

GREEN  
CLIMATE  
FUND

GCF First Replenishment (GCF-1)  
First consultation meeting  
4 – 5 April 2019  
Oslo, Norway

Document RC-1/2

21 March 2019

---

# Strategic Programming for the Green Climate Fund First Replenishment

---

## **Explanatory note for Version 2**

This paper has been developed in response to the Board's request, under decision B.21/18, for the Secretariat to prepare for consideration by the Board and the replenishment process a **strategic programming document** outlining scenarios for the GCF's first replenishment guided by ambitious mitigation and adaptation scenarios based on the GCF's implementation potential, taking into account the needs of developing countries.

This Version 2 incorporates input from Board members and alternate members provided through an initial round of consultations and discussion at the Board's 22<sup>nd</sup> meeting.

GCF figures are based on data as at 1 March 2019.

## Table of Contents

I.	Executive Summary: Toward a successful and ambitious GCF replenishment	3
II.	The GCF: A unique role in a complex global context	9
III.	The Opportunity: Realizing developing countries' climate ambitions	13
IV.	Scenarios for ambitious mitigation and adaptation impact	23
V.	Programming Directions	36
VI.	Operational Implications	45

## Appendices

Appendix 1.	Modelling assumptions	51
Appendix 2.	'Continuing Business' scenario	52
Appendix 3.	'Upper Frontier' scenario	57
Appendix 4.	Pursuit of Impact – analysis	64

<b>References</b>		<b>81</b>
-------------------	--	-----------

## **I. Executive Summary: Toward a successful and ambitious GCF replenishment**

### **A climate-safe future for all requires catalytic investment now**

The global community is at a decisive moment for climate action. The scientific consensus, presented in the IPCC's report on impacts of global warming of 1.5° above pre-industrial levels, warns that climate impacts are being felt more rapidly than before expected. The investment decisions of the next decade will determine whether we are in reach of achieving the needed transition toward a low-emissions, climate-resilient global economy. This transition must be enabled by increased mitigation and adaptation investments by both the public and the private sectors, a greater integration of climate considerations into local and national policy, accelerated technological innovation and behaviour change, forging synergies with sustainable development and poverty eradication.

### **Financing is key to realizing the potential of the Paris Agreement**

Developing countries have put forward wide-ranging plans to pursue mitigation and adaptation action under the UNFCCC and Paris Agreement. Work is underway in many countries to build these actions into concrete development and investment plans, that will deliver the new generation of low-emissions, climate-resilient institutions, infrastructure, businesses, communities, technologies, policies and practices. With investment needs estimated in the trillions, access to finance remains critical to achieving the full potential of developing countries' contributions, and to supporting raised ambition in line with science. Climate finance has a key catalytic role to play in shifting broader financial flows behind these new economic and social opportunities.

### **The GCF is the world's largest dedicated climate fund**

The Green Climate Fund (GCF) is unique: established as a dedicated multilateral fund for climate change and for developing countries, serving as an operating entity of the Financial Mechanism of the UNFCCC. Through funding projects, programmes, readiness and project preparation activities, the Fund invests in developing countries' ambitions for transformation, and helps build long-term capacity to integrate positive climate impact into planning and investment decision-making. Working through a partnerships approach, with the risk appetite to support innovation, and instruments that allow it to span both public and private sectors, the Fund is positioned to catalyse action at the frontier of climate finance, and serve as a bridge between others operating in the climate finance landscape. In line with its Governing Instrument, the Fund's distinguishing focus on balancing adaptation and mitigation investments, supporting the most vulnerable, and enhancing direct access position it uniquely to help developing countries turn their climate ambitions into action.

### **Ready for replenishment**

In only four years of full funding operations, and with a rapid scale-up of capabilities, the GCF has reached 97 countries with project funding and over 120 countries with readiness support. These investments, totalling USD 5 billion in GCF resources to realise USD 17.6 billion of total investments, have been estimated to reduce 1.48Gt of CO<sub>2</sub>-equivalent and benefit over 276 million people directly. GCF investments in readiness and direct access are also changing the institutional landscape and supporting integration of climate considerations into policy, planning and investment decision-making. With a USD 15 billion pipeline of funding proposals and concept notes, and a further USD 20

billion plus in project ideas emerging from developing countries' and entities' work programming, demand for funding is strong. The GCF's first phase of operations has provided valuable opportunities for learning, identifying where the Fund can optimize efficiency, effectiveness and impact.

### **Guided by scenarios for mitigation and adaptation ambition**

In line with the Fund's Governing Instrument, Strategic Plan and guidance from the UNFCCC Conference of Parties (COP), the Fund's overall impact ambition for replenishment is shaped by the ambitions of developing countries themselves, as well as the global climate goals set under the Paris Agreement. For GCF, ambition is not just measured by the mitigation and adaptation impact of funded activities, but also by the mainstreaming of capacity to consider climate impact, and the potential for paradigm shift toward low-emissions, climate-resilient development pathways. The Fund assumes some 'flexibility to fail', in its willingness to take risk to catalyse action and innovate knowledge.

The scenario analysis highlights significant opportunities for GCF to work with developing countries and partners to lift ambition for the first replenishment period, while underscoring the importance of a distinctive approach to measuring the Fund's impact. The analysis first considers ambition potential for each billion dollars the GCF invests in mitigation and adaptation. On basic performance measures, a continuation of impact levels delivered during the IRM would see the Fund reduce around 500 Mt CO<sub>2</sub>eq for each billion invested in mitigation, and reach around 150 million beneficiaries for each billion in adaptation, with an average portfolio co-financing ratio of 2.6.

An ambitious 'upper frontier', consistent with a more cost-effective global below 2<sup>0</sup>C pathway, would see the Fund near double its mitigation impact to between 700-1100 Mt CO<sub>2</sub>eq per mitigation billion invested, as well as extend its scale and reach in promoting transformational adaptation and resilience responses, to address developing countries vulnerabilities under a range of plausible temperature scenarios. Higher overall impact potential would be delivered through raising impact on key metrics, increasing investment leveraged by GCF resources, and increased scale of funding.

### **Programming for pursuit of impact**

A targeted 'pursuit of impact' scenario proposes strategic programming to raise the GCF's ambition and impact from a baseline 'continuing business' approach toward the 'upper frontier', while focusing on where the GCF has comparative advantage to drive transformation of institutions and investment practices. Programming directions are founded on basic precepts of the Fund's Governing Instrument, Strategic Plan and guidance from the UNFCCC COP, including the commitment to balance funding 50:50 between mitigation and adaptation, take specific account of the needs of the most vulnerable, and promote private sector action. Programming is guided by the overall vision of supporting **country-driven transformation, through catalytic investment**, underpinned by strengthened organizational performance, efficiency and impact. The approach proposes:

- **Keeping countries at the centre.** In keeping with the GCF's commitment to country ownership, the GCF's central programming tool would remain country-driven pipeline programming. Country programming would serve as a tool to help developing countries translate their current and progressive future NDCs into investment strategies, and play a stronger role in guiding priorities for GCF funding. The GCF would continue to work with developing countries to identify, programme and implement transformational investments in response to their needs, based on an understanding of where GCF is best suited to provide support and deliver leverage;

- **Investing in institutional transformation.** The GCF's readiness and preparatory support programme, as well as technical assistance funding, would be utilized over time to deliver lasting investment in the institutional and human capacity needed for developing countries to fully integrate climate information and risk into planning, policy frameworks, project design and delivery. This would also support the evolution of NDCs and country priorities over time in line with Paris Agreement goals. An envelope of predictable, multi-year funding would let countries plan to target institutional needs in complement to other sources of capacity-building funding;
- **Supporting science-based, systems thinking:** The GCF would work in partnership to strengthen the foundational building blocks of country climate information services and early warning systems, and promote climate science- and analysis- based systemic and value-chain approaches. Enhanced pursuit of expert partnerships, knowledge leadership, and peer learning would help encourage decision-making and design approaches that increasingly look beyond individual project boundaries, for opportunities to innovate, catalyze, replicate and scale systemic change across sectors and regions;
- **Orienting funding to needs and impact:** Consistent with its foundational instruments and COP guidance, the GCF would maintain its core current resource allocation objectives, including a 50:50 balance for mitigation and adaptation, providing adaptation funding for the most vulnerable, and substantial engagement with the private sector. Improved orientation to needs and impact, and better incentivization of country-driven transformation, would be delivered through adoption of portfolio-level impact and leverage goals, and more deliberate deployment of strategic programming through RfPs to target investment areas where there is strong alignment of country needs, climate impact and paradigm shift potential;
- **Risk-taking to catalyse innovation and scale:** The GCF would operationalize its stated willingness to take on higher levels of risk in its investments, and test changes to its business model in order to better catalyze innovation, replication and scale. This could include exploring use of a more diverse range of instruments, potential new investment vehicles and expanded access modalities and partnerships to maximise engagement with the private sector. The GCF could also examine its part in supporting technology innovation and deployment. The GCF would also work with partners to scale-up successful projects from other climate funds;
- **Operational reform to unlock catalytic potential.** Unlocking GCF's full potential for catalytic investment, particularly to bring wider investment behind developing countries mitigation and adaptation needs, depends on more deliberate use of country programming, programming tools, and operational and policy reform, including improved accessibility. Measures to evolve the Fund's operating modalities and instruments, and strengthen organizational performance, efficiency and effectiveness are proposed as a key underpinning of the programming strategy.

### **The opportunity to transform ambition into action**

Through strategic programming and targeted evolution of the Fund's operating modalities to strengthen efficiency, effectiveness and impact, the GCF could position itself to channel a growing share of the USD 100 billion to be mobilized annually in climate finance, and aim to deliver outcomes in the following key areas during replenishment;

- Significantly advance implementation of the Paris Agreement by supporting developing countries' to translate nationally determined contributions, national adaptation plans and other national climate strategies into **concrete investment plans and bankable projects**;
- Build ambition and country ownership of climate action by driving institutional transformation to strengthen **national climate investment coordination and direct access capabilities**;
- Increase the share of developing countries receiving GCF adaptation funding to help the **most vulnerable countries, peoples and communities address the adaptation and resilience priorities identified in NDCs, NAPs or other country strategies**;
- Work with the Fund's range of partners to see that an **increased share of conventional investment and development finance internalizes climate impact and risk factors**;
- Use the Fund's concessionality and risk appetite to test, across the Fund's results areas, **new business models, asset classes, technologies and practices** with the potential to attract wider sources of finance over time, including through scaling up pilot projects of other climate funds.

### **Commitment to operational excellence**

The scenarios for the GCF's replenishment presented in this paper are based on the Fund's current implementation potential, but assume the Fund will adopt some further evolution and refinement of its operating capabilities and modalities for the first replenishment period. It is noted that as part of the Fund's 2019 workplan, including the workplan of the Board and work programme of the Secretariat, the following key operational and policy issues will be taken up with a view to continuous improvement of the accessibility, efficiency, effectiveness, impact, scale and reach of the GCF:

- Review of the initial investment framework;
- Review of the modalities of the Private Sector Facility;
- Review of the accreditation framework;
- Update and completion of the Fund's results management framework;
- Implementation of a second phase of the readiness and preparatory support programme.

In addition to the above, the analysis in this paper proposes that the Fund consider the following operational measures for successful execution of strategic programming for replenishment:

- Implementation of a financial planning approach to enhance predictability in utilization of the GCF's resources, including establishing floor allocations for readiness, a scaled-up project preparation facility, and operating budget;
- Strengthening the GCF's portfolio and results management functions for all funded activities;
- Developing the GCF's regional presence to strengthen institutional support to developing countries and aide more effective and impactful utilization of the GCF's resources;
- Undertaking an updated capability review based on adopted programming directions for replenishment, with continued pursuit of measures to raise efficiency, simplify and improve accessibility, and foster partnerships to draw on best global expertise.

**The table on the following page presents a summary of proposed programming directions:**



<p><b>SUMMARY OF 'PURSUIT OF IMPACT' PROGRAMMING FOR THE GCF REPLENISHMENT</b></p> <p>Green text indicates proposed 'Pursuit of Impact' programming directions          Orange text indicates other programming directions discussed in the document          *Asterisked modalities, policies and instruments are due to be considered under Board items in 2019</p>	
<p><b>STRATEGIC DIRECTION</b></p> <p><b>Country-driven Transformation, Catalytic Investment</b></p>	
<p>Countries at the centre Orienting funding to needs &amp; impact</p>	<p>Investing in institutional transformation Risk-taking for innovation &amp; scale</p>
<p>Science-driven, systemic thinking Reform to unlock catalytic potential</p>	
<p><b>PORTFOLIO-LEVEL GOALS</b></p>	
<p>50 : 50 balance mitigation and adaptation 50% floor of adaptation funding for most vulnerable Geographic balance Significant allocation to PSF Goal to increase Direct Access projects</p>	<p>Emissions Impact goal Adaptation Impact goal Co-financing / leverage goal Institutional Transformation goal</p>
<p><b>RESOURCE ALLOCATION</b></p> <p>Floor allocations for (i) Fund operations (ii) Readiness (iii) PPF</p>	
<p><b>Country-driven pipeline programming</b> Based on concept note and funding proposal submissions Incentivizing concepts and funding proposals aligned with country work programmes Country allocations for specific investment areas Allocation-based country programming</p>	<p><b>Strategic Requests for Proposals</b> EDA; MSME I; MFS; REDD+ RBP Technology incubators and accelerators Design of new strategic RfPs for key impact areas based on market analysis of need, impact and uptake potential Overall targeted funding share for RfPs</p>
<p><b>ACCESS MODALITIES</b></p>	
<p>Simplified approval process* – streamlined Project approval process Readiness - Phase II and standard packages PPF support – scaled up GCF regional presence</p>	<p>Accreditation* Project-specific assessment approach* Direct investment approach for PSF, operationalizing the Governing Instrument* Co-Investment framework*</p>
<p><b>POLICIES AND INSTRUMENTS</b></p>	
<p>Initial Investment framework* – evolved Risk management framework Results Management framework* – evolved Completion of funding proposal policies*</p>	<p>Grants, loans, equity, guarantees Efficient guarantee instrument Local currency lending Climate bond issuance</p>



---

The body of this paper is presented in the following parts:

**Chapter II:** Outlines the global context for the GCF's replenishment and strategic programming

**Chapter III:** Presents an analysis of developing country needs, and the opportunities for the GCF to support paradigm shifting climate investment

**Chapter IV:** Details the scenarios for ambitious mitigation and adaptation impact, based on a "continuing business" approach, an "upper frontier" approach and a "pursuit of impact" approach that combine quantitative (examining potential impact per billion dollars invested in mitigation and adaptation) and qualitative analysis of the Fund's impact potential

**Chapter V:** Draws together the analysis of needs and ambitious impact to present proposed programming directions for the GCF's first replenishment

**Chapter VI:** Examines the operational and organizational implications of proposed programming directions, including reforms to promote fuller realization of the Fund's game changing potential.



