Companies

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^{11,46}. 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”⁵⁰.

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. The Green

Finance Study Group has taken up the issue of assessing environmental risk to financial markets and assets during the Chinese Presidency. Based on the work of the TCFD, the development of adequate stress-testing methodologies should be taken forward by the GFSG during and beyond 2017.

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 climate neutral 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 strategies¹¹. Firms need to weigh their strategies against plausible public policy developments, technological innovations, and physical impacts from climate change. For plausible transition scenarios, one option might be to base assumptions on the NDCs and/or LTS of the countries relevant to the company in question, another to use one of the commonly available model-trajectories towards 1.5-2°C by the end of the century. A full exploration may require consideration of financial risks under several scenarios, and should also entail the opportunities associated with the transition⁴⁶. Either way, as stated in the TCFD report, the assumptions and methodologies should be disclosed in order to allow for outside assessment.

The integration of shadow-carbon pricing into investment decisions could be a suitable approach to managing climate-related physical and transformational risks as well as enhance future business and investment decision making processes and planning⁵¹ (see also 6.2).

Current decarbonization strategies by companies often focus on reducing CO₂ emissions through the adoption of renewable energy targets or increased energy efficiency measures. For instance, the “RE 100”, a collaborative global initiative launched at the New York Climate Week in 2014, represents 69 companies that commit to 100% renewable electricity – thereby increasing demand for and delivery of renewable energy⁵². 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 December 2016, commitments from 2138 companies engaging in action throughout the sectors of energy access and efficiency, renewable energy and emission reductions have been recorded⁵³.

Divestment

The fossil fuel divestment movement has rapidly increased its scope over the past years. By December 2016, 688 institutions and over 58000 individuals from 76 countries representing USD 5 trillion in assets had committed to divest from fossil fuels, almost twice the sum committed by December 2015¹⁰⁸. 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”¹⁰⁹. At the Paris 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 sectors¹¹⁰.

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 companies¹¹¹. 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 strategies towards GHG neutrality (see Section 5.2) should constitute the most important criterion for investing in or divesting from companies, rather than just the stock of fossil fuels in their possession.

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. However, after the launch of the final report, the challenge will be back to the G20. The follow up must be organized with as much high-level engagement as the first round, and both the institutional anchor of that process and the actual steps of implementation should be ironed out now. One idea on process could be for the G20 finance ministers track to create a permanently staffed high profile climate stability team under continued guidance from the FSB⁵⁴, including an outreach to non-industry actors. Beyond such a blueprint for the Task Force's future, the German presidency should also push for the timely and stringent implementation of the TCFD's final recommendations. Risk disclosure could initially be implemented on a voluntary basis, creating lessons learnt along the way, with the perspective of making disclosure mandatory within the next 2–5 years. Also, the G20 members could show leadership by driving early national adoption of the TCFD recommendations, and through consideration and disclosure of physical and transition risks in major infrastructure projects and publicly owned enterprises.

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 dis-incentivizes 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 taxes⁵⁵, or as a contribution to the GCF or more generally to meet the climate financing commitments of the PA.

However, the 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 depending on the methodology used in measuring, the type of subsidy and the country⁵⁶. According to the International Energy Agency (IEA), worldwide fossil fuel subsidies amounted to USD 493 billion in 2014⁵⁷ - which is almost five times as much as pledged to raise annually supporting developing countries toward low-emission and climate-resilient development by 2020⁵⁸. Almost 50% was allocated to oil products, with a regional focus on the Middle East/North Africa, Central/Eastern Europe and Emerging and Developing Asia⁵⁹ (see Figure 6). In comparison, subsidies to assist the deployment of renewable energy technologies are almost four times lower, estimated at USD 112 billion for power generation and USD 23 billion for biofuels in 2014⁶⁰. 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.

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 2014, 11% of global energy related CO₂ emissions had an average carbon price of around USD 7 per tonne, whereas 13% of global CO₂ emissions stemmed from fossil-fuel use backed by consumption subsidies, equivalent to an implicit subsidy of USD 115 per tonne of CO₂⁶¹. 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 trillion⁶²

