Executive Summary

Scaling up climate finance in the context of Covid-19

A science-based call for financial decision-makers

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Foreword

To avoid catastrophic climate change, 197 countries adopted the Paris Climate Agreement in 2015. It aims to limit the increase of global average temperatures since pre-industrial levels to well below 2°C, while pursuing efforts to stay within 1.5°C. Bringing all countries together to achieve this Agreement in 2015 is one of my proudest personal achievements as UN Secretary-General. Since the historic agreement, 123 countries responsible for 63% of emissions have adopted or are considering net-zero targets. These net-zero targets have put the Paris Climate Agreement's goals within striking distance.

Financing a rapid transition to a net-zero, climate-resilient economy in line with the goals of the Paris Climate Agreement will require significantly greater investments, investments in a different set of assets, and investments that address the humanitarian imperative of social inclusion and poverty alleviation. Rapid decarbonization will have an overall net benefit but also significant distributional trade-offs.

Climate change places a triple responsibility on financial decision-makers, regulators of the financial systems and governments. First, they must maintain the capacity of the financial system to support economic activity, encourage entrepreneurship, and safeguard the assets of millions of people. Second, they must channel a much larger share of world private savings towards sustainable investments and low-carbon options.

Third, they must maximize the development co-benefits of climate policies. This is a precondition to scale up climate action in the context of the Covid-19 pandemic. Decisions taken by leaders today to revive economies will either entrench our dependence on fossil fuels or put us on track to achieve the Paris Climate Agreement targets and the Sustainable Development Goals.

A clear conclusion from the IPCC Special Report on the impacts of global warming of 1.5 °C above pre-industrial levels is that the sooner we act, the lower the physical and transition risks of climate change and the higher the synergies between climate action and other societal benefits.

However, financial actors might not fully anticipate the consequences of climate change as it initially affects geographies that represent a limited share of the market economy and capital flows. In one scenario, the financial system could ultimately disengage from threatened assets but would transfer to communities and taxpayers the costs of climate damage. In a second scenario, the financial system would not readjust on time in function of new information, endangering the stability of the entire financial system. In both cases, the financial system would fail to deliver on its triple responsibility to address climate change.

This publication is a science-based call to financial decision-makers to incorporate climate change in the valuation of financial assets and to lead the transition to net-zero, climate resilient economies. Every policy and every investment have an impact on the future. Policy makers and financiers continuously forecast future conditions. The report outlines how they can use models to understand the financial implications of climate change and capitalize on the new opportunities of a climate economy. Together, we must ensure that our response to the double tragedy of climate change and Covid-19 finances a safer, fairer, and sustainable future for us all.

Ban Ki-moon
President and Chair of the Global Green
Growth Institute
8th Secretary-General of the United Nations

Executive Summary

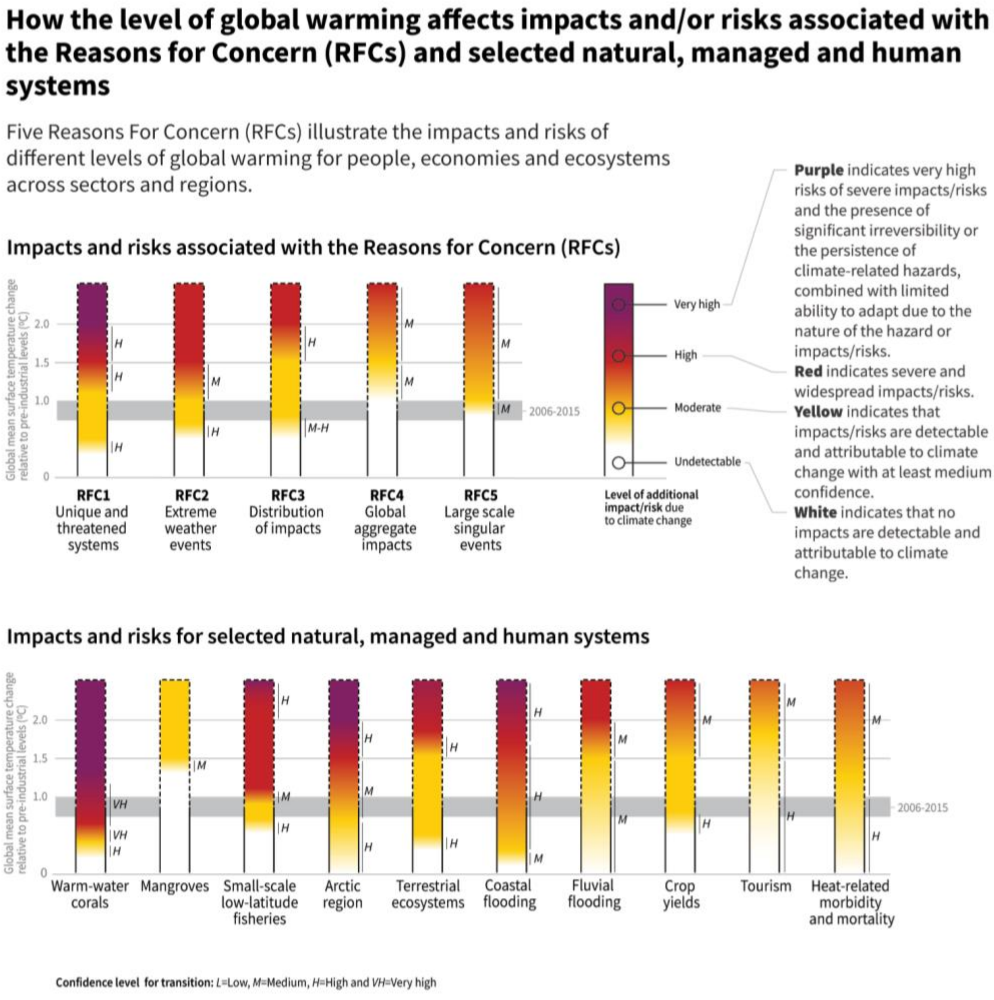
This publication aims to help financial decision-makers incorporate climate change in the valuation of financial assets and accelerate the transition to a net-zero, climate resilient economy, based on the latest scientific findings and policy developments.