## II. The GCF: A unique role in a complex global context

### The global moment for climate investment: the imperative to shift the trillions

As global literature shows, to become equipped to deal with climate change, the world must take decisive and immediate steps to transform global economic infrastructure, and fully integrate climate impact into development and investment decision-making. The 2018 New Climate Economy report projects that in the next 10-15 years around USD 90 trillion will be invested in infrastructure in the world's urban, land use and energy systems, making this the world's "use it or lose it" moment for choosing inclusive, low-emissions and resilient pathways (Global Commission on the Economy and Climate, 2018). The IPCC reports that over 2.38 trillion dollars in additional energy investment may be required annually to stay well below the 2°C guardrail; realizing the transformation towards 1.5°C would require a major shift in investment patterns and financial systems, urgent upscaling of multilevel and cross-sectoral mitigation and adaptation action, and strengthening associated institutional capabilities (IPCC, 2018). But inaction risks costing more: recent studies estimate that strong action to combat climate challenge would deliver a net global economic benefit of \$26 trillion by 2030 (Global Commission on the Economy and Climate, 2018).

Pursuit of the integration of climate action with sustainable development goals can yield mutually beneficial results. The IPCC has advised that pursuit of a 1.5 degree pathway, maximizing development synergies and minimizing trade-offs, would have the greater benefit in terms of avoided climate change impacts on sustainable development (IPCC, 2018). Climate risks to development, particularly for the poorest and most vulnerable, are likely to be further exacerbated by megatrends pointing to a bigger global population, increased urbanisation, growing migration, and increased demand for food, water and energy (World Bank, 2018; United Nations, 2014). Climate and development finance will need to work in sync to shift broader financial flows and investment into sustainable, low-emissions and climate-resilient options.

### Climate finance is still a fraction of total global financial flows

Against this global backdrop, the 2018 Biennial Assessment and Overview of Climate Finance Flows (BA)<sup>1</sup> prepared by the UNFCCC Standing Committee on Finance (SCF, 2018) estimates **total climate finance flows at USD 681 billion in 2016**. While this is an increase of 17 per cent on 2013-14, it still compares modestly to fossil fuel investment of USD 742 billion, potential real estate assets at risk from climate change valued at USD 35 trillion, and total global assets under management of USD 71 trillion.

Within the total 2016 estimated global climate finance flows of USD 681 billion, the following numbers were reported to capture funding channeled from developed country attributed public sources to developing countries (totaling USD 55.7 billion without counting mobilized finance):

- **USD 33.6 billion** was reported as climate-specific finance channeled through bilateral, regional and other channels;
- **USD 19.7 billion** was reported as attributed climate finance by MDBs;

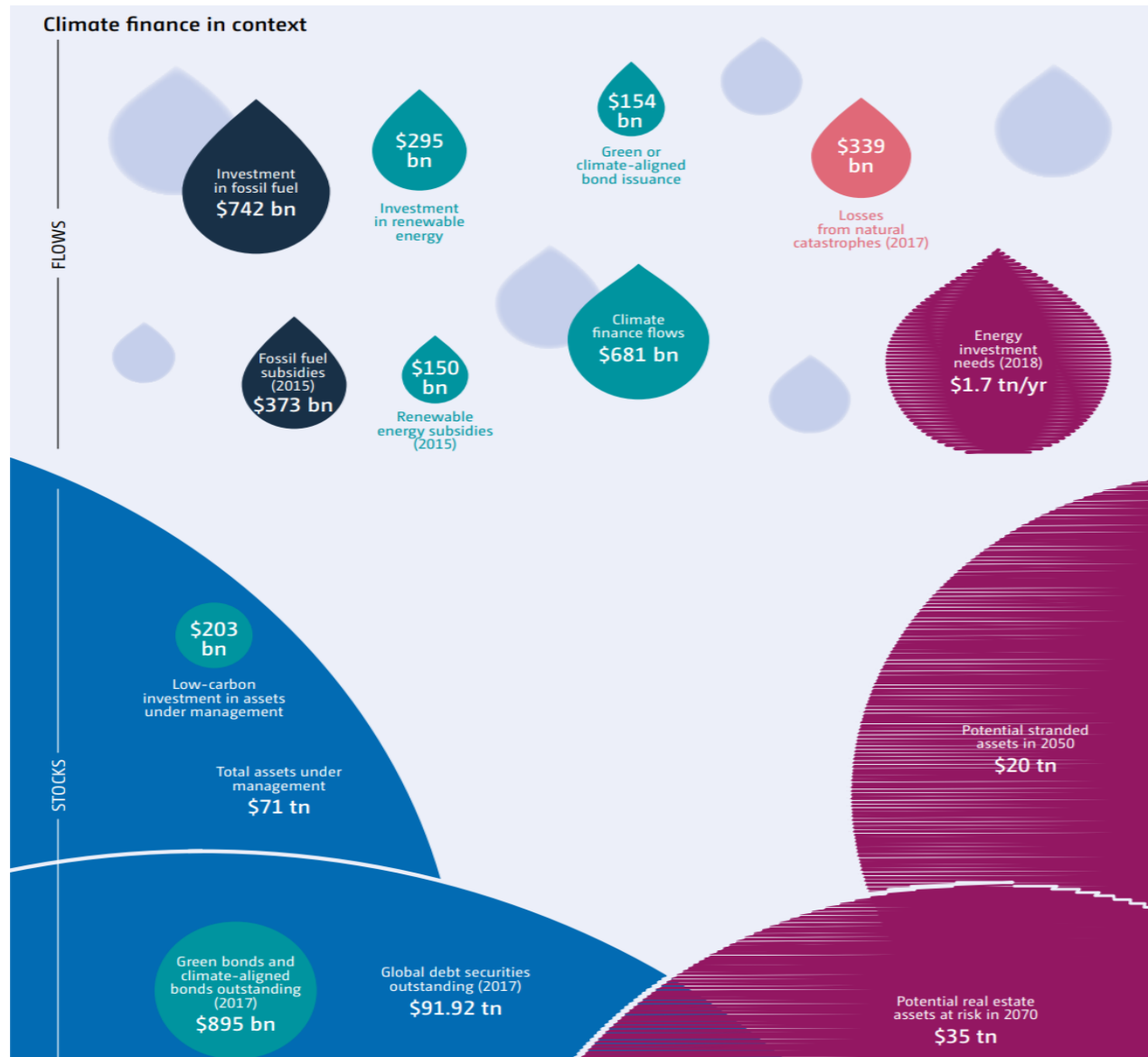
---

<sup>1</sup> All flows are global and annual for 2016 unless stated otherwise. Details on the basis for the estimation of finance flows are included in the report [SCF, 2018].



- **USD 2.4 billion** was channeled through UNFCCC (1.6) and multilateral (0.8) climate funds, including the GCF.

Figure 2.1: Global climate finance in context to global investment trends (SCF, 2018)



Growth in overall climate finance flows was largely driven by private investment in renewable energy enabled by falling technology costs. The growth of green or climate-aligned bond issuances to USD 250 billion in 2018 and increasing global investment into energy efficiency and vehicle electrification have also provided positive impetus into the wider climate finance landscape, along with growing awareness of climate risk in the financial sector.

The analysis notes that climate finance continued to account for just a small proportion of overall finance flows, with the volumes channeled through UNFCCC and multilateral climate funds

representing just a fraction of that. The BA also notes that current levels of climate finance are still considerably below what one would expect given the investment opportunities and needs that have been identified. In the context of the commitment made by developed countries to jointly mobilize USD 100 billion per year by 2020 from a variety of sources to address the needs of developing countries, there is significant potential for climate funds to channel increasing levels of climate finance for developing countries, as well as an imperative for this finance to be used to influence and shift much wider financial flows toward climate transformation.

### **GCF's mission is to deliver and catalyze increasing climate finance for developing countries**

The GCF was established under the Cancun Agreements in 2010 as a dedicated financing vehicle for developing countries within the global climate architecture, serving the Financial Mechanism under Article 11 of the UNFCCC, and now also the Paris Agreement. The GCF Governing Instrument sets out the Fund's purpose to make a significant and ambitious contribution toward attaining global goals on climate change (enshrined in the UNFCCC and Paris Agreement), by supporting developing countries to promote paradigm shift towards low-emissions climate-resilient development, taking particular account of the needs of the most vulnerable. As the world's largest dedicated climate fund, the GCF works to support implementation of countries' Nationally Determined Contributions (NDCs) and climate change strategies, and is built to channel a substantial share of the USD 100 billion per year to be mobilized by developed country Parties, in particular multilateral funding for adaptation (UNFCCC decision 1/CP.16 and 1/CP.21).

As expressed in its founding documents and initial Strategic Plan, the GCF is uniquely defined by its:

- **Climate focus:** working with countries and partners to integrate climate rationale into planning and investments, and funding activities based on potential for climate impact and paradigm shift;
- **Country-driven approach:** making substantial investments in building long-term country readiness to drive and implement mitigation and adaptation action, and strengthen the capabilities of national and regional direct access institutions to channel climate finance;
- **Catalytic potential:** mandated to work across public and private sectors, use a range of financial instruments, and to take higher-risk positions that will unlock innovation for wider climate investments and catalyze investments at scale;
- **Balance between mitigation and adaptation funding,** including prioritizing adaptation funding for the most vulnerable countries, SIDS, LDCs and African States.

The GCF's dedicated financing allocations for readiness, national adaptation planning and project preparation make the GCF a unique provider of end-to-end support to developing countries in planning, conceptualizing and implementing mitigation and adaptation projects and programmes.

### **After a rapid operationalization, the GCF is delivering results**

Since the Board approved the first project funding in November 2015, just over 3 years ago, the GCF has made rapid strides in building a portfolio of 102 projects, reaching 97 developing countries and providing GCF financing of USD 5.0 billion. These projects are expected to attract USD 12.6 billion in direct co-financing, delivering a projected mitigation impact of 1.48Gt, and increased resilience for 276 million beneficiaries. Forty-eight of the approved projects, valued at USD 2.1 billion in GCF

funding, are being implemented, initiating work to deliver stronger climate information services and early warning systems, clean energy, more resilient water supplies, climate-resilient farming, access to finance for climate-directed businesses, and more to developing country beneficiaries.

Twenty-three of the GCF's approved projects are with the private sector, from which each US dollar invested mobilizes 2.9 US dollars in co-finance. Sixty-five of the approved projects (66 per cent of approved funding) are to be implemented in least developed countries (LDCs), small island developing States (SIDS) and African States. Adaptation funding is USD 1.8 billion (37 per cent of total funding in nominal terms and 54 per cent in grant equivalent terms), of which over 65 per cent is for LDCs/SIDS/Africa.

The Fund has also approved over USD 140 million to support readiness activities in 122 countries, building national capacities to access and program climate finance. This includes work to build the capabilities of direct access entities (currently 48 of the Fund's 84 accredited entities), and support for national adaptation planning and project preparation. In parallel the Fund has been strengthening its internal operational capabilities, growing a Secretariat of over 200 professional staff, working to streamline Fund processes and improve accessibility. The Initial Resource Mobilization (IRM) period has served as a critical learning phase for the Fund, and in keeping with the Governing Instrument's call for the Fund to be a learning institution, the Fund is investing in evaluation and knowledge management, seeking out opportunities to improve efficiency and effectiveness, and is committed to becoming a knowledge leader in the field of climate finance.

### **GCF is working through partnerships, in complement to other climate financiers**

The GCF works through a partnerships approach, and in its first four years has built a network of 84 Accredited Entities. Partners span multilateral and national banks, international financial institutions, development finance institutions, UN agencies, conservation organizations, equity funds, government agencies, regional institutions and more, putting the GCF in a unique position to serve as a bridge for developing countries in navigating a complex climate financing landscape.

Within this network the GCF plays a catalytic role that is complementary to other sources of climate finance: unlocking projects that would not have happened without GCF financing or which would not have otherwise internalized rigorous climate considerations. In this way, the GCF works in complement to MDBs, DFIs and other partners to move investment into low-emissions, climate-resilient development, while also taking a leading role in driving a greater share of climate finance into adaptation. Through its partnerships approach, the GCF acts not just as a catalyst of finance, but also of strengthened decision-making and institution building, promoting the uptake of class-leading environmental, social and gender standards.

The GCF is committed to delivering greater complementarity and coherence with other climate funds, including the Global Environment Facility (GEF), Adaptation Fund (AF) and Climate Investment Funds (CIFs), as well as relevant climate change finance initiatives. GCF project funding is being deployed to scale up innovative projects from these climate funds, in parallel with cooperative work to support direct access and coherence in national programming. Through its ability to scale-up impact, the GCF brings to this landscape a focus on transformation and paradigm shift, while working in tandem with other climate funds to improve navigability for countries and strengthen national coordination mechanisms.

### III. The Opportunity: Realizing developing countries' climate ambitions

#### The science is clear: urgent transition is needed now, and acceleration requires investment

Science shows that the opportunity and need for the GCF to deliver impact are enormous. The IPCC's special report on impacts of global warming of 1.5 degrees delivers a clear message: climate change impacts are being felt more rapidly than expected, and a lower temperature guardrail will have greater global benefit, particularly for the most vulnerable. The greatest impacts of climate change are likely to be felt by communities dependent on agricultural and coastal livelihoods, indigenous people, children and the elderly, and urban dwellers with limited income, as well as populations and ecosystems in the Arctic and Small Island Developing States (IPCC, 2018).

The report states that the required rapid and far-reaching transition toward a low-emissions, climate-resilient global economy will need to be enabled by increased mitigation and adaptation investments, policy, accelerated technological innovation and behaviour change. The next 15 years are critical to accelerating investments toward this goal. A 1.5 °C pathway would see emissions reach net zero by 2050, implying rapid and comprehensive transitions in all sectors, including substantial decarbonization of primary energy, rapid increase in electrification of energy end use, robust demand-side interventions, and essential action in the land use sector. While the scale of the required transition is unprecedented, the speed is not: a wider systemic transformation requires acceleration of changes which are already in train in a number of sectors, through an upscaling of climate investments backed by adequate enabling environments and policies.

For a 1.5 °C pathway, SR1.5 reports that **beyond USD 2.38 trillion would need to be invested annually in mitigation** through the energy system to stay well below 2 degrees (IPCC, 2018). Adaptation investment needs are noted to be more difficult to quantify, both because of the relationship to mitigation pathways and the greater difficulty of identifying resilience investments as a component of underinvested infrastructure, but estimates have been steadily rising. Studies from 2010 estimated the global costs of adaptation at \$70 to \$100 billion annually up to 2050, while more recent estimates indicate a range from **USD 140 billion to USD 300 billion needed by developing countries** annually by 2030, and between **USD 280 and 500 billion per year** in 2050. Higher temperature pathways present greater uncertainties in terms of expected climate risks or range of climate hazards, which make these figures indicative.

#### **Nationally determined contributions (NDCs) under the Paris Agreement are the foundation for global action on mitigation and adaptation, but provide only part of the picture**

A total of 165 Parties representing 192 countries submitted Intended Nationally Determined Contributions (NDCs/INDCs) under the Paris Agreement, the global framework for countries to express their ambitions for action on climate change. Fully implemented, these NDCs are estimated to reduce global emissions by up to 6Gt (UNEP, 2018).