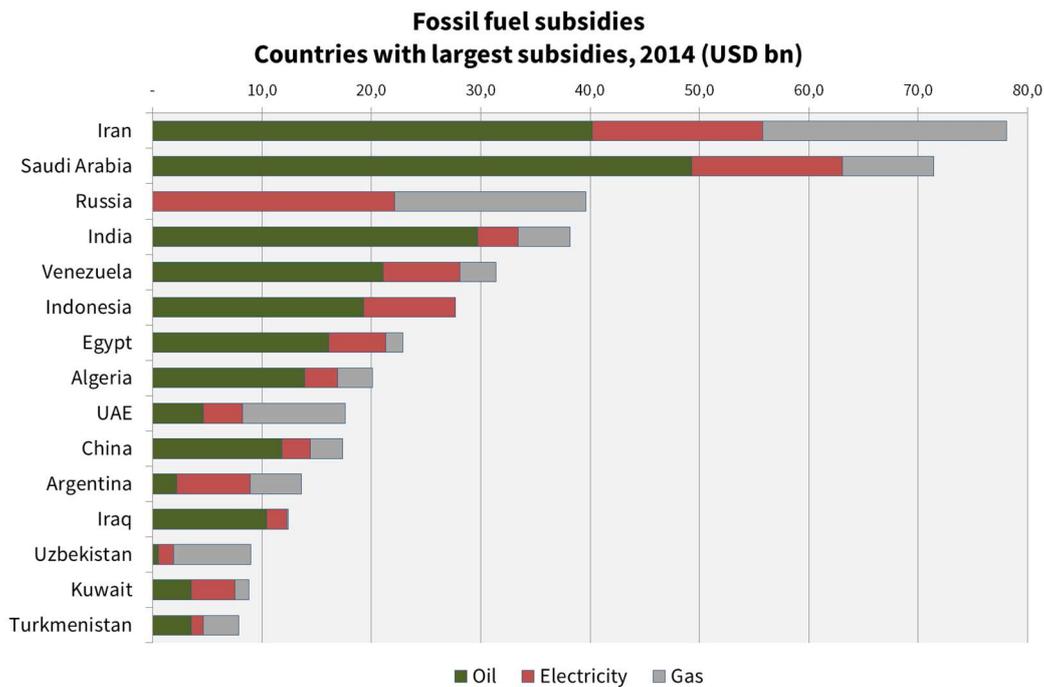


Figure 6: Countries with the largest subsidies for fossil fuels in 2014.

Own illustration, data source:⁶³

The IEA identifies the “Phasing out of remaining fossil-fuel subsidies to end-users by 2030” as one of five crucial steps that have to be taken to cap energy emissions by 2020 and to thereby leave the door open to a 2°C scenario⁶⁴. A recent report by the Nordic Council of Ministers concludes that reform and removal of fossil fuel subsidies could entail direct global emissions reductions of around 3% by 2020, rising to around 8% by 2050⁵⁸. On a national scale, research across 20 countries reveals a potential for average national emissions reductions of 11% through phasing out fossil fuel subsidies by 2020 or a total of 2.8 Gt of CO₂e across just 20 countries⁶⁵ – resulting in average annual savings to governments of almost USD 93 per tonne of GHG emissions removed. The IEA estimates that accelerating the partial phase out of subsidies to fossil fuel consumption would lead to a 10% reduction in energy sector emissions by 2030⁶¹. Stefanski (2014) suggests 20% lower global carbon emissions between 1980 and 2010 if countries had not subsidized fossil fuels⁶⁶.

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 2014⁶⁷. Yet 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, reallocating subsequent savings (also from lower world oil prices) of USD 15.6 billion to investments in people and infrastructure⁶⁸. 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 disruption⁶⁹.

However, while individual countries have gradually begun to reduce subsidies, rhetorical commitments by the G20 have not been translated into sufficient policy action.

The 2009 Pittsburgh Summit marked the first time the G20 addressed phasing out 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 spearhead the G20 efforts in this area⁷⁰.

For the upcoming G20 summit in Germany, it is important that the group rekindles and reinforces its commitment to tackle an incremental elimination of fossil fuel subsidies. While it may be difficult to agree to a date certain without backing from the US, all G20 members could still commit to undertake peer reviews of their domestic fossil fuel subsidies as a first step towards making them transparent and ambitious in their reform⁷⁰.

Since June 2010, an informal group of non-G20 countries, namely Costa Rica, Denmark, Ethiopia, Finland, New Zealand, Norway, Sweden and Switzerland, is working towards building political consensus around the necessity of fossil fuel subsidy reform. A key activity of the “Friends of Fossil Fuel Subsidy Reform” was the launch and promotion of the Fossil Fuel Subsidy Reform Communiqué, which has by now been endorsed by more than 35 nations, including seven G20 members (Germany, France, UK, Italy, Mexico, Canada and the USA). The Communiqué calls for increased transparency around fossil fuel subsidies, greater ambition in the scope of reform and the provision of targeted support for the poorest.