What climate science says about risks associated with climate change

The earth's surface global mean temperature is currently 1.0°C higher (0.8°C - 1.2°C range) than in the pre-industrial period (1850-1900). It has increased faster in these 170 years than at any other time in the past 800,000 years. This trend is unequivocally linked to human activities responsible for the release of greenhouse gases (GHGs) (IPCC 2018). The atmospheric concentration of carbon dioxide (CO_2) has increased from 280 ppm (parts per million) in 1850-1900 to 417 ppm in 2020, predominantly due to fossil fuel combustion, cement manufacturing, and land use change (deforestation, removal of land cover and land tilling).

Multiple lines of evidence show warming is already affecting all earth systems and many human systems, and that its impacts are more severe than initially anticipated. As shown in figure 1 below, we fear today that a 2°C increase in mean global temperatures could wipe out 90% of coral reefs and endanger the security and economic livelihoods of hundreds of millions of people.

Figure 1: Climate risks depending on global mean temperature increases.



Source: IPCC. (2018).

The net impact of warmer climates on people, ecosystems and the economy is the result not only of temperature increases, but also of the capacity to prevent damage and adapt to the changing circumstances. The impacts of a warmer world experienced so far are distributed unevenly. For most countries in the Global North, the evidence of net economic impacts so far is inconclusive, but in most poor countries global warming is already having a negative impact on gross domestic product (GDP) and wellbeing.

To avoid catastrophic climate change, 197 countries in 2015 adopted the Paris Agreement. Its aim is to limit the increase of global average temperatures since pre-industrial levels to well below 2°C, while pursuing efforts to stay within 1.5°C. Cumulative CO_2 emissions and global mean temperature increase are directly related. To stabilise the global mean temperature, global net CO_2 emissions must decline to zero. Table 1 compares global net CO_2 emission declines depending on the targeted limit to global warming.

Table 1. Global CO_2 emissions decline and year of reaching net zero CO_2 emissions associated with limiting warming to 1.5°C and 2°C. Interquartile ranges are shown in square brackets (based on table 2.4 in Rogelj et al., 2018).

Long term (2100) temperature limit	Global CO_2 emissions reduction in 2030 compared to 2010	Year of reaching net zero CO_2 emissions	Year of reaching net zero GHG emissions
1.5°C	45% [40-60%]	2050 [2045-2055]	2065 [2060-2085]
2°C	25% [10-30%]	2070 [2065-2080]	2090 or thereafter

The Nationally Determined Contributions (NDCs) as of 2018 do not yet chart a path towards net-zero CO_2 emissions. Their full implementation is projected to result in warming within about 2.9°C - 3.4°C until the end of the century. The difference in projected impacts between 1.5°C and 2°C is already significant, but the difference in impacts between 2°C and 2.5°C is projected to be even greater. This increases further at higher temperatures. The estimated impacts at 3°C or 4°C of warming are expected to trigger very large, abrupt, or irreversible changes in the climate system with cascading impacts on nature and humans.

For example, chances of a major heatwave occurring in somewhere in the world in a given year increases five- to sixfold in a 1.5°C warmer world compared to the past three decades and almost twentyfold in a 4°C warmer world. For global staple foods, the chances of a damaging hot spell increases around twofold for rice and fourfold for maize in a 4°C warmer world compared to 1.5°C.

We still have choices in how we limit warming to 1.5°C. To illustrate this, the Intergovernmental Panel on Climate Change (IPCC) in its Special Report on global warming of 1.5°C (SR1.5 2018) highlighted four illustrative emission pathways that give us a 50% to 66% chance of limit warming to 1.5°C with limited or no temporary temperature overshoot (see table 2). All of them accelerate the deployment of fossil-free energies but they differ in the emphasis placed on reducing CO_2 emissions more quickly in the next decades by lowering energy demand through behavioural change compared to relying on great quantities of carbon dioxide removal (CDR) (P1 and P2 pathways versus P3 and particularly P4 in table 2).

Pathways relying on CDR have greater uncertainties on technological maturity and economic, socio-cultural, and institutional feasibility, and are likely to present greater trade-offs with food and water security, and biodiversity protection and restoration. Of the four illustrative pathways, P1 minimizes these uncertainties and trade-offs while P4 would exacerbate tensions between mitigation, adaptation and the Sustainable Development Goals (SDGs). Such tensions would represent economic and financial risks, for instance if they lead to a sudden shift in development strategies.

The longer the delays, the higher will be the adaptation needs. Fundamentally, adaptation cannot be disconnected from overall sustainable development trajectories (IPCC 2018) because the magnitude of risk climate change poses is also a result of existing vulnerabilities and capacities to anticipate and adapt. Thus, development interventions such as reducing the infrastructure investment gaps or improving health systems intrinsically build adaptive capacities and reduce risk.