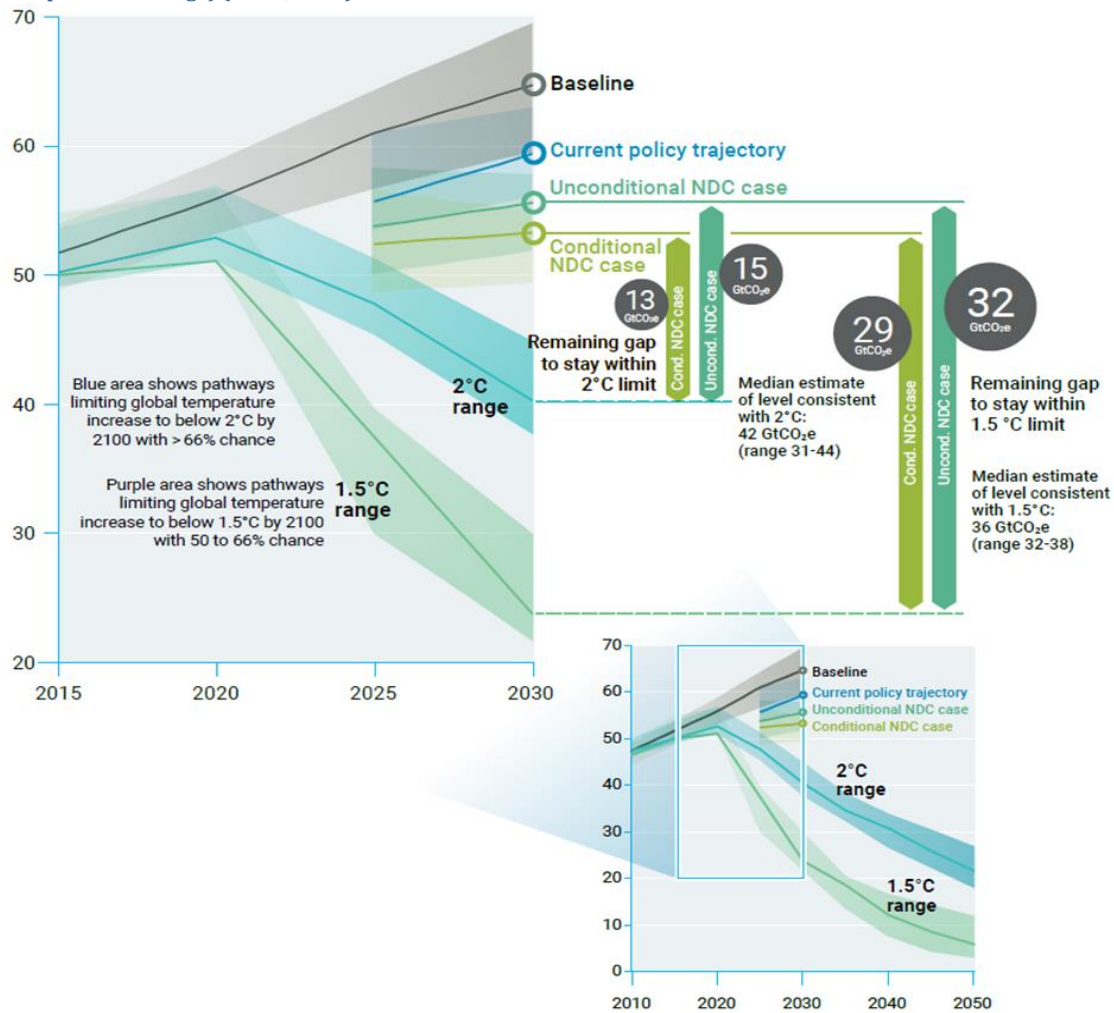
As shown in figure 3.1 below from the 2018 UNEP emissions gap report, a pathway consistent with 2°C or 1.5°C degree pathway implies **additional annual emissions reductions beyond the NDCs of 13-32 Gt annually by 2030**. Accordingly, while this analysis takes NDCs as the critical starting point for an analysis of developing countries' ambitions, it also notes that current NDCs represent only a part of the full picture of ambition, and associated investment needs, required for the paradigm shift to low-emission, climate-resilient development pathways. It is noted that countries are expected





to review and update their NDCs, including both the actions they contain and associated investment needs, as part of a periodic process under the Paris Agreement. Countries have also been encouraged under the UNFCCC to develop long-term low-emissions strategies.

Figure 3.1: Global greenhouse gas emissions under different scenarios and the emissions gap in 2030 (median estimate and 10th to the 90th percentile range) (UNEP, 2018)

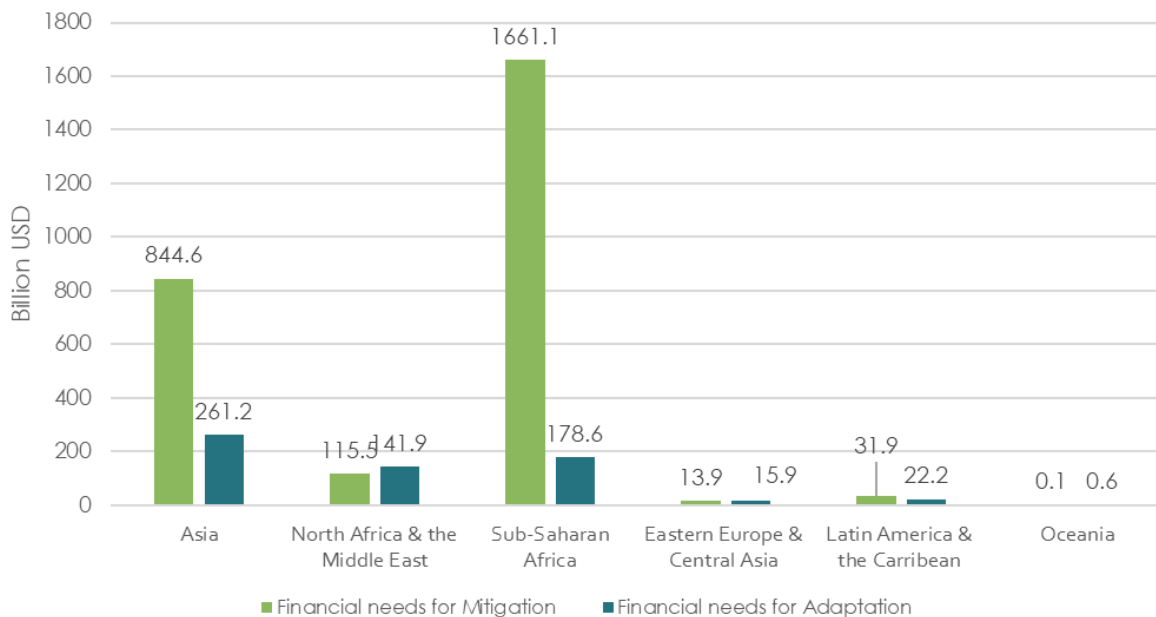


### Trillions in investment are required to support developing countries current NDCs

Globally, 80 developing countries have specified financing amounts for the implementation of their INDCs, totalling **USD 5.4 trillion** (IGES, 2016) for both the conditional and unconditional components. Conditional components of the INDCs are most often linked to provision of finance, technology transfer or capacity-building support. Some countries also elaborated sources of finance to support their INDC implementation. A total of 129 developing countries (86%) made reference to the need for international support, while 46%, reference mobilization of domestic resources (IGES, 2016). The amounts requested by countries varies greatly across and within regions. India and South Africa alone have estimated USD 2.5 trillion and USD 1.4 trillion respectively as financing needs for their NDCs, making up 45% and 26% of the total amount across all INDCs. The remaining 78

countries make up a requested total of USD 1.7 trillion, suggesting investment needs are not yet fully articulated.

**Figure 3.2: INDC expressed financial needs for adaptation and mitigation (IGES, 2016)**

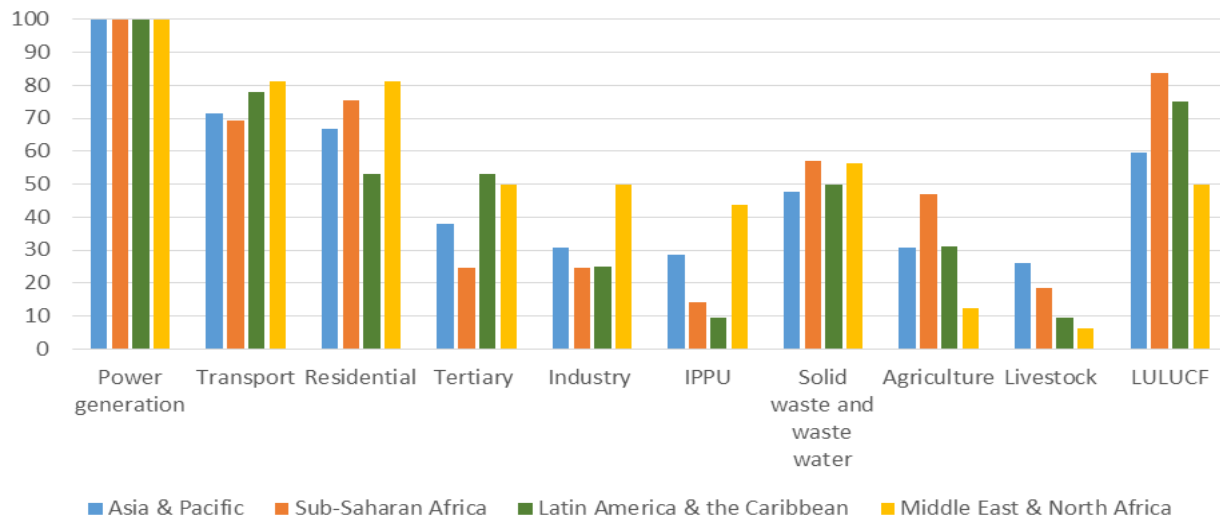


Some countries provided a breakdown of projected adaptation costs for different mitigation scenarios, indicating that the need for adaptation will depend on mitigation ambition. As reflected in the above Figure 3.2, the expressed needs in INDCs were **USD 2,667.5 billion for mitigation and USD 619.9 billion for adaptation** (the total is less than USD 5.4 trillion as breakdown for mitigation and adaptation was not always specified). As adaptation was not consistently captured in INDCs, global studies estimate higher investment needs for adaptation than indicated in the INDCs.

### **Countries' NDCs reflect priorities for action across different sectors**

All parties included information on their mitigation contributions and 87 per cent of the INDCs also included an adaptation component (GIZ, 2016). A distribution of the mitigation sub-sectors targeted per region is provided in Figure 3.3 below. Literature reviews of NDCs indicate that the most frequent mitigation measure being sought is the promotion of renewable energy in power generation, mostly through on-grid wind or solar, followed by measures in transport, the residential sector, land-use change and forestry (LULUCF) (Schletz, M. C., Konrad, S., Staun, F., & Desgain, D. D. R., 2017). After measures in the power generation sector, priorities vary across regions, with LULUCF being the second most prioritized in Sub-Saharan Africa, transport and residential measures most prioritized in Middle East and North Africa and Asia & Pacific, and transport and LULUCF most predominant in Latin America and the Caribbean.

**Figure 3.3: Percentage of developing countries from Asia and Pacific, Sub Saharan Africa, LAC and Middle East and North Africa, including mitigation measures in the defined sub-sectors (IGES 2016)**



Under the adaptation component, the most vulnerable sectors were identified as being water, agriculture, biodiversity and health. Key sectors covered by the adaptation components of the INDCs are outlined in Figure 3.5 below. In terms of bio-geographical zones, adaptation components identified included arid or semi-arid lands, coastal areas, watersheds, atolls and other low-lying territories, isolated territories and mountain ranges; some Parties also identified specific regions of their countries that are most vulnerable. In terms of climate hazards, the main sources of concern identified by most Parties are flooding, sea level rise, and drought or desertification, highlighting the need for disaster risk reduction mechanisms supported by robust climate information services.

Most Parties referred to developing nationwide adaptation plans and strategies and most of them foresee having developed their national adaptation plans (NAPs) by 2020. The incoming GCF NAP pipeline of proposals submitted to the Fund largely mirror the priority sector areas targeted (Figure 3.4) in the adaptation priorities emerging from the NDCs. As NAPs progress toward implementation and countries advance efforts to assess the cost of adaptation options, the Fund expects to refine its understanding of emerging adaptation needs and related financing requirements.

**Figure 3.4: Most referenced result areas in GCF NAP proposals (GCF)**

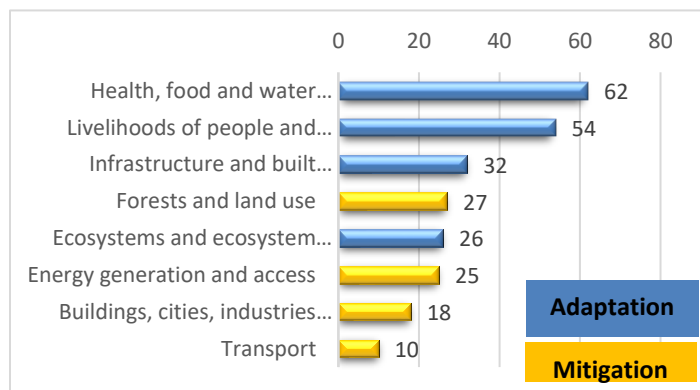
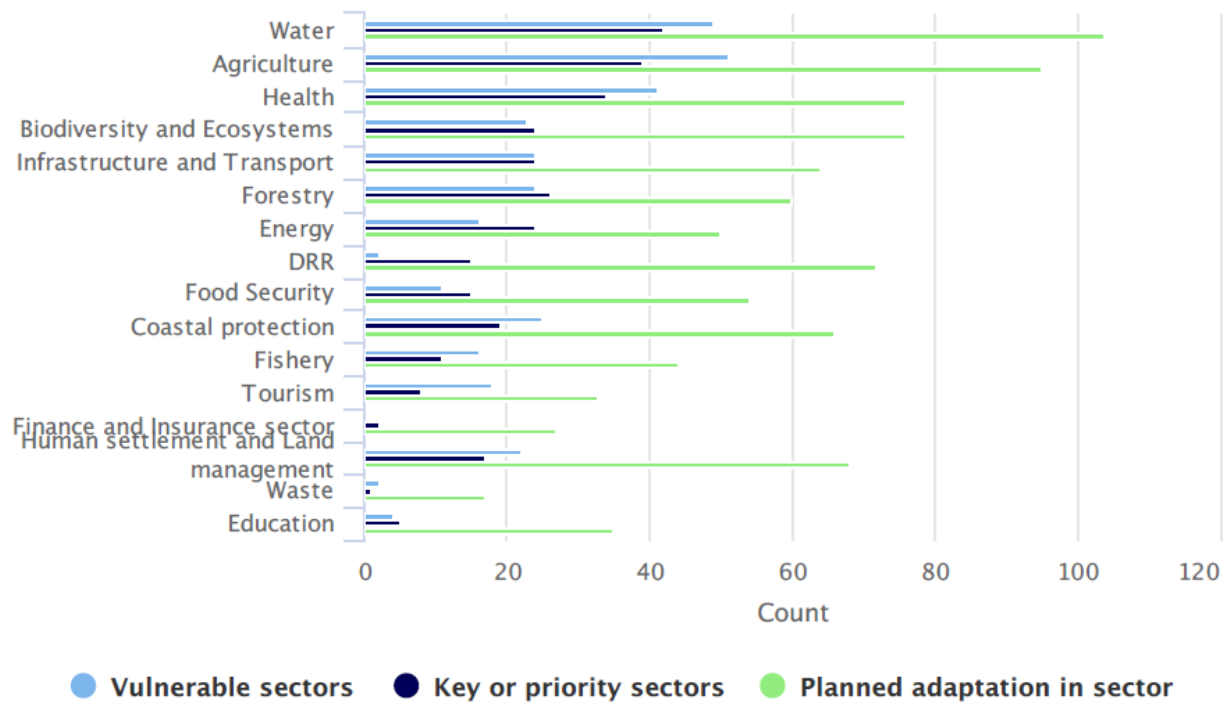






Figure 3.5: Sectors mentioned in NDCs adaptation component (from Tool Assessing Adaptation NDCs, 2016)



### Technology is identified as a cross-cutting need

In addition to identifying needs for financial support, more than 100 developing countries expressed the need for international support for technology development and transfer to implement their NDCs. These cover a wide array of needs across the technology cycle. Nearly one-third of developing countries mentioned specific climate technology needs, with nearly 20 per cent referring to Technology Needs Assessments (TNAs) (UNFCCC, 2016). One quarter of developing countries highlighted specific costs for the technologies of their NDCs, but did not provide detail on barriers to be overcome for enabling such technologies, and about 20 per cent referred to non-financial aspects.