The G7 summit in 2016 set a 2025 deadline for the ending of support for fossil fuels, which constitutes a major breakthrough. 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, both for production and consumption. As the potential carbon emissions from the oil, gas, and coal in the world’s currently operating fields and mines would already take us beyond 2°C of warming⁷¹, subsidies for coal production and fossil fuel exploration should be considered a priority. 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 CO₂, (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 2030⁷², however new research suggests the real SCC is much higher^{73,74}. 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 economy⁷⁵. Most estimates of efficient carbon prices from integrated assessment models in line with a 2°C pathway range between USD 80 and 120 in 2030⁷⁶.

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 USD 15 in 2015²⁶. 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 models⁷⁷. 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 CO₂e, Statoil ASA USD 50, and ExxonMobil USD 80⁷².

The reason for such low carbon prices is not purely economic, but lies in the political economy: institutional structures, power, and influence pose political constraints on carbon pricing that may not be easily overcome in the short run⁷⁸. 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).

Table 2: 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 practitioners ~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 all carbon pricing instruments (Article 6 PA) 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

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 CO₂e⁷⁹. 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 2). While ICAP is focused purely on ETS, all other initiatives and platforms explicitly support all forms of carbon pricing.

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^{76,80}. 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 tradable 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 process¹¹².

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 autonomy⁸¹.

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 trading⁸¹.

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 magnitude 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 path¹¹⁵.

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 policies can undermine the goals of the EU ETS by weakening its price and reallocating emissions to member states with lower ambitions¹¹⁶. 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 terms¹¹⁷. 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^{118,119}. To a limited extent, this is currently achieved through allocation rules, especially the initial allocation of allowances¹²⁰.

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 expectations¹²¹, and allow to utilize the member state policies as companion policies¹²². 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 accord¹²³.

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^{80,82,83}. 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 establishing (national) minimum carbon prices that rise over time. At start, prices could be differentiated between industrialized and emerging economies. A global harmonization and coordination of carbon prices will however require substantial transfer payments between rich and poor countries. Donor nations would benefit from such conditional payments through the overall rise in ambition⁸⁰. 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 Agenda⁸⁴.

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 CO₂: 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 behavior⁵⁵. 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 annually⁸⁵. 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 sectors⁸⁶. 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^{55,87}.

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-established⁸⁸. Also, GHG-emission abatement has substantial co-benefits in other public domains, air pollution control and associated health benefits being the most prominent one⁸⁹. 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 2040⁹⁰. 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^{32,55}.

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 jurisdictions⁷⁸. A recent report from Canada’s Ecofiscal Commission shows how this can be done in a thoughtful and participatory way⁹¹. Table 3 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 3 costs could be smoothed over time, gradually nudging the possible in the direction of the optimal.²⁶

Table 3: Differentiated revenue-recycling priorities at subnational level in Canada. Source:⁹¹

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 system¹⁴, 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”¹⁴ outlines a broad system reform towards sustainability, based on 10 key principles (see Table 4), 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 4: Possible principles for a sustainable financial system; Source:¹⁴

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 assets⁹². 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 exists⁴⁵. 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 generation⁴³.

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 incentives⁴³. 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 killings⁹³.

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. 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, do exist, though the most commonly available scenarios falls short of the raised ambition of the PA. Taking such pathways as a starting point, it is possible to develop criteria that can be used to determine whether certain infrastructure investments are consistent with the Paris objectives or not.. 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.

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 2010⁵⁰. 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 5: Proposed 2°C investing criteria for transport infrastructure. Source:⁵⁰

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)	Airports with transport interconnectivity plan/bio-fuelling stations	<i>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.</i>	Rail networks dedicated to fossil fuel transportation
	Mass rapid transit/ Light Rail Transit			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.

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 a 1.5°C warming limit. 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 sectors⁵⁰ (see Box).

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. A monitoring platform combining results of indicator-based modelling exercises with real-asset data would be a further option⁹⁴. 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 trans-border 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-Saharan 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 levels⁹⁵. 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 savings⁹⁶.

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°C⁹⁷. 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 sector⁹⁷.

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. As the latest New Climate Economy report “the sustainable infrastructure imperative” states “*We have a historic opportunity to deliver inclusive economic growth, eliminate poverty and reduce the risk of climate change. Now is an opportune time to act because of record low interest rates, large available pools of finance and rapid technological change.*”⁹⁸

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 green investment 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 disconnected⁹⁹. 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 infrastructure⁴⁴.

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, and also guide relevant activities such as the “Compact with Africa” and 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 projects¹⁰⁰.