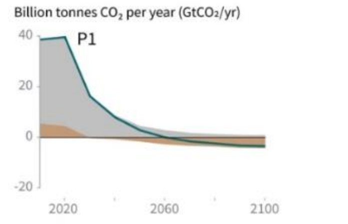
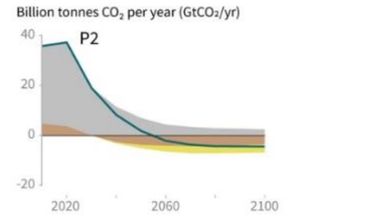
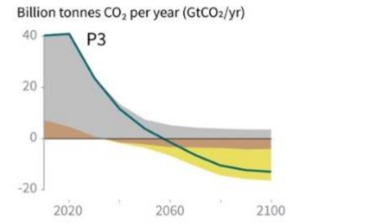
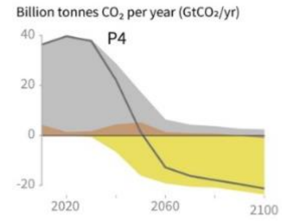
Adaptation actions might also be maladaptive or insufficient. *Maladaptation* denotes adaptation actions that disproportionately burden the most vulnerable, have high opportunity costs, reduce the incentive to adapt or instil path dependency. In some places and for some human and ecological systems, there are *limits to adaptation* when the pace of climate change impacts makes the prevention of intolerable risks impossible (Klein et al., 2014). Such limits emerge either from situations where the technological or institutional capacity to adapt is 'by passed' by the pace of damage or from hard constraints such as thermal limits of survival for species, or sea level rise that makes permanent relocation the only viable adaptation strategy in certain low-lying areas.

Scaling up both climate mitigation and adapation is critical to reduce the physical and transition risks from climate change. Physical risks stem from the impact of climate change and transition risks are related to uncertainties about technological innovations, changes in legislation and regulation, implementation of a carbon tax and changes in consumer behaviour (e.g., a shift in attitudes towards the purchase of diesel cars, air travel or deforestation-based products).

Reducing the physical and transition climate risks on society will require an acceleration of the transition of our socio-economic systems towards zero-emission development pathways to avoid physical and detrimental social tipping points. For adaptation and mitigation, four system transitions are key: the energy system transition, the land and ecosystem transition, urban and infrastructure system transitions, and the industrial system transition.

The combination of aggregated but integral modelled pathways and a detailed assessment of the *feasibility* of mitigation and adaptation options across the four systems transitions reveals that it is still the technical feasibility space to limit warming to 1.5°C. However, the technical maturity and cost efficiency of many options need to be improved, especially in hard-to-decarbonize sectors. Furthermore, some options that are already financially attractive are hampered by systemic barriers, including those in the financial system. The systems transitions will require a dramatical scale-up of climate-related innovation and investment and a rapid decline in investments in low carbon options.

Table 2: Climate risks characteristics of four illustrative pathways.

	P1	P2	P3	P4
				
	Fossil fuel and industry AFOLU BECCS			
Storyline	Social, business and technological innovations; lower energy demand by 2050; higher living standards (also in the global South); downsized energy system; rapid decarbonisation of energy supply; afforestation the only CDR option considered; no CCS.	Focus on sustainability incl. energy intensity; human development; economic convergence; international cooperation; shifts towards sustainable and healthy consumption patterns; low-carbon technology innovation; well-managed land systems; limited BECCS.	Societal and technological development follow historical patterns; emissions reductions through changing production of energy and commodities rather than through reductions in demand.	Economic growth and globalisa gas-intensive lifestyles, includir for transportation fuels and live emissions reductions mainly thı technological means; CCS and E
Temperature outcome (within 0.1°C accuracy, median estimate)	Warming limited to 1.5°C	Warming limited to 1.5°C	Warming limited to 1.6°C	Warming exceeds 1.5°C limit by assumption it can be reversed I
Risk of overshoot of 1.5°C	Small	Small	Large	Very large (designed to first mis
Alignment with sustainable development	Very strong	Strong	Medium, with potential trade-offs	Weak, with marked trade-offs
Physical climate risks to 2050	Lowest	Low	Medium	Highest
Physical climate risks after 2050*	Low	Lowest	Low	High
Transition risks & Opportunities				
Energy demand reduction/management	Very high	High	Medium	Low
Energy supply Infrastructure investments	Lowest	Medium	High	Highest
Asset stranding	Near-term retirement of fossil-fuel assets	Near-term retirement of fossil-fuel assets	Moderate stranding of fossil-fuel assets	Stranding delayed by a decade higher magnitude**
Reliance on CDR	Small	Medium	Large	Extreme
Deployment of land-based mitigation & bioenergy	Medium	Medium	High	Extreme
Discontinuation risks	Failure to achieve demand and behavioural changes may leave little time to ramp up supply-side measures like CCS.	Full portfolio of supply and demand options hedges against failures and discontinuation risks	Failure to address potential trade-offs from land-based mitigation, risks policies being reversed due to societal concerns.	High risk of necessary post-203 strongly competing with other s and hence not being implemen discontinued.

Source: IPCC. (2018).

Climate Investments: proactive approaches for addressing gaps and realizing opportunities

Financing a rapid transition to a net-zero emission, climate-resilient economy will require significantly more investment in low carbon and climate resilient options. They will be scaled up at the required level only if they alleviate and do not exacerbate the short-term economic and social tensions. They must also address the imperative of social inclusion and poverty alleviation (UNFCCC, 1992).

This places a triple responsibility on financial decision-makers, financial system regulators and governments:

- Maintain the capacity of the financial system to support economic activity, encourage entrepreneurship, and safeguard the assets of millions of savers, pensioners, local public institutions, and businesses;
- Channel a much larger share of private savings towards sustainable and low carbon options; and
- Create a business environment in which climate policies alleviate today's tensions in the world economy (unemployment, poverty, inequality, trade disputes).

The Network for Greening the Financial System (NGFS, 2019) estimates that between 2% and 5% of total financial assets are directly at risk. The Sustainability Accounting Standard Board (2016) indicates that climate-related risks could impact 72 out of 79 industries assessed representing 93% of equities (or $27.5 trillion) by market capitalization in the US alone. Financial players will progressively integrate physical risks under a 'value at risk' framework, and revise them according to new information, but it is not certain that this integration will happen fast enough to maximize the chances of a P1 or P2 scenario.