Generally, the most reported themes were the need for support for technology development and the transfer, and promotion of R&D and innovation. In Africa, technology was mentioned in 100 per cent of NDCs, in Latin America and the Caribbean 97 per cent, in Asia and the Pacific a 94 per cent and in Eastern Europe 67 per cent (UNFCCC, 2016). SIDS and LDCs raised technology needs relatively more often than others, with 80 per cent of LDCs and 75 per cent of SIDS noting technology support needs; 50 per cent of LDCs and 30 per cent of SIDS specifying needs on R&D and innovation, and over 40 per cent of LDCs and 25 per cent of SIDS expressed finance needs for technology.

### More work is needed to articulate and understand countries' priorities and financing needs

In line with the above analysis, developing countries are still articulating both their mitigation and adaptation priorities and financing needs. On the one hand, the NDCs capture broader investment needs than would be expected to be directed to the GCF. On the other, the NDCs only capture part of the ambition and investment needs required to align the world with 1.5 or well below 2-degree

pathways. A critical future area of ongoing and future work lies in translating both current and potential developing country ambition under NDCs into investment strategies for mitigation and adaptation action, including through the GCF country programming process.

This paper acknowledges specifically that **there is still limited information on what financing needs developing countries are likely to direct to the GCF**, and how the GCF can act catalytically in a country context to shift broader financing behind countries' climate priorities. For the present analysis, the GCF's pipeline and current country programme data have been used to further analyse developing countries' climate finance needs in a GCF context. The caveat is that the data reflects project concepts and ideas at different stages of maturity, and the country programme data is incomplete in its coverage of countries, articulation of priorities and associated financing needs.

More systematic and climate-information based country programming remains a critical vehicle for the GCF to better understand the totality of developing country demand for Fund resources going forward, as well as priority action areas. The Fund will also improve data reporting and management for better demand and impact estimations, and to reconcile requests derived from the project pipeline of the respective country and entity work programmes.

### **Country and entity work programmes request GCF funding of up to USD 16 billion and USD 7 billion respectively**

The GCF's country and entity programming processes are at an early stage in their development, and provide an indicative and evolving picture of developing countries' financing needs and the results areas in which countries are targeting action. Country programmes are intended to present information on project ideas that may or may not have yet been submitted to the Fund, but which are identified as a priority at national level and are expected to be submitted to the Fund in the near term, typically 1-3 years.

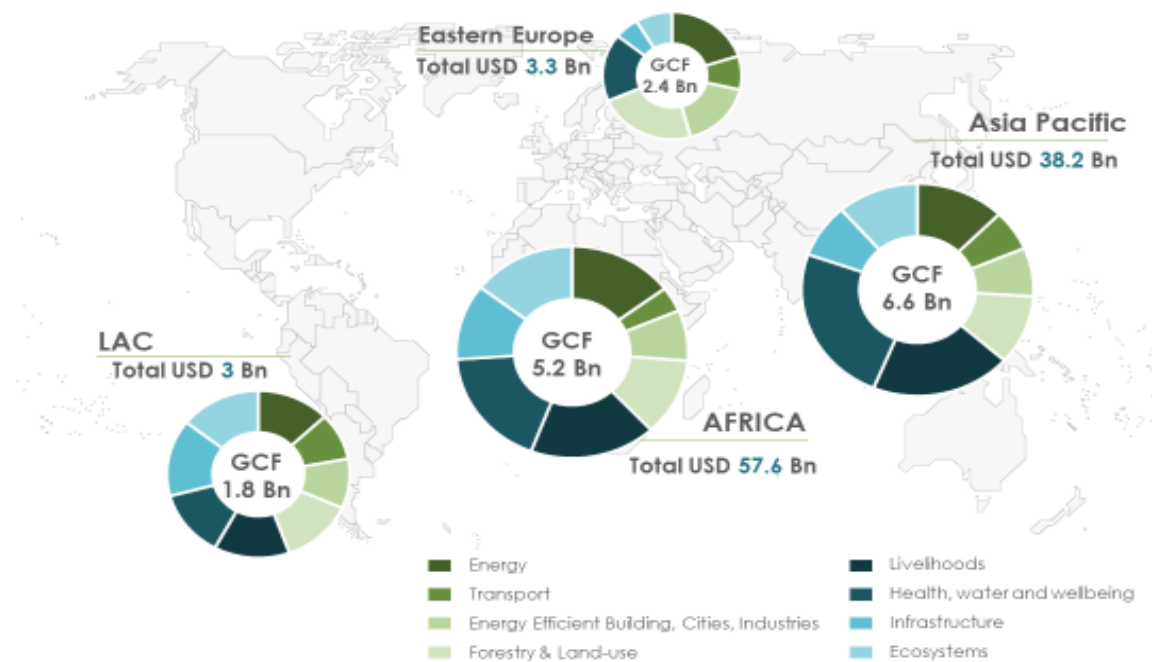
As at the date of this report, the GCF Secretariat has assessed such prioritized project ideas provided by seventy-nine (79) countries in the form of:

- Country programmes officially submitted to the GCF Secretariat by eighteen countries;
- Draft country programmes or country programme briefs shared by thirty-nine countries; and
- Project ideas discussed during GCF Regional Structured Dialogues by twenty-two countries that have not yet shared information in the form of a country programme or brief.

The collation of this data shows that these 79 countries are working on a total of 606 project ideas that were not yet submitted to the GCF, intending to seek around **USD 16 billion from the GCF for a total project funding of at least USD 102 billion**. These figures are indicative as many project ideas are in an early development stage and/or have not yet clearly defined the financing that would be requested in their total estimated amounts. Particularly in the case of finalized country programmes, countries have indicated anticipated total financing amounts but only **349** projects indicate financing requested from the GCF and only **198** indicate expected co-financing, leaving a large number of projects that are still to further define the financing request from the GCF.

Figure 3.6 below shows an initial breakdown by region of the results areas in which countries are prioritising projects, and total requested financing, based on currently available information collated from country programmes and Structured Dialogue inputs. This is highly indicative given data gaps.

**Figure 3.6: Prospective project pipeline under country work programmes and indicative project ideas collected through GCF Structured Dialogues: total amounts requested and distribution (by number of projects) by result area and region (GCF iPMS)**



Sixty-one per-cent (61%) of projects in country pipelines are expected to have adaption outcomes, and thirty-nine per cent (39%) include mitigation initiatives. Many of the projects in country pipelines are cross-cutting and target both adaptation and mitigation results. In the Pacific Islands, 54% of planned non-iPMS projects seek results in health, food and water security (21%), livelihoods (19%) and ecosystems (14%) and in the Caribbean, 61% of planned non-iPMS projects seek adaptation investments, with a stronger focus on ecosystems (18%), livelihoods (16%) and health, food and water security (16%).

Globally, among the mitigation result areas there is a focus on Energy Access and Generation as well as Forests and Land-use, with Transport being the least represented area. Mitigation activities are less predominant in Small Island Developing States. There is a more even split between the four adaptation result areas, though infrastructure is under-represented. The distribution varies across region, reflecting both varying priorities as well as differences in the maturity of concrete project proposals being developed for the Fund.

Entity work programmes put forward around USD 7 billion in requests from the GCF for total project financing of USD 16.8 billion. Entity pipelines target 48% adaptation outcomes, 19% mitigation and 33% cross-cutting. Within the mitigation sphere, transport and energy efficiency remain the least represented sector areas. A third of projects are indicated to require project preparation support. Projects emerging from entity pipelines that are also featured in country pipelines were around 10%



of the total country pipeline as at August 31<sup>st</sup> 2018, with further work being carried out to assess the current overlap between recent country data and existing entity data. Existing country and entity pipelines do not include information on estimated impact of activities being considered.

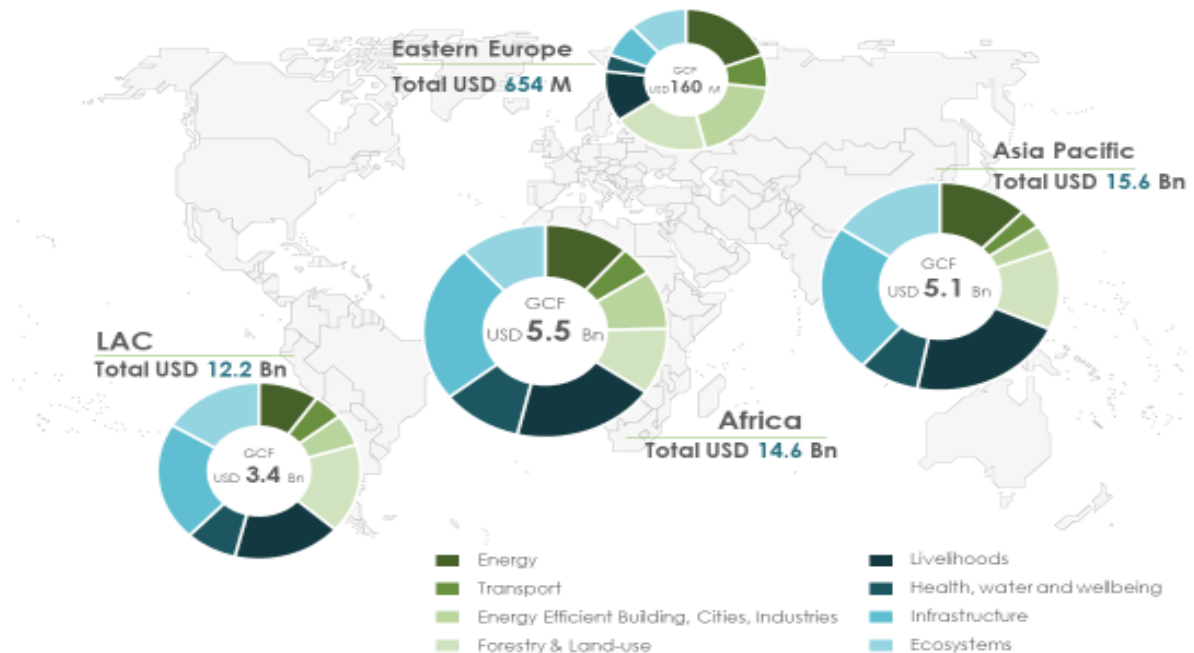
### Pipeline projects request GCF funding in the range of USD 15 billion

As of March 1 2019, the current GCF Pipeline is comprised of 78 funding proposals, requesting **USD 3.9 billion** in GCF funding to support projects and programmes totalling USD 19 billion, and 244 concept notes seeking **USD 11.3 billion** from GCF. A distribution of the estimated funding amounts requested per regions as well as distribution of the number of proposals per result area is provided in Figures 3.7 and 3.8 respectively. The funding proposals and concept notes in the pipeline are estimated to reduce **1.8 GtCO<sub>2</sub>e**q and improve the climate resilience of **370 million** people. The anticipated impact is not available for all Funding Proposals and Concept Notes in the pipeline so total impact is expected to be higher than the figures in Figure 3.7.

Figure 3.7: Pipeline funding requested per region per result area; Total indicated impact per region (GCF iPMS)

Region	Result Areas									Impact projections	
	Energy access & power generation	Low emission transport	Buildings, cities and industries & appliances	Forestry and land use	Most vulnerable people & communities	Health and well-being, and food & water security	Infrastructure & built environment	Ecosystem & ecosystem services	Grand Total	Lifetime CO <sub>2</sub> (megatonnes)	Total Beneficiaries
Africa	683 M	472 M	1029 M	1304 M	141 M	746 M	251 M	1056 M	5685 M	784	242 m
Asia-Pacific	371 M	464 M	708 M	899 M	524 M	527 M	836 M	692 M	5024M	381	90 m
Eastern Europe	13 M	2 M	44 M	15 M	7 M	20 M	44 M	40 M	187 M	34	4,7 m
Latin America and the Caribbean	392 M	179 M	414 M	677 M	423 M	721 M	356 M	656 M	3821 M	610	32 m
Unidentified	83 M	13 M	90 M	60 M		40 M	29 M	116 M	434 M		
Grand Total	1543 M	1131 M	2286 M	2957 M	1096 M	2056 M	1519 M	2562 M	15152 M	1809	370 m

Figure 3.8: Funding proposal and concept note pipeline: total amounts requested, total project value and distribution (by number of projects) by result area and region (GCF iPMS)



## The GCF pipeline reflects some, but not all the priorities identified in NDCs

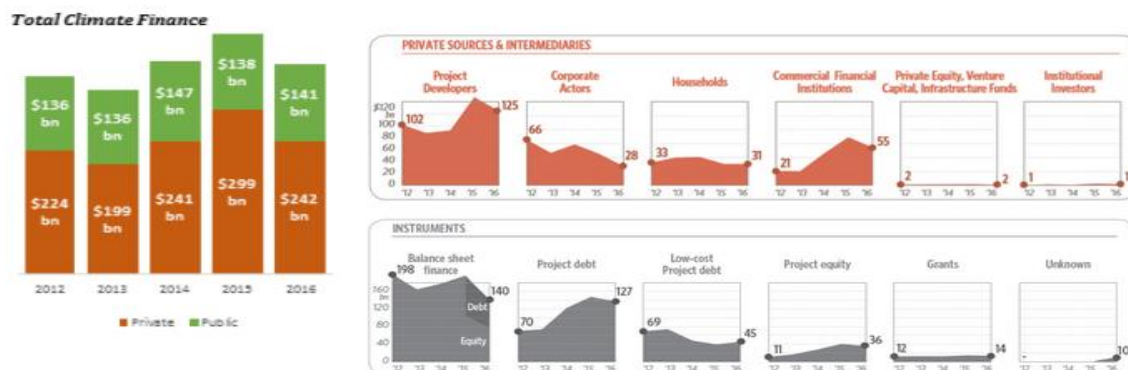
A comparison of country priorities as outlined in the NDCs and through the GCF indicate a high correlation of priorities across many result areas, although some measures predominantly featured in NDCs, national adaptation plans and other national planning documents are not similarly represented in the indicative country programme pipelines or current GCF pipeline. Transport and energy efficiency projects are identified as key sectors under NDCs but are least represented in the pipeline. Health, well-being and water are the most referenced adaptation results areas in both NDCs and National Adaptation Plans submitted to the GCF, though the scale of demand has not yet been translated to a mature project pipeline. The lack of sufficient mature projects addressing these interventions may be due to a variety of challenges including difficulty structuring project proposals or identifying appropriate financial instruments, inhibiting regulatory environments, market immaturity, or a varying scope of capacity in the existing network of Accredited Entities.