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 respectively¹⁴. 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 and potentially inhibit growth through misallocation of capital, but it may also be a challenge with regard to fiduciary duty¹⁰¹.

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 services¹⁰².

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 equity¹⁰³. The bond market is therefore an essential tool to finance the transition to a low-carbon economy. Green bonds are variable or fixed interest rate bonds labelled by the issuer who undertakes to use the proceeds for investing into environment and climate protection projects. The green bond market is growing rapidly: USD 36 billion of labelled green bonds were issued in 2014, up from 11 billion in 2013¹⁰⁴. At around USD 62 billion labelled green bonds issuance until October 31st, 2016 has already surpassed the total issued volume of USD 42 billion in 2015¹⁰⁵. 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 Scheme¹⁰⁶, 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 funds¹⁰⁷. 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).

Leverage Private Finance by Public Investment

In their 2016 report “Financing change: How to mobilize private-sector financing for sustainable infrastructure”¹⁰², 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.

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.

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 GHG-neutrality 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 implementation path. The ambitious implementation of the Paris Agreement and the SDGs is key to prevent catastrophic climate change, to limit poverty and provide a reasonable chance to adapt for many people, nations and species at risk. At the same time, it also offers the opportunity of truly sustainable development and a stable, green world economy. However, the drastic change required will create winners and losers. To what extent fossil fuel assets will be stranded depends crucially on near-term action and reliable long-term planning as well as an appropriate mix of policy instruments including a carbon price signal consistent with empirical and scientific evidence. Without decisive action to better represent climate policy risks within the financial system, severe disruptions of the world economy become a real possibility.

Many existing enterprises will have to change their business models, and many countries, in particular developing nations fear to be left behind without being able to use their domestic fossil fuel reserves or having a cost effective alternative. 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. With the recent changes in the political landscape, it is even more important to recognize that energy security in times of global warming can only be organised through cooperation.

Decarbonizing the global energy system until mid-century and to reach a GHG-neutral economy by 2070 is paramount to keep within the warming limit of the Paris Agreement. The G20 is a unique forum for creating 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 enabled by German demand and Chinese mass production is often seen as Germany’s gift to the world. However, time is running and the next steps need to be taken now. While the German “Klimaschutzplan” was welcomed internationally as one of the first comprehensive long-term strategies from an industrialized country, it still lacks the ambition necessary to keep the Paris climate goals within reach. The record-speed of the adoption and entering into force of the Paris agreement and the many supportive voices and actions during COP22 in Marrakesh show that this treaty will not and cannot be repealed. However, to keep that momentum and create the trust needed to move forward with the necessary speed, the G20 has to take steps showing that the industrialized world is willing to take the lead towards global GHG neutrality. With the ongoing climate backlash in the US after the election of Donald Trump, new leadership is urgently needed in international climate policy. Germany and Europe need to step up to join China and the nations of the Climate Vulnerable Forum in a new phalanx for progress. But 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. In the interconnected world we live in, a just transition also requires stabilizing and revitalizing the EU through a major reform towards more solidarity, equity and a joint vision for a truly sustainable economic development path. If this can't be achieved within the EU as a whole in the near-term, then at the minimum a coalition of some EU-members should join forces and work together to contribute to global climate leadership.

Within the G20, the German presidency should therefore work towards:

- Reconfirming the G20's commitment to the Paris Agreement and the Agenda 2030, including the long-term climate goals and climate finance pledges;
- Mainstreaming the climate and sustainable development goals across all work streams, specifically those concerned with infrastructure development, investment and trade, growth and financial system reform;
- Submission of long-term low GHG development 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;
- Include climate goals in the national strategies for sustainable and inclusive growth or development, and make the G20 growth strategies consistent with the LTS;
- 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 in G20 countries;
- 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 finance sustainable infrastructure and enable transformational change.
- 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;
- Introducing a stress test for companies how they are prepared for GHG neutrality and a steadily increasing carbon price;
- Requirements for all big companies to annually submit decarbonization strategies until mid-century as a basis for finance market rating;
- Preparations to upgrade the study group on green finance (GFSG) to a working group and continuation of its work with the aim to use the G20 as a forum to prepare a financial system reform that mainstreams low-carbon and sustainability issues;
- Ensuring that the progress report on the GFSG synthesis-report is delivered by all members, and that substantial progress is made towards the development of stringent criteria for green finance and methods for stress-testing;
- 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;
- Fostering resilience to climate related disasters by extending the scope and coverage of climate risk insurance with a perspective for a global risk pooling, with a specific focus on poor and vulnerable groups and 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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