Financial actors might not immediately anticipate the consequences of climate change as it is initially affecting zones that represent a limited share of the market economy and capital flows. In a first scenario, the financial system would ultimately disengage on time from threatened assets but would transfer the costs to communities and taxpayers. In a second scenario, the financial system would not readjust on time in function of new information, endangering the its own entire stability. In both cases, the financial system would fail to deliver on its triple responsibility to address climate change.

Understanding the challenge of climate finance requires differentiating between global low-carbon investment needs, and the amounts needed to bridge the infrastructure investment gap (IMF, 2014). Global low-carbon investment needs are estimated between 3.9% and 8.7% of the world's GDP over the next two decades. However, the additional investments compared to a business-as-usual scenario could be funded by redirecting between 1.4% and 3.9% global savings (2.4% on average, see box 4.8 of IPCC, 2018) that currently flow towards real estate, land, and liquid financial vehicles. This task is not insurmountable macroeconomically. More challenging is that it has to be achieved together with the reduction of the infrastructure investment gap. This gap could be of 15.9% (Global Infrastructure Hub 2017) or even 32% (Arezki et al., 2017) between 2035 and 2040 for a cumulative value between $14.9 and $30 trillion worldwide.

The global infrastructure investment gap reflects risk-averse behaviours that cause a wedge between the propensity to save and the propensity to invest. It also represents a misalignment in the geographic distribution of savings, capital flows, and infrastructure investment needs. Developed countries have ageing populations, high saving capacities, established social safety nets, and the bulk of their infrastructures in place. Developing countries have a significant opportunity to leapfrog as they still must build two-thirds of their infrastructure capital. They have young populations, a wide range of savings rates (from 15% to over 40%) and underdeveloped social safety nets.

This misalignment is compounded by the limited capital flows from high-saving to low-saving regions. From a microeconomic point of view, the infrastructure investment gap looks like an economic paradox since, with current low-interest rates, infrastructure investments deliver a real return between 4% and 8% (Bhattacharya et al., 2016). With an estimated $14 trillion of negative-yielding debt in OECD countries and $26 trillion of low carbon, climate-resilient investment opportunities in developing countries by 2030, capital in search of higher results should flow from developed to developing countries to address this gap. This is not happening. Three-quarter of global climate finance is deployed in the country in which it is sourced, revealing a strong preference for home-country investments where risks are well understood. This explains why sub-Saharan Africa accounted for only 5% of climate-related financial flows in non-OECD countries, at $19 billion (CPI, 2019).

Neither financial investors nor project developers try and take advantage of what the IMF's World Economic Outlook (Abiad et al., 2014) describes as 'free lunch' opportunities because these opportunities face several political, regulatory, macroeconomic, and technical barriers. These barriers and associated business costs are magnified in developing countries because of the considerable differences in their creditworthiness. The spread between the interest rate of a bond issued by the US government and the interest rate of loans to a given country comes on top of projects' risk premium. In 2018, it was 1.30% for a five-year project and 2.5% for a ten-year project in BBB-rated countries. At the beginning of 2020 it jumped to 6% and 9%, respectively, in B-rated countries. Before the Covid-19 crisis, more than 60 countries were rated below BBB and had access to capital only at interest rates higher than 18% for two-year projects. The impact of this inequality is exacerbated by the fact that countries in this class are often those whose creditworthiness might be the most affected by climate change damages (Buhr et al., 2018).

Two approaches are advocated to incentivize the changes needed in investment, production, and consumption patterns and induce technological progress that brings down carbon abatement costs on time to avoid catastrophic climate change: market fixing and market shaping.

The market-fixing approach aims to send the right pricing and risk signals to enable financiers to better value assets and reallocate capital accordingly. To achieve these objectives, it calls on scaling up carbon pricing and promoting climate risk disclosure and taxonomies. There is a widely shared consensus in economics that, in a frictionless world with perfect capital markets and without uncertainty, carbon prices would be sufficient to secure the attractiveness of low carbon options for capital markets. In the real world, however, the carbon price signal is swamped by the noise of other signals, such as oil prices, interest rates, and currencies exchange rates in addition to business uncertainty.

The high-level commission led by Nicholas Stern and Joseph Stiglitz (Stern-Stiglitz, 2017) estimated that carbon prices should be set at a higher level than the $40–80/tCO2 by 2020 and $50–100/tCO2 by 2030 to be capable to cover these noises. The scaling-up and geographical expansion of carbon prices to such levels are highly uncertain. The adverse economic and distributive effects of higher energy prices and the removal of fossil fuel subsidies are more severe for low-income countries, countries with a large share of energy-intensive activities, and countries exporting fossil fuels.

The full deployment of climate risk disclosure and taxonomies faces a different set of challenges. Historically, the concerns about the implications of climate change for the financial community arose from potential fiduciary obligations of reinsurers and pension funds. The focus on liability risks responded to the advocacy strategies deployed by universities' endowments and mission-based investors such as philanthropic and religious organisations to remove the 'social license' from the fossil fuel industry and to raise the cost of its access to capital.

Marc Carney's speech (2015) on *the 'tragedy of the horizons'* broadened this perspective, adding the 'physical risks' and the 'transition risks' to the 'liability risks'. This alert from the former Governor of the Bank of England had an influence amongst financial actors who generally do not consider the future beyond a quarterly horizon. This discussion led to the creation of a Taskforce on Climate-related Financial Disclosures (TCFD) under the auspices of the Financial Stability Board (FSB) that brings together financial authorities from G20 countries to prevent new financial crises. Climate disclosure is meant to help asset managers to correct their short-term bias and send financial signals to investors by setting the cost of loans in an inverse proportion of the projects' carbon content, thereby hedging against abrupt corrections in financial markets caused by cumulated mispricing of assets.