## There is significant opportunity for the GCF to mobilize wider finance flows to help developing countries meet their climate investment needs

The above analysis highlights that the investment needs required to implement developing countries NDCs and national climate plans, present and future, will far outstrip the resource capacity of the GCF, and even public financial resources more broadly. In line with the Paris Agreement, a key opportunity for GCF is to utilize its funding to shift broader financial flows into investing in low-emissions, climate-resilient development pathways.

The largest sources of global finance sit with commercial lending institutions and institutional investors which still remain marginal participants in the climate finance landscape. Interventions which have the opportunity to alter the status quo include: i) changing incentives for investment through regulatory policies, risk disclosure, favourable pricing systems for low carbon investments and proliferation of standards; ii) widening the deployment of instruments for de-risking low carbon investments, including through concessional lending and deploying guarantees to maximize leverage of public funds; and iii) innovating to develop new investment vehicles, in order to attract capital at wider scale (IPCC, 2018.). Within this landscape and context, adaptation finance is observed to be lagging behind mitigation finance. For building resilience, widening the scope of mechanisms for risk sharing and spreading for adaptation, such as via insurance and risk guarantees, can also play an increasing role in meeting financing needs.

Figure 3.9: Climate Finance by public and private actors / Sources and intermediaries of private climate finance (CPI, 2017)



---

## Developing countries also need sustained investment in knowledge, institutional and human capacities to realise their climate ambitions

While the above analysis attempts to present a picture of developing country financial needs for climate investment and GCF resources, the GCF's experience during the IRM underscores that an **equally critical need in developing countries is the institutional, human and knowledge capacity** to plan, manage and implement low-emissions, climate-resilient development projects and programmes. The GCF together with many other organizations and partners is engaged in supporting readiness, capacity-building and knowledge activities in developing countries, but the adoption of the Paris Agreement and experience of the GCF to date has brought a sharper focus to several particular areas of need:

- **Integrating 'climate rationale' into decision-making:** effective climate investment planning depends on countries' and other actors' ability to access climate information and analytics and apply them within the context of development planning and investment decision-making;
- **Facilitating the development of participatory national modalities:** to work across government, private sector and other national stakeholders, and generate input and buy-in for the development of policies that take climate considerations into account across national planning, budgeting and decision making;
- **Translating plans into impactful investments:** many countries need support to identify priority climate action areas, and then to work with implementing entities to develop high impact and paradigm shifting project/programme concepts, prepare full funding proposals, reach financial closure and participate in effective implementation;
- **Building the enabling environment and knowledge-sharing mechanisms** that will enable countries and stakeholders to monitor and evaluate project progress, and amplifying the impact and scalability of project and programme interventions.

Working with countries to translate priorities from the NDCs and other plans into bankable pipelines, while considering opportunities to raise ambition and strengthen paradigm shift potential, is a long-term endeavour in which the GCF has a critical role to play. It will require both ongoing support for national institutions and processes, including multi-level inclusive and integrated governance frameworks that can devise solutions that minimize trade-offs with sustainable development, as well as building the implementation capacity of accredited entities, financial institutions, communities and others. Adequate enabling environments and policies also remain a key prerequisite for ensuring the sustainability of most climate interventions.



## IV. Scenarios for ambitious mitigation and adaptation impact

### Ambition defined through maximising impact and paradigm shift

In line with the Fund's Governing Instrument and initial Strategic Plan, the GCF is guided by parallel impact ambitions in its support for developing countries:

- **Maximizing impact** of funding for adaptation and mitigation, with balance between them;
- **Promoting paradigm shift** toward low-emissions and climate-resilient development pathways.

As requested by the Board, this section of the paper presents scenarios that describe possible mitigation and adaptation ambitions for the GCF's first replenishment, based on the GCF's implementation potential and the needs analysis presented above. The quantitative analysis focuses on mitigation and adaptation impact potential, including through finance leveraged by GCF. Simulations have been undertaken on the basis of the impact indicators defined in the Fund's initial Results Management Framework, using assumptions about the replenishment period, GCF implementation potential, and funding scenarios, as described in **Appendix 1**. This is followed by a qualitative discussion of GCF's potential to drive paradigm shift, including institutional transformation based on country ownership, for which more limited data and metrics exist, but where the Secretariat will continue developing analysis to inform the replenishment process.

Each scenario presents a range of impact outcomes, based on a funding scenario range between (a) a continuation of current average programming capacity (around USD 3 billion per year), and (b) programming at the trend growth rate of the portfolio (growing to around USD 5 billion per year by the end of the period). This is consistent with the Secretariat's estimate of the Fund's current implementation capacity. It is noted that these scenarios have been designed to present an illustration of GCF impact potential under a range of funding possibilities, guided by the GCF's implementation potential.

The analysis underscores the importance of a **distinctive approach to defining and measuring the GCF's impact ambitions for replenishment**, that takes into account the fact that (a) it is a key tenet of the Fund is to be country driven, hence countries' submitted priorities will shape the impact potential of the Fund; (b) many of the Fund's most important impacts, including on institutions, markets and behaviours are difficult to quantify; (c) there may be trade-offs between maximizing immediate impact and driving longer-term paradigm shift; (d) the Fund's mandate assumes 'flexibility to fail and learn' in the interest of taking risks to innovate and drive catalytic action; and finally (e) the Fund's desire to ensure that it does not crowd out other potential funders in the pursuit of the most cost-effective interventions, which would likely be funded by others, especially the private sector. Each of these factors limit comparability of impacts identified through the scenario analysis discussed below with other climate funds and financing institutions.

### Summary of scenario findings

A '**continuing business**' analysis of the GCF's performance shows that if IRM performance is maintained, and funding is programmed between current average levels and the portfolio growth trend (USD 3-5 billion per year), the GCF could deliver between 3.3 to 5.1 Gt of CO<sub>2</sub>eq reduced or

avoided (around 500 Mt CO<sub>2</sub>eq for each billion invested in mitigation) and reach up to a billion beneficiaries. This assumes maintenance of an average portfolio co-financing ratio of 2.6.

To define an ‘**upper frontier**’ for ambitious programming, the analysis also shows that in a scenario consistent with a global pathway well below 2<sup>0</sup>C, the GCF might strive to nearly double its mitigation impact for the same funding amount, to 5.1 to 9.6 GT (between 700-1100 Mt CO<sub>2</sub>eq for each billion invested in mitigation), by increasing the cost effectiveness of its interventions and/or expanding co-financing. The GCF could also seek to work at the upper frontier on adaptation by working with countries to design transformational adaptation and resilience interventions, at systems level, that strive to minimize climate impacts across a range of credible temperature scenarios. Higher-end impact would be achieved in both the above two scenarios by increasing available funding.

Between these two frontiers, the analysis presents options for the GCF to deepen its ‘**pursuit of impact**’. This could be achieved through deploying a range of programming measures that invest in developing countries’ own ability to drive transformational programming, and also target key areas of alignment between developing countries’ needs, impact potential, and the GCF’s comparative advantage as a Fund that measures success through pursuit of paradigm shift, risk-taking and innovation, not just in tonnes or beneficiaries reached. Delivering a pursuit of impact scenario would be premised on the GCF implementing reform to improve the efficiency and effectiveness of its processes, clarify key investment, risk and results management policy settings, look at expanding its instruments and access modalities, and further strengthening its institutional capabilities to match the desired scale of programming and support for developing countries.

### Potential impact in a ‘Continuing Business’ scenario

The baseline scenario for the GCF’s mitigation and adaptation impact during the first replenishment period is a ‘Continuing Business’ scenario. The detailed scenario analysis is presented in **Appendix 2**. This examines the mitigation and adaptation impacts the Fund is projected to deliver from its IRM investments, and extrapolates potential impacts for replenishment on a similar basis. The scenario assumes that the GCF continues to operate during replenishment per ‘business as usual’ modalities, and that the projects brought forward by AEs and countries deliver similar total average results.

Notable characteristics of the Fund’s IRM investment approach include:

- portfolio allocation parameters per the initial Investment Framework and Decision B.06/06;
- accreditation as the sole access modality for project funding;
- ‘soft’ allocation of a total of USD 1.4 billion through RfPs (for MSME, EDA, MFS and REDD+ RBP), of which by the end of 2018 USD 70 million had been approved to funding proposals;
- almost 90 per cent of funding allocated through grant and senior loans instruments, with only 9 per cent equity and 2 per cent guarantees.

Overall, the GCF’s investments during the IRM are projected to deliver a total mitigation impact of 1.48 GtCO<sub>2</sub>eq reduced or avoided, 276 million beneficiaries reached with an average co-financing ratio of 2.6. The Secretariat’s analysis shows that on average for **every USD 1 billion invested**:

- through the mitigation funding window, **512 MtCO<sub>2</sub>eq** were reduced or avoided while the Fund mobilized **USD 3.06 Billion**;
- through the adaptation window, **150 million beneficiaries** were reached, and the Fund mobilized **USD 1.73 Billion**.



**Table 4.1: Breakdown of impact per billion for public/private and mitigation/adaptation windows**

Impact/USD billion	Adaptation (in beneficiaries)	Mitigation (in Mt CO2-e)
Portfolio	150 million	512 Mt
Public	155 million	331 Mt
Private	132 million	646 Mt

Note: The adaptation and mitigation totals include the relevant cross-cutting portion  
Source: GCF iPMS as of October 31<sup>st</sup> 2018

**Table 4.2: Summary of Co-financing Ratios as of B.21**

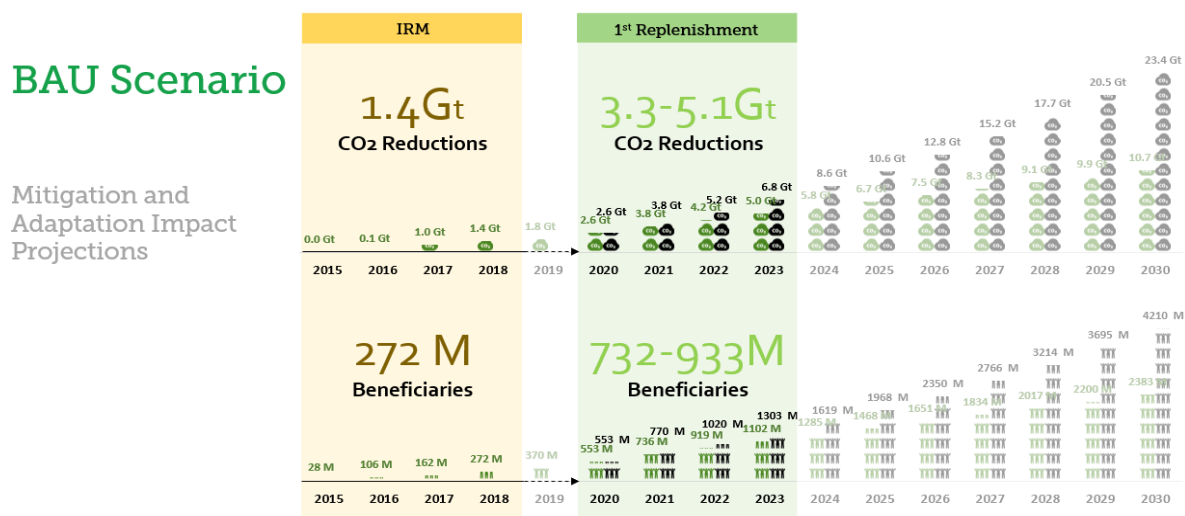
Co-financing ratio	Portfolio Average	Adaptation	Cross-Cutting	Mitigation
Public	2.35	1.51	2.24	3.59
Private	2.87	1.02	2.27	3.43
Portfolio	2.56	1.50	2.26	3.51

Source: GCF iPMS as of October 31<sup>st</sup> 2018

As shown in Figure 4.1 below, extrapolating a ‘continuing business’ analysis of the GCF’s performance shows that if IRM performance is maintained, the GCF could during the first replenishment period:

- deliver between **3.3 to 5.1 Gt of CO2eq reduced or avoided;**
- reach between **732-933 million beneficiaries;**
- with continuation of the **average co-financing ratio of 2.6.**

**Figure 4.1: Mitigation and Adaptation impact projections under ‘Continuing Business’ Scenario**



Note: The cumulative impact over the indicative replenishment period (2020-2023) is calculated by subtracting the cumulative impact achieved in 2019 from the cumulative impact by 2023, e.g. 6.8 Gt – 1.8 Gt = 5.1 Gt

These results are indicative, noting the uncertainties in projecting expected impacts to date into the future, given the IRM was a start-up phase and project implementation is at an early stage.<sup>2</sup> No clear impact trends are presently identifiable across the development of the GCF portfolio, with a small number of projected high-impact proposals significantly influencing overall results. Under a country-driven approach, performance during the replenishment would be expected to vary depending on the mix of funding proposals brought forward by countries and AEs and subsequently approved by the Board. It is also noted that at present, only portfolio level impact results are available. The Secretariat will be continuing to deepen analysis of projected portfolio impact by result area and region. A more representative and granular picture of impact, and higher confidence in estimates would be supported by ongoing evolution of the Fund's results, reporting and MRV systems.

### Potential impact in a 'Upper Frontier' scenario

To illustratively characterise an ambitious possible pathway for the GCF, an 'Upper Frontier' scenario estimates the additional mitigation impact the GCF would need to deliver with its available resources to align overall investment performance with delivering a least-cost global pathway to limiting global temperature rise well below 2 degrees<sup>3</sup>. It also describes how the GCF could work to help prepare developing countries to adapt to the likely impacts of climate change over a range of credible temperature scenarios. The detailed scenario analysis is presented in **Appendix 3**.

In developing this scenario, the Secretariat used best available literature to shed light on the estimated financial needs and emissions reductions needed to reduce global CO<sub>2</sub> emissions to a level consistent with keeping global temperature rise below 2°C, and provide a representative picture for developing countries. The modelled pathway identifies needed global emissions reductions of 19 to 25 GtCO<sub>2</sub> per year and incremental average financing needs of USD 18.261 trillion. Based on available literature, this translates for developing countries to estimated emissions reductions of 13 to 17 GtCO<sub>2</sub> per year by 2030 with incremental average financing needs of USD 13.404 trillion.

Acknowledging that GCF is only one actor in a much broader climate finance landscape, with defined resources, the scenario then estimated metrics that would see the GCF align its overall investment performance with this 'upper frontier' pathway. The analysis calculated an average annualised cost per tonne of emissions reductions needed for a 2°C pathway between USD 812/tCO<sub>2</sub>/year and USD 1,069/tCO<sub>2</sub>/year. This compares to GCF portfolio performance of USD 1,452/tCO<sub>2</sub>/year.