In late 2017, the Network for Greening the Financial System (NGFS) was launched. It now has 90 members, amongst which central banks from many developed and developing countries. Observers include the IMF, the World Bank, the Bank for International Settlements, the Basel Committee for Banking Supervision, and the Green Climate Fund (GCF). Its first report established a taxonomy of green, non-green, brown, and non-brown products (NGFS, 2019) to help direct investments to sustainable options. In parallel, stress test methodologies have tried to assess the risk exposure of various asset portfolios. The concrete outcome of these processes is still uncertain, but they show an increasing demand for knowledge tools from high-level decision-makers in an uncertain environment.

While market-fixing approaches address information barriers for financiers, the market shaping approach has gradually emerged over the past 30 years to address both demand and supply barriers to climate finance. It aims to tackle several risks that deter entrepreneurs and financiers from exposing their resources:

(i) Political and regulatory risks arising from governmental actions, including changes in policies or regulations that adversely impact infrastructure investments;

(ii) Macroeconomic and business risks arising from the possibility that the industry and/or the economic environment are subject to change; and

(iii) Technical risks determined by the skills of operators and managers, and related to the features of the project (e.g. its complexity, construction, and technology).

A direct consequence of these risks is the limited supply of high-quality, transparent low-carbon climate-resilient investment projects despite the unmet demand for new infrastructures.

The need to address market and investment barriers to low carbon options has inspired the development of a wide array of public measures. According to the International Energy Agency's Policies and Measures Database, over 5,500 climate policies and instruments are currently in use globally. Table 3 shows the main types of instruments.

Table 3: Environmental Policies Instruments

	Information and empowerment instruments	Control and regulatory instruments	Economic and market instruments	Institutional instruments	Financial instruments
Market Creation Instruments	Rely on knowledge, communication, and persuasion to influence behaviour and supply skilled labour.	Rely on the establishment of obligations, encouraging or prohibiting or restricting certain types of behaviour	Financial incentives and disincentives to influence private sector behaviour and investment decision-making	Create an institutional and organizational environment to facilitate policy and technology development and deployment	Direct public sector (co) investment to establish a proof of concept or commercial track record of new solutions
Demand-side instruments	▶ Information disclosure and green taxonomies (climate risks, carbon liabilities, etc.)	▶ Macro-prudential regulations (climate stress tests for banks and insurers, etc.)	▶ Carbon taxes, phase out of fossil fuel subsidies ▶ Development of new asset classes ▶ Fossil fuel divestment by public financial institutions	▶ Green finance regulatory networks, asset managers coalition and central bank coordination mechanisms	
	▶ Long-term policy commitment and targets ▶ Valuation methodologies ▶ Public awareness and persuasion	▶ Mandates ▶ Ban ▶ Zoning ▶ Building codes ▶ Norms and minimum performance standards ▶ Standards and labels	▶ Taxes/tax breaks (e.g., carbon taxes) ▶ Charges and penalties ▶ Favourable tariffs ▶ Green procurement ▶ Advanced market commitment ▶ Tradable permits and quotas	▶ Establishment / restructuring of environmental institutions ▶ Development of R&D networks and ecosystems	
Supply-side instruments	▶ Investment in education and research ▶ Technical and vocational training and retooling	▶ Streamlining licensing processes	▶ Power purchase agreements ▶ R&D commissioning ▶ Property rights agreements	▶ Dedicated financial institutions (green banks, green guarantee companies, green bond platforms, etc.)	▶ Public sector-led R&D ▶ Project concessional finance (grant and loans) ▶ Incubation grants/venture capital ▶ Guarantees ▶ Equity investment

The first four columns list environmental policy instruments that create a business context conducive to the demand for low carbon investments and the supply of low carbon projects, including by reducing their transaction costs. In contrast, financial de-risking instruments do not seek to change the overall business context to reduce risks but tackle projects' risks by transferring part of them to public actors. They blend public and private resources, often to encourage market-creating projects that will establish a proof of concept (innovation to market) or commercial track record (market deployment) for new climate solutions. The structuring approach of financial de-risking instruments is often referred to as 'blended finance'.

A common limit of these instruments lies in the fact that the tighter the public funding constraints, the lower the political credibility of their maintenance over time. Combined with the difficulty of controlling opportunistic behaviours in subsidies, this can lead public budget officers working under tight constraints and competing demands to lower support to these measures or make their administration particularly complex.

Furthermore, blended finance has proven effective for mature technologies in mature markets, but not for early-stage technologies in early-stage markets. Over 2012-18, $205.1 billion was mobilized from the private sector by official development finance interventions. But only 5.3% of these flows went to Least Developed Countries (LDCs) and other Low-Income Countries (LICs), and very little to adaptation and nature-based solutions (CPI, 2019). The role of guarantees was particularly important in these countries, as they mobilised 62% and 46% of the resources in 2015-16 and 2017-18 respectively. Direct equity investment followed, mobilizing 14% and 24% of the resources in 2015-16 and 2017-18 respectively (Attridge and Engen, 2019). However, blended finance has usually taken the form of relatively safe senior debt rather than guarantees and equity.

While blended finance aims to use public resources in a catalytic manner to align private sector flows with sustainable development, the leverage ratio of blended finance for climate change is very low. On average, every $1 of resources invested from multilateral development banks (MDBs) and development finance institutions (DFIs) leveraged just $0.37 of private finance in LICs because of a poor business context (Attridge, and Engen, 2019). The geographic and thematic concentration of blended finance and its low leverage ratio are significant obstacles to tapping into the vast private savings pool to reduce the infrastructure investment gap in emerging economies.

In theory, market-fixing approaches can be embedded within broader market-shaping efforts (see Table 3 placing key market-fixing policies within measures directed at the demand side - top line). In practice, market-fixing and market-shaping approaches tend to emphasize different sub-sets of public instruments.

Market fixing relies on price signals to create a demand for low-carbon low-climate-risk goods and services and shift financial flows towards climate-friendly investments. Market shaping intervenes at the level of sector policies and endeavours to create a demand and directly de-risk the supply of climate-friendly investments to crowd-in private finance.

Experience to date, however, shows that these two approaches are mutually supportive and should be deployed in tandem. The combination of the two sets of instruments helps overcome the constraints inherent to each approach and increases the overall efficiency and effectiveness of public policies and finance to accelerate the transition to net-zero climate-resilient economies.

Scaling Climate Finance in the context of Covid-19

The Covid-19 pandemic has pushed the global economy into the deepest recession since the Second World War. The World Economic Outlook (April 2021) estimated a 3.5% contraction in global growth in 2020, which is far higher than the 0.1% recorded after the 2008 financial crisis. The situation has been particularly devastating for developing countries. During the subprime crisis they continued growing, with a rate of 2.8% in 2008 (World Bank, 2020), whereas their GDP in 2020 contracted by 2.6% and 5% respectively, China excluded (World Bank, 2021). In addition to the health consequences of the pandemic, these countries experienced sharp drops in commodity export prices, including oil prices, a collapse in tourism revenues, reduced exports to developed economies, and the blocking of specific nodes in the supply chain. This led to an increase of the number of people facing food insecurity from 135 million in 2010 to 272 million in 2020 and a significant transfer of the employed population into 'inactivity' (ILO, 2020). An additional 500 million people have fallen below the poverty line. This increase, the first in thirty years, was particularly acute in LDCs and Small Island Developing States (SIDS) (UNU WIDER, 2020).

To rescue their economies and support a strong recovery, governments are adopting large-scale expansionary fiscal measures. The fifty largest economies in the world have announced \$14.6 trillion in fiscal spending in 2020, of which \$1.9 trillion is for long-term economic recovery (UNEP, 2021). There is a disparity between announced spending by advanced economies (22.5% of their combined GDP), and that of emerging markets and developing countries (10.6%) - a 17 times greater amount on a per capita basis (UNEP, 2021). One of the key reasons for this disparity is the difference in the cost of additional debt. For most high-income countries, the cost of additional debt is close to 0% per annum. For developing countries, with low credit ratings, interest rates are significantly higher, increasing the cost of any new debt thus burdening fiscal budgets. The proportion of poorest countries in or at high risk of debt distress has climbed to 55% in January 2021, from 50% in 2019 and 26% in 2013 (LIC Debt Sustainability Framework).

The Covid-19 crisis has brought the world at a crossroad in the fight against climate change. Shan Y. et al. (2020) have shown that carbon-intensive packages would increase global five-year emissions (2020 to 2024) by 16.4% (23.2 Gt) while the 'greenest' one could reduce them by 4.7% (6.6 Gt). Forster et al. (2020) show that a 'colourless' recovery would put the world on an emissions pathway that would pass the 1.5°C threshold within a decade and the 2°C limit soon after 2050, whereas the world has a 50% chance to stay below the 2°C warming target with a moderate green stimulus, and below 1.5°C with a solid green stimulus. The UN Environment Programme (2021) finds that, in the 50 largest economies, only 18% of recovery spending and only 2.5% of total spending will enhance sustainability. In 2020, G20 countries spent $208.73 billion supporting fossil fuel energy, compared with at least $143.02 billion supporting clean energy.

Advanced economies are undertaking expansionary fiscal measures, but the present low green content of their recovery packages could entrench their dependence on fossil fuels and undermine the capacity to meet their net-zero emission targets by 2050. Developing countries, on their side, are suffering from increasingly restricted monetary and fiscal spaces, which seriously undermine their ability to finance mitigation and adaption measures. A weak comeback in regions that represent (China excluded) 55% of the world markets may in turn make the world economic recovery more fragile.

The main argument not to postpone climate action in a context of competing pressures on public budgets is that bridging the infrastructure investment gap would be a blueprint for a fast and robust global recovery thanks to the strong knock-on effect on infrastructure investments, notably unlocking two-thirds of world infrastructure markets currently 'frozen' in developing economies. The public policy devices mobilised to redirect savings towards low-carbon options have the advantage, compared to untargeted recovery measures, to secure the efficiency of every unit of public money spent.

The economic and financial impacts of Covid-19 have exacerbated the four challenges developing countries were already facing to scale up climate action. These countries will need to ensure that climate action and economic recovery are mutually supportive, scale up investment without increasing the debt burden, attract large scale private financial flows in a context of perceived higher investment risk, and secure access to long-term affordable finance at a time of rising capital costs.

These challenges can be addressed through four sets of complementary actions.

1. **Integrating policies on climate action, sustainable development, and Covid-19 stimulus to minimize incremental investment requirements and optimize development co-benefits**

NDCs are at the heart of the Paris Agreement and countries' commitment to transform their development trajectories. Countries are currently in the process of submitting updated and more ambitious NDCs. Integrating policies on climate action, sustainable development and Covid-19 stimulus measures could reduce investment needs by 40% and leverage the stronger economic multiplier of climate action to build back better.

The imperative to green the Covid-19 recovery amplifies the need to translate integrated NDCs into investment plans that: (i) align, combine and sequence multiple sources of international and domestic finance from the public and private sectors; (ii) enable countries to take a more integrated value-chain investment approach, notably by acquiring the technical capacity needed to address policy and regulatory gaps to improve the bankability of the NDC project pipeline; and (iii) identify financial mechanisms and investment patterns that will not increase sovereign debt, but catalyse private funds and increase access to long-term affordable finance.