Overall, as illustrated in Figure 4.2 the analysis shows GCF's estimated potential mitigation impact for the replenishment period on an 'upper frontier' aligned basis would be:

- between **716 - 1,111 MtCO<sub>2</sub>** per billion dollars invested by the GCF in mitigation (compared to GCF portfolio performance of 512 MtCO<sub>2</sub>); or
- a total of **5.1 to 9.6 GT CO<sub>2</sub>eq** overall (compared to the 'continuing business' scenario of 3.3 to 5.1 Gt CO<sub>2</sub>-eq).

---

<sup>2</sup> As of year ended 2017, the average implementation period of the 18 projects which provided APRs to the GCF was 7.4 months (as per GCF's Annual Portfolio Performance Report B.21\_16(c) )

<sup>3</sup> A 'well below 2-degree pathway' has been analyzed given current availability of literature did not permit full analysis of a 1.5 degree pathway. In future iterations of this paper, an effort will be undertaken to update the paper with additional information improving the understanding of requirements that would be consistent with 1.5-degree scenario.

**Figure 4.2: Mitigation impact projections under 2°C frontier and BAU (GCF)**



Note: The cumulative impact over the indicative replenishment period (2020-2023) is calculated by subtracting the cumulative impact achieved in 2019 from the cumulative impact by 2023, e.g. 11.4 Gt – 1.8Gt = 9.6 Gt

If the GCF wished to pursue a direction of travel consistent with the ‘upper frontier’ scenario, as illustrated in Table 4.3 below, it would modify its investment approach for replenishment to:

- deepen overall mitigation impact per dollar invested;
- increase its co-financing and leverage ratio; or
- a combination of both.

As noted above in the framing section, there are reasons integral to GCF’s mandate and business model as to why portfolio performance may not align with global cost-effectiveness benchmarks. This scenario is accordingly presented as a reference scenario to indicate a potential ‘direction of travel’ for the GCF. The results of this scenario are expressly not intended to be applied in the assessment of individual funding proposals. In addition, given limitations within the data available from current literature, the predictions are intended to be illustrative – while the magnitude of forecast results is presented with express acknowledgement of uncertainty, the overall direction of results is clearer.

**Table 4.3: Alternatives for improving the co-finance ratio or mitigation impact results**

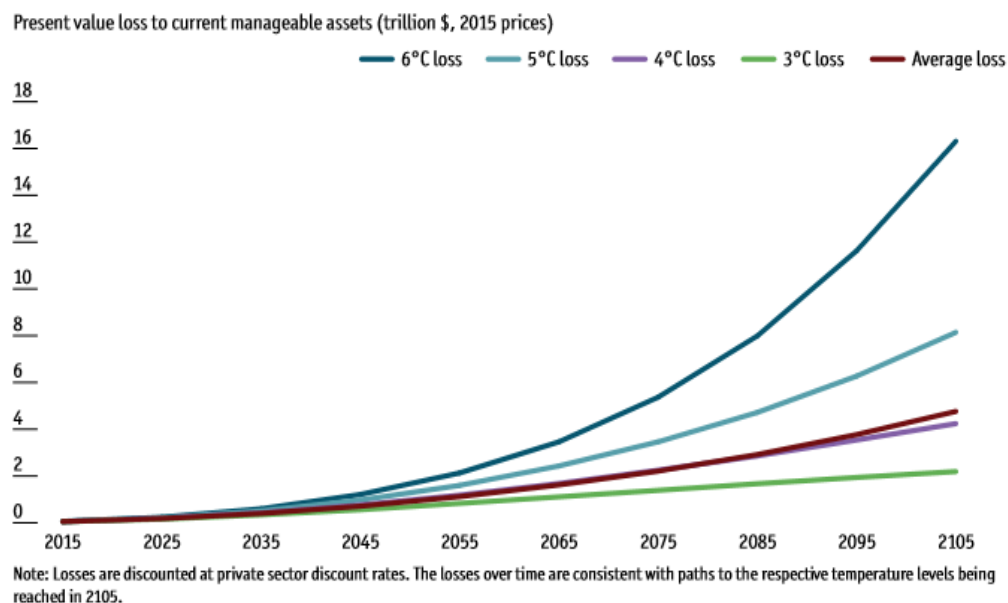
	Co-Finance ratio	Improved mitigation results from baseline scenario US\$ 812/tCO2/year	Improved mitigation results from current policy trajectory scenario US\$ 1069/tCO2/year
Current to B21	3.1	<b>Upper limit</b>	<b>Lower limit</b>
Alternative1	3.1	84%	42%
Alternative2	3.5	75%	33%
Alternative3	4.0	64%	21%
Alternative4	4.9	43%	0%
Alternative5	6.7	0%	

## Working at the ‘upper frontier’ on adaptation

Given the context-specificity of adaptation, a similar quantitative global pathway analysis does not present the best approach to characterise an ‘Upper Frontier’ for ambitious GCF adaptation impact during replenishment. An extrapolation of the number of beneficiaries reached per adaptation billion invested, or projected adaptation costs, ultimately presents a limited picture of meaningful adaptation and resilience outcomes for people, systems and institutions in developing countries. Building an upper frontier scenario for adaptation accordingly requires work to understand, prioritize and action the most urgent measures needed by countries to support transformational adaptation and resilience, across a range of plausible temperature scenarios, through measures that are local in nature but implemented through systemic change.

Understanding the variability of adaptation needs across a range of the most plausible temperature scenarios is the starting point. An assessment of national and sector-based studies concluded that current adaptation costs are in the range of US\$56 to US\$73 billion per year, but by 2030, adaptation costs are likely to be in the range of US\$140 to US\$300 billion per year, and USD 280 and USD 500 billion by 2050 (UNEP, 2016). The severity of impacts, and associated adaptation investment needs are predicted to vary significantly under different temperature pathways – while global adaptation costs are projected to be broadly similar between scenarios up to 2040, they diverge strongly thereafter, with estimates that costs without mitigation (>4°C) will be about five times higher than a 2°C scenario by end century (Hof et al, 2014).

Figure 4.4: The cost of inaction: Recognising the value at risk from climate change, The Economist Intelligence Unit, 2015

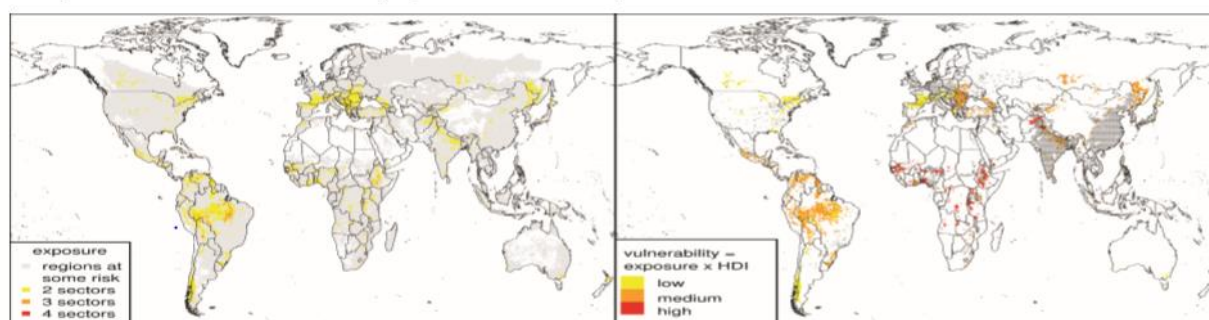


The IPCC SR1.5 report emphasizes that even the difference between a 1.5 and 2°C pathway is material to reducing climate risk; global adaptation costs are expected to be multiples higher by mid-century under a 4°C scenario. Striving for the mitigation upper frontier would optimize adaptation outcomes, by reducing climate impacts; but even at current levels of warming increasing adaptive capacity will be required. If the mitigation upper frontier is not achieved, the world will need much more far-reaching adaptation investments.



Recognizing that the GCF is mandated to maintain a 50:50 balance in its mitigation and adaptation investments, the potential for the Fund in “working at the frontier” on adaptation is to help countries first understand, and then plan to minimise the impacts of climate change across a range of credible temperature scenarios, variable climate impacts and associated adaptation needs. At an “upper frontier” of ambition, the GCF would seek to reach a maximum number of developing countries, work to address countries’ top adaptation priorities reflecting critical areas of vulnerability across temperature scenarios, and promote both incremental and transformational adaptation investments that will reduce risk, minimise losses and more fundamentally, encourage change in systems, policies and behaviours so that climate-resilient investments become the norm.

Figure 4.5: Regions vulnerable to multisector pressures (World Bank, 2013)



Vulnerability = exposure x human development level		Level of human development		
		Low	Medium	High
# of overlapping sectors	2	Medium	Low	Low
	3	High	Medium	Low
	4	High	High	Medium

Grey regions in the left panel show areas at risk of multisectoral pressure, if conservative assumptions are relaxed (see Appendix 3 for Method). Vulnerability (right) is a combination of number of sectors affected and level of human development as measured by the year 2000 Human Development Index (UNDP 2002). Hatched regions are regions with very high population density (year 2000), which is expected to act as an additional pressure.

The GCF is well positioned to support this through its ability to assist developing countries across the full adaptation planning and implementation life cycle: building on its readiness investments in NAPs and adaptation planning, to support development of adaptation investment strategies, strengthening of climate information and early warning systems, design of adaptation interventions at systems level, based on aligned policies, legal and institutional frameworks and budgets, and implementation of country-driven projects addressing specific areas of risk and vulnerability on the ground.

The design of interventions to protect people’s lives, livelihoods and health would optimally consider benefits and trade-offs, and look in an integrated way at adaptation and mitigation impacts. Supporting investment in climate information and data, and effective adaptation policy and planning processes would also be integral to this – without which adaptation costs would be expected to be much higher. Development of additional adaptation metrics, beyond the number of beneficiaries reached, are needed to calibrate the Fund’s adaptation impact, including adaptation in the enabling environment through climate-related adjustments as tabled in national and sectoral policies, plans and budgets. The GCF could, for example, aim to support all of the most vulnerable countries – SIDS, LDCs and African States – to implement their priority adaptation and resilience responses, and

increase the overall share of new investment that takes climate risk and vulnerability considerations into account across land, water, energy and infrastructure systems.

### **Opportunities for ‘Pursuit of Impact’**

To move from a ‘Continuing Business’ approach toward the ‘Upper Frontier’, the GCF has a range of options to deepen its ‘Pursuit of Impact’. Drawing from the analysis presented in Chapters II and III, and the scenarios described above, programming directions for Pursuit of Impact would optimise alignment between areas of developing country need, identified impact and paradigm shift potential, the GCF’s institutional comparative advantages and its operational capabilities.

Under this scenario, GCF would work in a more focused way with countries to pursue an integrated model of investments that aim to create, organize and develop value chains for systemic change. This would require a strengthened scope of readiness support to countries to underpin institution- and knowledge- building and integrated planning. GCF would seek to help countries strengthen the enabling environment for mitigation and adaptation and support well-functioning markets for sustained impact at the country level. Thirdly, GCF would seek to better leverage impact through partnerships and crowding-in capital from climate finance providers that can help build scale.

The initial analysis presented below to scope out these opportunities is qualitative in nature, based on conclusions drawn from the above information on how developing country needs are expressed in NDCs, NAPs and the GCF pipeline, on an analysis of impact and paradigm shift potential by results area set out in Appendix 4, and reflections on where the GCF’s can improve its operational effectiveness and play to its strengths. To further advise the Board and replenishment process, the Secretariat will continue work to elaborate this section with more quantitative analysis of how deliberate programming pursuit of the impact areas, opportunities for shifting financial flows, and policy and operational improvements set out below might expand the expected ambition of the GCF’s impact and paradigm shift performance during the first replenishment period.

#### *Impact areas*

The analysis of developing country needs presented above, and of impact and paradigm shift potential contained in Appendix 4, highlights impact areas across the Fund’s results areas where the GCF could seek to focus programming during the first replenishment period. These include:

- **Energy generation and access**, which is strongly represented as a priority in both NDCs and the GCF pipeline. The GCF could work with partners on the potential to drive paradigm shift toward decarbonization of world energy supply through continuing to: (a) lead investments to open renewable energy markets in countries where conditions remain too risky or financially untenable for development bank or private investment, with the goal of catalysing future investment at scale particularly from the private sector and institutional investors; (b) in least developed countries, investing to bridge the energy access gap through clean energy smart grids, testing business models and demonstrating potential to scale; and (c) invest in scaling up of energy storage solutions, digitization, carbon capture and storage (CCS), and other technologies to reduce costs and shift markets;
- **Forests and land use**, which is underrepresented in the GCF portfolio, despite significant low-cost and near-term emissions reduction potential, high co-benefits, and featuring strongly in the



NDCs and GCF pipeline for forest developing countries. The GCF could work with partners to: (a) demonstrate ways to shift incentives across the forest economic value chain as part of a wider landscape approach, including through ongoing financing for UNFCCC REDD+ results based payments, prototype private sector investments and supporting evolution of REDD+ markets; (b) prove, replicate and scale approaches involving local communities, indigenous peoples, civil society and the private sector to drive change, for example through agroforestry and fostering sustainable livelihoods, and incentives for securing high carbon content in indigenous territories;

- **Energy efficiency**, which has significant but difficult-to-tap potential for low-cost emissions reductions and is identified as a priority particularly in Eastern Europe's GCF pipeline. The GCF could work with partners to pursue approaches beyond stand-alone subsidized project investments, such as through: (a) building enabling environments and influencing behaviour change through readiness funding and technical support, working with partner organizations that have piloted successful standards and practices; (b) delivering financial products for projects and facilities that target upscaling of energy efficient equipment uptake; and (c) promoting innovation in technologies for energy efficiency, such as refrigeration and cooling;
- **Cities**, which are a locus of economic activity, demographic growth, GHG emissions and climate vulnerability, with urban sector investments widely identified as a need in developing countries NDCs and national plans. GCF could work with partners to: (a) identify the most innovative and impactful proposals for financing at scale to program integrated cities or regions interventions (a "Green Cities Challenge"), building on the GCF's significant programmatic pipeline and seeking to attract increasing private sector investment; (b) supporting financial innovation through guarantee facilities that enhance the economic profile of urban interventions; (b) embed urban greening and resilience action into NAPs, through readiness support and PPF assistance;
- **Transport**, which continues to be underrepresented in the GCF pipeline despite strong identification in NDCs. The GCF could work with partners in making headway towards capturing significant global emissions reduction potential from the sector through: (a) supporting holistic urban mobility planning and multimodal transport strategies, and project design that incorporates these planning approaches; (b) financing interventions that expand transport electrification and fuel and technology alternatives.
- **Climate information and early warning systems**, which provide a critical building block for successful adaptation and mitigation interventions in developing countries across all result areas, and key to managing and minimising economic losses from climate-related events, particularly in SIDS, LDCs and Africa. The GCF can deepen its collaboration with partners including the World Metrological Organization to: (a) design and implement end-to-end multi-hazard early warning systems, moving from existing capital-based infrastructure to service-oriented approaches, and supporting monetization of climate information services; (b) promote partnerships across the scientific community, technology providers and private sector to deliver solutions across the climate services value-chain; (c) support country uptake of updated data models and innovative technologies that data-driven weather insurance and other financial services solutions; (d) promote approaches that integrate health impacts, including air pollution management;
- **Agriculture and food security**, which provides the main source of livelihoods, food and incomes for 78% of the world poor living in rural areas and is highly prioritized in developing countries' NDCs and the GCF pipeline, particularly in Africa and LDCs. GCF can work with partners to: (a)

incentivise planning and investment in climate-resilient and low-emissions agricultural value chains, including through the reorientation of mainstream finance for agriculture; (b) prove, replicate and scale approaches with participation of local communities and indigenous peoples in innovating and implementing new technologies and practices; (c) piloting a programme of financing for agricultural productivity impacted by climate change, attracting public and private sector investment; (d) deploy at scale climate information and services tailored for agriculture and agricultural insurance products that enable risk-management;