2. **Alleviating developing countries' debt burden to create fiscal space to finance their green, climate-resilient recovery plans**

Several multilateral actions are being taken to help developing countries cope with the economic crisis and creating more fiscal space. The G20 has suspended – not cancelled – official bilateral debt payments for 42 low-income countries, corresponding to approximately $5 billion. The discussion about the issuance of new special drawing rights (SDRs) has been reopened by the IMF (IMF, 2021). An even bolder action is to consider at scale 'debt-for-climate swaps' - a partial cancellation of debt by the creditor government transforming the remaining part into local currency and directing it to investment in climate action. The use of debt reduction could be a function of a country's overall climate vulnerability.

The scaling-up of new payment facilities (debt-for-climate swaps, SDRs) is complex to design and requires a pipeline of high-quality bankable climate investments, which can be capitalized in the form of credible assets, together with transparent and credible domestic spending. A direct linkage with integrated and costed NDCs and dedicated technical assistance facilities would remove some of these barriers. These unconventional debt management instruments respond to the specifics of the post-Covid-19 context and are additional, not alternatives to the commitment of developed countries to mobilize $100 billion in climate finance per year by 2020 for developing states. Reaching the $ 100 billion commitment is critical to finance essential non-market services as well as the deployment of environmental policy instruments to create a conducive business context to catalyse low carbon, climate resilient private investment.

3. Leveraging sovereign and multi-country guarantee funds to reduce investment risk and catalyse private finance

The experience of blended finance highlights the importance of sovereign and sub-sovereign (local governments) guarantees to overcome the barriers hindering climate-friendly investments in nascent technologies in nascent markets. They reduce upfront risks, provide a broad risk coverage, a lower cost for public budgets of donor countries, and a high leverage ratio of public to private capital (Blended Finance TaskForce, 2018).

In a context of heightened risk perception in developing countries, multi-sovereign guarantees, where developed countries rated AAA-AA join forces to provide an AAA-AA backing to developing countries, could:

- Expand developing countries' access to capital markets at a lower cost and longer maturities thanks to the reduction of creditworthiness risks, especially for small states;
- Accelerate the recognition of climate assets suitable for institutional investors seeking 'safe investments havens', thanks to the reputational effect of a selection of projects with multilateral backing and transparent assessment methods;
- Strengthen climate disclosure through high grades in the environmental notation of these climate assets;
- Increase the effectiveness of carbon pricing with more mitigation activities unlocked by a given price level, a stronger employment impact and higher funding facilities to help industries adapt;
- Free up grant capacities for SDGs and adaptation by crowding in private investments for mitigation. For non-marketable activities, grants are the key instrument to develop policy and capacity and establish a conducive investment environment that deals with risks.

4. Increasing developing countries' access to the green bond market

The potential of green bonds is estimated at €29.4 trillion over 2030 (Bolton, 2020). They can drive new public-private partnerships and increase access of developing countries to long-term affordable debt. The development of green bonds is far below this potential (only $1 trillion in the ten years since their launch and $258 billion in 2019, CBI 2020). They represent about 5% of total bonds issued globally and fell by 11% in 2020 in the aftermath of the pandemic.

Options to significantly broaden developing countries' access to the green bond markets include creating credible and standardized assessments and valuation methods to select, design, value, monitor and report on high-quality bankable climate projects; and enhancing country capacity to design, float and implement green bonds.

Some countries are already exploring the four sets of instruments discussed above. For example, Saint Lucia, one of the SIDS hardest hit by climate change, is translating its NDC into a detailed investment plan exploring financial innovations like resilience bonds and climate debt swaps to supplement public resources and finance these efforts without raising its debt.

Conclusion

Accelerating the transition to reduce emissions along a P1 or P2 pathway is required to maximize development co-benefits and achieve both the Paris Agreement and the SDGs. The P1 and P2 pathways, which entail reducing energy demand and improving energy efficiency, are technical feasible for both adaptation and mitigation. Financing a P1 or P2 pathway will require significantly more investment and investment in a different set of low emission, climate resilient assets.

However, inertia on the part of the financial system means that in the absence of policy interventions, the financial system will not be able to redirect carbon private capital on the needed scale. This will lead towards a P3 or P4 scenario with greater tension with sustainable development outcomes and more severe overshoots cannot be excluded. The Covid-19 pandemic exacerbates this inertia, and with the large fiscal stimulus measures, 'colourless' investments could tip the world beyond the 1.5°C threshold within a decade and the 2°C limit soon after 2050.

To avoid this irreversible outcome, financial flows must first be shifted towards a P1 and P2 pathway. This can be achieved through a combination of market fixing and shaping efforts. Deploying both approaches in tandem helps overcome the constraints inherent to each approach and increase the overall efficiency and effectiveness of public policies and finance to scale up climate action.

Second, four strategic interventions could enable developing countries to address the additional economic and financial challenges created by the pandemic for developing countries to realize their climate ambitions. Together these four interventions – support to integrated and costed climate policy and plans; alleviating developing countries' debt burden; leveraging sovereign and multi-country guarantee funds; and increasing developing countries' access to the green bond market – would enable developing countries to foster a green, climate resilient recovery from the Covid-19 crisis.

These four immediate actions could also have a structural positive impact on the future climate policy architecture. They could a) facilitate the deployment of carbon pricing since de-risking mechanisms will increase the volume of low-carbon investments at a given carbon price; b) magnify the impact of financial transparency and disclosure though the emergence of investments and asset classes of higher credibility; c) reduce the fragmentation of climate and development finance; and d) enhance the capacity of official climate and development assistance to support nonmarketable services.