- **Water security**, which is a very high priority for adaptation action in developing countries with widespread cross-sectoral impact, and particularly significant for SIDS, water scarce and drought prone regions, fragile mountain environments, coastal and delta regions and megacities. The GCF can work with partners to pursue climate investments in tandem with SDG targets on water through (a) promoting integrated water resource management, building synergies between water, energy and food security; (b) managing water demand via cost-reflective pricing, regulation and consumer awareness while respecting human rights to water and sanitation; (c) stimulating private sector investment in water resources development and in water supply and sanitation; (d) supporting scale-up of innovative financing models and innovative technologies for water management;
- **Ecosystems and ecosystem services**, which support human livelihoods and are a critical buffer against climate shocks. The GCF can work with partners to (a) mainstream ecosystem-based adaptation, adoption of nature-based solutions, and integrate ecosystems services assessment into national planning through Natural Capital Accounting; (b) build capacity for the explicit quantification, valuation and attribution of ecosystems services in investment proposals; (c) promote mitigation impact through carbon sequestration in peatlands, mangroves and other coastal ecosystems, and semi-arid grasslands, implemented by better land management;
- **Infrastructure**, where trillions in investment will be needed over coming decades to shift infrastructure stock to take full account of climate risks and well as emissions impact, and is particularly strongly prioritized in the GCF SIDS pipeline. The GCF can play a key role in (a) working with traditional infrastructure investors, including countries, IFIs and the private sector, to more fully incorporate climate rationale methodologies into infrastructure planning and design; incorporate ecosystem-based adaptation options where available; and prioritize better integration of planning, implementation, and operations and maintenance; (b) support demonstration projects and programs that work along the infrastructure value chain and seek to build resilience through complementary initiatives rather than stand-alone interventions;
- **Health and well-being** is currently scarcely represented in the GCF pipeline. Paradigm shift can occur when the GCF works with partners to (a) mainstream health benefits across adaptation and mitigation project interventions, including in the enabling environment with a systems approach to policies. This could include promoting integrated climate and health information systems; (b) support adaptive health systems, contributing to health outcomes in countries impacted by extreme weather events particularly SIDS; (b) address fine particulate matter including short-lived climate pollutants which threaten human health (with potential to save over two million lives each year), while in parallel reducing GHG emissions.
- **Institutional transformation, planning and policy environments**, cutting across all results areas. As noted in the analysis above, the GCF has significant potential to effect transformational



change by supporting developing countries in the critical work of building institutions, planning, policy and regulatory approaches that internalize climate considerations to design, incentivise and implement transformational interventions. Readiness support, project preparation support and funding proposals could increasingly include components underpinning institutional and policy transformation. Through this work, GCF could also provide technical support and knowledge leadership to guide the planning of integrated interventions and value-chain approaches for systemic change. The Fund's accreditation framework also presents opportunities to drive broader institutional shift toward low-carbon, climate-resilient approaches and best practice gender, environmental and social safeguarding standards;

- **Implementation and update of NDCs:** The GCF can support countries to refine their understanding of opportunities for transformational programming across all of the areas covered above, by supporting the core process of translating NDCs into investment strategies and bankable funding proposals. Noting that NDCs are expected to be updated to build increasing alignment with the goals of the Paris Agreement, targeted technical assistance delivered through readiness, country programming and project preparation support could also help build national technical capabilities to support the NDC cycle. This would help developing countries access robust analysis to underpin the design of successive NDCs of growing ambition, while planning and securing implementation of the most impactful mitigation and adaptation interventions;
- **Technology and innovation** is another impact area which cuts across all results areas and has been a focus of guidance to the GCF from the UNFCCC Conference of Parties. The GCF potential to actively support technology piloting, deployment and scale up through its projects and programmes has not been fully tested to date, and is an area where collaboration with partners could be enhanced. The Board has requested the Secretariat to develop terms of reference for a Request for Proposals to support climate technology incubators and accelerators, recognising that the GCF could be positioned to support innovation and scale at the riskier early-mid stage of the technology cycle (piloting and testing), between research and development and later stage commercialization. Realizing such potential impact through innovative approaches and engaging new players, such as the RfP, innovation prize models or support to technology start-ups, may require reform to GCF access modalities and other policy changes;
- **Insurance**, is a further area relevant to climate risk management across the spectrum, where the GCF could be positioned to innovate to support developing countries. GCF currently finances projects with insurance applications in agricultural risk management; climate information and early warning systems; renewable energy and energy efficiency finance; and de-risking of financing institutions' climate lending portfolios. There is opportunity for the GCF to work with countries and the insurance industry to develop further approaches to deploy insurance capital, modelling capabilities, risk products and advocacy to strengthen climate impact. This could be done through country capacity-building, design of national or regional risk pools, expanding guarantees, or identifying co-investment opportunities with asset management operations of global re-insurers, utilizing pipeline programming or strategic RfPs.

#### *Pursuit of action to shift financial flows*

As referenced in the above analysis and detailed further in **Appendix 4**, a critical opportunity for the GCF to broaden its impact and paradigm shift potential, is by pursuing interventions to catalyse shifts in broader financial flows, and maximise engagement with the private sector.



In developing a Private Sector Strategy for the Fund, the Secretariat has worked with the Private Sector Advisory Group and external support to complete analysis and consultations with NDAs, AEs and private investors on barriers to private sector climate investment in developing countries. A range of underlying causes of underinvestment – including narrow capital markets, affordability and availability of debt particularly for smaller projects, regulatory ambiguities, long lead times and a wide range of commercial and political risks – impede the funding of bankable climate projects, and standard investment practices have proven inadequate in mitigating such risks.

The GCF’s concessionality and willingness to take on more project and portfolio risk, as well as its readiness programme and project preparation facility create unique potential for the GCF to have impact in this area. But to realise that impact potential, the GCF itself needs to be well-adapted to engaging with the private sector, through appropriate access modalities enabling speed of response.

Key Gaps in Financial Ecosystem	Gaps in Focus and Topics	Private Sector Needs
<ul style="list-style-type: none"> <li>&gt; Financing for smaller scale projects (between \$500k - \$10M)</li> <li>&gt; Financing for projects targeting BOP</li> <li>&gt; Support for early-stage project preparation and technical assistance</li> <li>&gt; Affordable low-cost debt in local currency</li> <li>&gt; Guarantees and off-taker risk support</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Investment in adaptation and resilience</li> <li>&gt; Investment in small-scale, off-grid renewable energies</li> <li>&gt; Investment in grassroots organizations providing last mile delivery or support for BOP</li> <li>&gt; Investment in LDCs/SIDS</li> <li>&gt; Investment in forestry, land use and low-carbon transportation</li> <li>&gt; Incubation of new climate finance vehicles, inc. project preparation support</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Private sector interventions require speed (weeks not years) and clarity in all transactions.</li> <li>&gt; Simpler and more efficient way to access and engage with the GCF</li> <li>&gt; In addition to capital, private sector investors expect co-investors or partners to offer additionality e.g. ESG know-how and access to government stakeholder</li> </ul>

Source: GCF / CCAP, 2018

Areas in which programming for replenishment could focus to catalyse private sector engagement in developing countries and shift funding at scale include:

- **Taking on more project and portfolio risk** to crowd in private finance, including by facilitating financing in local currency and taking more equity and guarantee positions to ensure that the GCF plays a complementary, impact-oriented role within the wider climate finance architecture;
- **Supporting the development of climate-compatible national financial systems** by deploying readiness and funding to strengthen local institutions and markets, foster national and regional capital markets for “green” securities, and invest in institutions like national green banks, that can work as DAEs blending international and national public and private sector finance;
- **Acting as “market maker” for sector transformation** by deploying support to build familiarity of NDAs and governments with private sector stakeholders, identify and implement national policy priorities for private investment, and enhance public-private partnerships;



- 
- **Exploring further options to support policy reforms** that can improve impact and engagement with the private sector, including short-term options such as policy- or results-based financing in the readiness programme and funding proposals for specific deliverables that unlock and remove some of the identified barriers, starting with quantitatively measurable results areas;
  - **Deploying flexible financial instruments**, by using a combination of debt, equity and guarantees with concessional financing to enhance the financial attractiveness of projects by de-risking investments, supporting first-movers, using credit enhancement tools;
  - **Continuing work at the 'bottom of the pyramid'**, to develop MSMEs, promote access to finance and financial inclusion, and support private sector engagement in SIDS and LDCs;
  - **Seeking to mobilize greater private sector investment in adaptation**, including through investments in scaling adaptation technologies and knowledge transfer, investing to pilot new business models, and encouraging use of risk transfer products such as insurance;
  - **Exploring vehicles, such as a co-investment framework**, or building project portfolios at scale, that can raise participation by institutional investors in climate financing;
  - **Reforming the GCF's business model and access modalities**, to enable a wider scope of engagement with private sector actors, such as through a direct investment modality.

## V. Programming Directions

### A programming strategy based on developing country needs and ambitious impact potential

The above chapters set the frame for the GCF's programming strategy for replenishment: based on an understanding of the needs of developing countries and their country-driven priorities for action (Chapter III), and an understanding of ambitious mitigation and adaptation impact potential. (Chapter IV). Overall, the analysis identifies that there are significant opportunities for GCF to advance its ambitious mandate through its first replenishment period, by targeting programming to areas where there is identified alignment of developing country need and high impact and paradigm shift potential, as well as a comparative advantage for the GCF to act. Realizing this potential will in some cases require the GCF to reform its operating policies, modalities and instruments.

This section proposes programming directions for the GCF's first replenishment, by drawing together the opportunities identified, and also bringing into consideration the GCF's operating framework and the implementation potential of the GCF and its partners. The proposals included in this section build on lessons learned by the GCF to date through experience and evaluations.

### Framework for programming: Governing Instrument, COP Guidance and Strategic Plan

The starting point for the proposed GCF programming approach for the first replenishment is the Fund's Governing Instrument, Strategic Plan and guidance from the Conference of the Parties (COP). These set out an ambitious and durable **strategic vision** for the GCF, being to (a) promote the paradigm shift towards low-emissions and climate-resilient development pathways in developing countries; and (b) support implementation of the Paris Agreement within the evolving climate finance landscape, by building on the comparative advantages of the GCF and operating in coherence with existing climate finance institutions.

The **Governing Instrument** also sets down basic parameters for programming, including that the Fund will seek to (a) balance between funding for mitigation and adaptation; (b) follow a country-driven approach providing simplified and improved access to Funding, and aiming for appropriate geographical balance; (c) take account of the needs of the most vulnerable, including LDCs, SIDS and African States in allocating adaptation funding; (d) ensure adequate resources for capacity building (including readiness and preparatory support) and technology development and transfer, and also provide resources for innovative and replicable approaches; (e) directly and indirectly finance private sector action consistent with a country-driven approach; and (f) pursue complementarity and coherence with other climate finance sources. The Governing Instrument also states that a results-based approach will be an important criterion for allocating resources.

The GCF has also annually received **Guidance from the UNFCCC COP**, in particular, guidance on "policies, programme priorities and eligibility criteria". COP guidance has reinforced the above programming principles from the Government Instrument, and more particularly guided the GCF to focus on (a) delivering readiness support and support for capacity building; (b) supporting national adaptation plans and adaptation planning processes; (c) providing financing for forest action, including results-based finance for REDD+, private sector finance for forest action, and alternative approaches to sustainable forest management; (d) supporting development of environmentally sustainable technologies, technology transfer and collaborative research and development; and (e) increasing direct access proposals. The COP has also requested the GCF to enhance its operating

modalities by, inter alia, improving and simplifying access, streamlining accreditation, completing policies and ensuring transparency and appropriate stakeholder and expert consultation.

### **Country-driven transformation. Catalytic Investment.**

Building on its ambitious mandate and the opportunities identified through the above analysis, it is proposed that programming for the GCF's first replenishment be based on the core value proposition of supporting **country-driven transformation through catalytic investment**, using six key strategic directions as a guide:

- **Keeping countries at the centre.** Programming would be based on the GCF's commitment to working with developing countries to identify, design and implement transformational investments in response to their needs and ambitious national goals set under the Paris Agreement. This could include a continued focus on supporting the most vulnerable. Country programming would serve as a key tool for the GCF to help developing countries articulate their investment plans through successive NDC cycles under the Paris Agreement, and ensure the GCF pipeline and portfolio are increasingly aligned with ambitious national strategies for action;
- **Investing in institutional transformation.** Programming would be based on the lesson that a truly country-driven, transformational approach requires patient and sustained investment in the technical, institutional and human capacity in developing countries to fully integrate climate information and risk into planning, policy, regulations, investment decisions, and implementation – across governments, implementing entities and communities. The Readiness and Preparatory Support Programme, together with technical assistance funding, position GCF uniquely to support the necessary institutional transformation. While to date work has focused particularly on NDAs and direct access entities, the Programme in its 2<sup>nd</sup> phase would expand its support to broader multi-stakeholder government planning processes, supporting policy reforms and development of enabling environments including for private sector engagement;
- **Supporting science-based, systemic thinking:** Recognizing that knowledge and innovation are key to climate transformation, programming would internalize the latest scientific and expert advice, and seek to drive systemic and value-chain approaches. The GCF could continue to invest in the building blocks of climate information, climate rationale and associated expert capabilities. It could also encourage partners to look increasingly beyond the “project envelope”, at opportunities to innovate, catalyze, replicate and scale through interventions that plan integrated and systemic change across sectors and regions. Complementary work with other climate funds seeking to apply a catalytic approach to scaling up high impact initiatives and collaboration on knowledge management alongside pursuit of opportunities to drive innovation, can position GCF as a knowledge leader;
- **Orienting funding to needs and impact:** Programming could more actively incentivize country-driven transformation and seek catalytic impact, through improved orientation of activities toward scale, impact and results. This would be framed by portfolio-level impact targets, set at a level which recognize the difference between the GCF and other Funds in acting at the frontier of risk, and innovation for paradigm shift. Programming tools could be deployed more deliberately to target investment areas where there is strong alignment of country needs and paradigm shift potential, and opportunity to catalyze wider finance flows toward climate action. This could be

delivered through an updated framework for pipeline programming, strategic use of RfPs, and dedicated work to scale up the successful investments of other climate funds;

- **Risk-taking to catalyse innovation and scale:** Programming would operationalize the GCF's willingness to take on higher levels of risk in its investments, in order to catalyse innovation, replication and scale. The GCF could seek to diversify use of its instruments, as well as pursue new instruments, investment vehicles and partnerships to catalyse funding at scale and unlock much-needed wider participation from the private sector, including from institutional investors and the insurance sector. The GCF can also play a part in supporting technology innovation;
- **Operational excellence and reform to unlock catalytic potential.** Unlocking GCF's full potential for catalytic investment, particularly to bring wider investment behind developing countries mitigation and adaptation needs and promote technology innovation, will depend on a number of key reforms to GCF's operating practices and modalities. The programming strategy suggests key reforms which could be taken up within the GCF's strategic planning for replenishment, as well as setting out proposed measures to promote operational excellence, improved access, strengthened results management, and increased complementarity and coherence with other funds through targeted joint initiatives.