Executive Summary References

Abiad, A., D. Furceri, and P. Topalova. (2014). The Time Is Right for an Infrastructure Push. World Economic Outlook 2014. Washington DC: International Monetary Fund

Arezki, R., P. Bolton, S. Peters, F. Samama, J. Stiglitz. (2017). From Global Savings Glut to Financing Infrastructure: The Advent of Investment Platforms. Economic Policy 2017

Attridge, S. and Engen, L. (2019). Blended finance in the poorest countries. ODI. https://cdn.odi.org/media/documents/12666.pdf

Bhattacharya, A., J.P. Meltzer, J. Oppenheim, Z. Qureshi, N. Stern. (2016). Delivering on Sustainable Infrastructure for Better Development and Better Climate. Washington DC: Brookings Institution, The New Climate Economy, Grantham Research Institute on Climate Change and Environment.

Blended Finance Taskforce. (2018). Better finance, better world. Consultation paper of the Blended Finance Taskforce. http://s3.amazonaws.com/aws-bsdc/BFT_BetterFinance_final_01192018.pdf

Bolton P., Musca X, Samama F. (2020). Global Public-Private Investment Partnerships: A Financing Innovation with Positive Social Impact, Journal of Applied Corporate Finance; https://doi.org/10.1111/jacf.12403

Buhr B., Donovan C, Kling G., Lo Y., Murinde V., Pullin N., Volz U. (2018). Climate Change and the Cost of Capital in Developing Countries Assessing the impact of climate risks on sovereign borrowing cost; Unep, Imperial College, University of London, https://eprints.soas.ac.uk/26038/1/ClimateCostofCapital_FullReport_Final.pdf

Carney, M. (2015). Breaking the tragedy of the horizon – climate change and financial stability. Speech. https://www.bis.org/review/r151009a.pdf

Climate Bonds Initiative. (2020). 2019 Green Bond Market Summary. In Market Summary. Retrieved from https://www.climatebonds.net/resources/reports/2019-green-bond-market-summary

CPI. (2019). The global landscape of climate finance 2019. https://climatepolicyinitiative.org/publication/global-climate-finance-2019

Forster P.M. Forster H.I., Evans M.J., Gidden M.J., Jones C.D. Keller C.A., Lamboll R.D. Le Quéré C., Rogelj J., Rosen D., Schleussner C-F, Richardson T.B., Smith C.J. Turnock S. T. (2020) Current and future global climate impacts resulting from COVID-19, Nature Climate Change 10, 913–919 (2020), https://doi.org/10.1038/s41558-020-0883-0

Global Infrastructure Hub. (2017). Global Infrastructure Outlook: Infrastructure investment needs 50 countries, 7 sectors to 2040. Sydney. Retrieved from https://cdn.gihub.org/outlook/live/methodology/Global+Infrastructure+Outlook+-+July+2017.pdf

ILO. (2020). ILO Monitor 2nd edition: Covid-19 and the world of work.

IMF. (2021). IMF Executive Directors Discuss a New SDR Allocation of US$650 billion to Boost Reserves, Help Global Recovery from COVID-19 March 23, 2021, https://www.imf.org/en/News/Articles/2021/03/23/pr2177-imf-execdir-discuss-new-sdr-allocation-us-650b-boost-reserves-help-global-recovery-covid19

IMF. (2014). World Economic Outlook October 2014: Legacies, Clouds, Uncertainties (R. D1581, trans.). Retrieved from International Monetary Fund (IMF) website:

https://www.imf.org/en/Publications/WEO/Issues/2016/12/31/World-Economic-Outlook-October-2014-Legacies-Clouds-Uncertainties-41632

IPCC. (2018). Global warming of 1.5°C: An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. Geneva: IPCC.

Klein, R. J. T., Midgley, G. F., Preston, B. L., Alam, M., Berkhout, F. G. H., Dow, K., & Shaw, M. R. (2014). Adaptation opportunities, constraints, and limits. In C. B. Field, V. R. Barros, D. J. Dokken, K. J. Mach, M. D. Mastrandrea, T. E. Bilir, … L. L. White (Eds.), Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel of Climate Change (pp. 899–943). Cambridge, UK: Cambridge University Press.

NGFS. (2019). A call for action climate change as a source of financial risk. Retrieved from https://www.banque-france.fr/sites/default/files/media/2019/04/17/ngfs_first_comprehensive_report_-_17042019_0.pdf

Rogelj, J, Shindell, D., Jiang, K., Fifita, S., Forster, P., Ginzburg, V., … Vilariño, M. (2018). Mitigation pathways compatible with 1.5°C in the context of sustainable development. In V. Masson-Delmotte, P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla … T. Waterfield (Eds.), Global Warming of 1.5 °C: An IPCC special report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty (pp. 93-174). Geneva: IPCC.

Shan, Y. Ou, J. et al. (2020). Impacts of Covid-19 and fiscal stimuli on global emissions and the Paris Agreement. Nature Climate Change, 11, 200–206(2021) https://doi.org/10.1038/s41558-020-00977-5

Stiglitz, J. E., Stern, N., Duan, M., Edenhofer, O., Giraud, G., Heal, G., La Rovere E., Winkler, H. (2017). Report of the High-Level Commission on Carbon Prices. https://www.carbonpricingleadership.org/report-of-the-highlevel-commission-on-carbon-prices

Sustainability Accounting Standard Board (2016). Climate Risk-Technical Bulletin

UNEP. (2021). Are we building back better? Evidence from 2020 and pathways to inclusive green recovery spending.

UNFCCC. (1992). United Nations Framework Convention on Climate Change. https://unfccc.int/resource/docs/convkp/conveng.pdf

UNU-WIDER. (2020). Estimates of the impact of COVID-19 on global poverty. https://www.wider.unu.edu/sites/default/files/Publications/Working-paper/PDF/wp2020-43.pdf

World Bank. (2020). World Development Report 2020: Trading for Development in the Age of Global Value Chains. https://doi.org/10.1596/978-1-4648-1457-0Economic Prospects 2020

World Bank. (2021). Global Economic Prospects 2021

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