### Outcome-driven focus areas

While the GCF will continue to make available funding to developing countries for activities across the full range of its readiness activities and results areas, as highlighted by the above analysis, within the above strategic areas, and based on its capabilities and consolidating areas of comparative advantage, the GCF sees particular opportunity to contribute to ambitious action on:

- **Helping developing countries to articulate NDCs into investment strategies**, as well as supporting implementation and evolution of NDCs over successive cycles of ambition and impact, by investing in developing countries capabilities through readiness and project preparation;
- **Mainstreaming climate information, risk and analysis across national planning, policy and investment processes**, informing decisions to shift more "brown" investment to "green", drive the development and implementation of standards, and support evolution of climate-compatible financial systems;
- **Increasing the number of markets where renewable energy is viable and competitive for energy supply at scale**, as well as proving models for off-grid supply and storage;
- **Mobilizing private sector investment into REDD+ and shifting forest/land value-chains**, cultivating sustainable forest/land-based economies;
- **Scaling up interventions that finance transformation across cities and regions**, deploying system-based planning and integrated mitigation-adaptation approaches;
- **Measurably increasing the resilience of the most vulnerable peoples** to the climate-induced effects of natural disasters and sea-level rise, particularly in LDCs, SIDS and African states;



- **Fostering innovative adaptation across water, agriculture, energy and health sectors**, encouraging deployment of new technologies including use of digitization, ecosystems-based approaches, increased private sector engagement, and knowledge sharing;
- **Demonstrating scale**, working with other climate funds to scale and replicate successful investments;
- **Accelerating the uptake of green investment by mainstream investors**, including by growing the number of national ‘green banks’ able to pilot and scale investments in local conditions and innovating financing vehicles to increase institutional and equity investment;
- **Piloting development and deployment of new insurance products**, which will broaden the toolbox for climate risk management and help underwrite wider viability of climate investments.

### **Capitalizing on the GCF’s comparative advantages**

The above programming directions and focus areas seek to capitalize on the GCF’s “niche” and comparative advantages in the broader climate finance landscape: its country-driven focus and ability to offer end-to-end support, concessionality and risk profile, size and scale, and climate focus.

In reasonably ‘busy’ areas of the climate finance landscape such as NDC implementation and climate information services, the GCF can seek to fill key value-chain gaps, offer predictable funding to build lasting national capacities, as well as assist with improved coordination of multi-donor efforts. Across major investment areas such as energy, energy efficiency, cities and landscapes, the GCF can focus where its concessionality and risk appetite have the greatest potential to shift market dynamics and move wider sources of finance, noting that both development finance institutions and private investors continue to count on GCF funding to catalyse their own climate finance commitments.

On adaptation, the GCF can complement the Adaptation Fund, LDCF and SCCF focus on innovation, technology and piloting of smaller projects, to replicate and bring scale to successful interventions, including by using the simplified approvals process to expedite learning and scaled-up impact. And through its focus on strengthening climate rationale in project and planning design, the GCF can help cooperatively reinforce a strategic focus across many development institutions on mainstreaming climate change into their operations, contributing to an increasing share of ‘conventional’ finance internalizing climate considerations over time.

***The following section sets out in more detail the programming initiatives the GCF could pursue to realise the six strategic programming directions set out above.***

### **Portfolio-level goals oriented to impact**

The GCF’s programming for replenishment could continue to be framed by the broad Strategic Vision set out in its Governing Instrument and initial Strategic Plan. Central to this would be maintenance of the Fund’s core resource allocation goals, as set out in Decision B.06/06, aiming for:

- 50:50 balance between mitigation and adaptation activities,
- 50 per cent floor of adaptation funding for LDCs, SIDS and African States,
- geographic balance, while maximizing scale and impact,

- significant allocation to the Private Sector Facility; and
- sufficient resources allocated for readiness and preparatory support;

For the first replenishment period, a strengthened orientation to impact and results informed by the above analysis of scenarios for ambitious mitigation and adaptation action, could introduce new portfolio-level impact goals. Informed by the above analysis, these could be set at levels that are realistically ambitious based on Fund performance to date and strengthen programming orientation toward mitigation and adaptation results, but also recognize the difference between the GCF and other Funds in acting at the frontier of risks and innovation for paradigm shift. These could include:

- A **portfolio-level emissions impact goal** – for example, targeting at least the average level of emissions reduction impact achieved during the IRM, and seeking to increase it;
- A **portfolio-level adaptation impact goal** – for example, targeting either a total number of people benefitting from improved resilience, or alternative metric, such as targeting delivery of the top adaptation priorities of a specific percentage of developing countries;
- A **portfolio-level co-financing and/or leverage goal** – for example, targeting an increased co-financing ratio for the GCF’s mitigation investments, which could be largely driven by higher rates of catalytic investment through the GCF’s Private Sector Facility
- A **portfolio-level institutional transformation goal** – for example, targeting a number of countries benefitting from GCF support to translate NDCs into investment strategies, capacitate Direct Access Entities, or strengthen institutional or policy frameworks.

In addition, to give clearer orientation to the GCF’s institution-transforming work on direct access, and fully operationalize COP guidance, existing allocation goals could be expanded to include:

- A **resource allocation objective on Direct Access** – for example targeting representation of a certain percentage of approved funding proposals (by number) from Direct Access Entities.

### **Predictable and equitable allocation of resources**

The GCF’s programming for replenishment could aim to deliver a more strategic, predictable and impactful approach to the allocation of resources. Annual programming at scale, in line with the GCF’s implementation potential (discussed in Chapter VI) could be based on regular pipeline management informed by the available amount of funding available for the first replenishment period, agreed portfolio-level goals, strategic programming initiatives and financial planning decisions of the Board. Predictability would be aided by clear earmarking of resources for known priorities, including:

- A **floor amount identified for Fund operations**. The GCF’s total annual operating budget is currently USD 80 million. Operating costs would be expected to show some growth with increased programming and a larger portfolio of funded activities under implementation. New business functions or modalities should be specifically budgeted for in addition;
- An **up-front allocation of funding for readiness, either by amount of percentage**: An amount in the range of USD 500 million is projected to be needed over four years, based on current trends, to respond to levels of developing country demand for readiness. A predictable up-front



allocation would be a clear signal of the Fund's commitment to supporting institutional transformation, and enable countries to more effectively plan resources over multiple years to maximise impact and reduce transaction costs. The allocation would include amounts still to be allocated for NAP development and adaptation planning under IRM decisions, and is premised on an increasing uptake of readiness and results in areas such as analytical support for transformational country programming, mainstreaming climate risk information, private sector engagement and green bank development, and work on policy and enabling environments, under a higher performance Phase II of the programme.

- **An up-front allocation of funding to the project preparation facility:** An amount in the range of USD 100 million is projected to be needed over four years, based on current estimates of demand growth. The PPF could be expected to play an increasingly vital role as a link between the concepts emerging from country-driven work programming and national adaptation planning processes, and the development of bankable investments and full funding proposals, particularly for direct access entities. The PPF would be strengthened through new strategies including rollout of project preparation sectoral training, scaling up technical assistance to DAEs and NDAs for PPF applications, active provision of advice to identify high potential project concepts, and further simplification of PPF access.

The balance of replenishment funding would be utilized to support developing countries' projects and programmes through the GCF's funding proposal windows. The GCF could continue to deploy two major programming approaches in allocating this funding: pipeline programming driven by clearly articulated national priorities, and strategic RfPs.

### **Pipeline programming guided by country priorities**

Pipeline programming on the basis of concept notes and funding proposals submitted to the GCF has been the basis for programming the vast majority of the GCF's portfolio during the IRM. Pipeline-based programming, in line the principle of country ownership, would be expected to continue to serve as the major vehicle for programming during the replenishment period. Based on lessons from the IRM and the GCF's commitment to placing countries at the centre in driving transformational and impactful programming, the Fund could consider:

- **Further formalizing use of Country Programmes in pipeline programming** as part of the project approval process. This would help to deliver increasing alignment between the GCF pipeline and portfolio and countries' articulated priority needs, implementation strategies and NDCs of increasing ambition and impact. The increasing use of Country Programmes to guide pipeline development would be underpinned by readiness support for countries to engage in transformational programming;
- **Country-based allocations for particular investment areas or regions, such as for climate information services and early warning systems in the most vulnerable countries.** This could recognize the need to strengthen essential building blocks for climate investments, particularly in the most vulnerable countries. Allocations of funding could, for example, ensure that countries have an agreed set of essential tools to facilitate effective climate information services, early warning systems and essential climate expertise. A country-based allocation, guided by GCF best practice and coordinated with work and investment by others, could help incentivize more widespread, planned and efficient investment in this and other areas;

- **Evolution of a wider country-oriented resource allocation approach** could also be considered. This could be developed to promote equitable distribution of resources among developing countries, particularly for adaptation, and add certainty for country programming.
- **Expanding the application of the SAP**, through further efforts to simplify SAP templates and speed up SAP preparation, review, approval and disbursement processes for small scale activities and low-risk projects. Since its inception, SAP has proven to be a key platform for adaptation finance by GCF, with a current pipeline comprised largely of adaptation and cross-cutting projects. The Fund could encourage uptake of SAP projects as an “incubator” and value-chain-link between pilot and larger investment projects (including those supported by other climate funds, or the private sector) and bringing ideas to scale, as a means to build DAE implementation capacity to manage larger amounts of finance, and to address urgent needs in countries most vulnerable to climate change;
- **Completion of funding proposal policy frameworks and sectoral guidance** to better orient pipeline programming towards needs and impact, inform improved project design by countries and AEs, and improve efficiency of the Secretariat’s funding proposal review processes.

### Strategic programming through RfPs

Requests for proposals (RfPs) are the other programming tool used by the GCF during the IRM, with USD 1.4 billion dollars or almost 20% of available IRM funding notionally made available for RfPs, but only 70 million approved for specific projects to date. For the Fund’s first replenishment, targeted RfPs (or other strategic funding allocation tools) could play a key role in helping GCF better target impact and innovation in areas strongly aligned with country needs, in line with the analysis presented in Chapters III and IV above.

However, in light of IRM experience, reforms would be essential to better target RfPs to areas of known demand and to facilitate greater uptake, in particular to expand participation beyond international AEs. For replenishment, RfPs could be designed based on market analysis, backed by an earmarking of resources, and reviewed at a set date after launch to evaluate uptake and performance, with reallocation of resources as needed. An approach to deploying RfPs for replenishment could be based on:

- **Setting an overall target share of replenishment funding to be allocated through RfPs.** This would set an overall ambition level for use of RfPs versus pipeline programming, providing an incentive to keep total RfPs allocations under review to ensure the most efficient use of resources. The target could be calibrated to the overall ambition of the GCF replenishment;
- **Review of ongoing RfPs to decide on future funding allocations:** The Fund could review the ongoing RfPs on Enhanced Direct Access, Micro- Small- and Medium Sized enterprises, Mobilizing Funds at Scale and REDD+ Results Based Payments, and determine what future funding should be allocated to each. Current estimates suggest that up to USD 1 billion will remain unallocated under these RfPs after 2019;
- **Design of new strategic RfPs based on analysis of need, impact and uptake potential:** In line with the analysis presented in Chapter IV, the GCF could design a range of strategic RfPs to target

impact potential aligned with country identified priorities and catalytical potential. Prospective areas include:

- Technology incubators and accelerators, for which design work is ongoing further to COP guidance and prior Board decisions, in collaboration with the TEC and CTCN;
- A cities' challenge to attract the most impactful proposals for programming for low-emissions, climate-resilient cities at scale;
- A programme of financing for agricultural productivity impacted by climate change, driving public and private investment to widen the uptake of resilient agriculture practices;
- Scaling up of successful projects from other climate Funds, to demonstrate replicability, scale and knowledge sharing;
- Innovative design for private sector investment in forests, in line with COP guidance and the significant impact-need alignment in forest countries;
- Innovative design for private sector investment in adaptation, to harness untapped potential for a greater private sector role in areas such as agriculture, water and infrastructure;
- Unlocking the potential of insurance, as a tool to expand respond to climate-induced risk.

GCF could evaluate prospective areas for RfP programming, by undertaking country consultations to assess need and demand, evaluating potential for AE uptake, ensuring calibration to available access modalities, and analyzing impact potential.

### **More diversified use of instruments and GCF-structured products**

Implementation and impact of GCF's programming approaches, as discussed above, could be enhanced by further work to diversify the deployment of available instruments, and structure products for uptake by countries. As noted in Chapter IV above, currently almost 90% of GCF funding is deployed through grants and concessional loans. While these will continue to be important instruments, the GCF could explore deployment of more catalytic instruments and products to shift funding at wider scale and maximise private sector engagement. These may require an expansion of some areas of the GCF's internal operations, and/or operational reform:

- **A more efficient guarantee product or partnerships.** Guarantees can provide a powerful instrument to catalyse funding in riskier investment areas, but the effectiveness of the GCF guarantee in mobilizing funds at scale is limited by its current treatment as a cash set-aside within the GCF. Developing a more efficient guarantee product could help the GCF achieve greater leverage and impact. The GCF could also examine options to partner with other guarantee providers in structuring projects to widen leverage;
- **A local currency financing and/or guarantee facility:** Recognizing that currency risk presents a significant barrier to enhancing private sector investment in many developing countries, a GCF local currency financing facility could help to manage unhedged currency risk and/or guarantee FI credit lines. This could be based on establishing an internal risk reserve or hedging.
- **Climate bond issuance** as a vehicle for mobilizing wide private sector investment. The GCF could explore options to expand climate bond issuances, either in association with funding proposals, or over the medium term, delivered by the GCF itself against its portfolio.

- **A co-investment facility or framework:** GCF could work with partners, including private, philanthropic and institutional capital, to identify opportunities to make mitigation and adaptation investment at scale through co-investment. GCF could take a lead role in structuring investments for uptake with AEs, or under reformed access modalities, finance directly or through a dedicated co-investment vehicle.
- **Innovating insurance as a ‘fifth instrument’:** The GCF could lead work to innovative new insurance instruments, in partnership with insurance providers, unlocking a further tool for countries to manage climate risk transfer, and reducing project risks to improve viability. This could include support for enabling environments for insurance, hazard modelling, disaster risk financing facilities and parametric or index-based insurance instruments.
- **Fit-for purpose readiness support including standard packages:** A refreshed Readiness Programme (phase II) will help countries assess their readiness capacity, then develop tailored support to meet country needs and foster institutional transformation. This could include package of support to countries with least capacity; analytical support and guidance for strategic country programming; coordinated technical support for pipeline development and project implementation; support to mainstream climate information and risk into national planning systems; readiness for private sector engagement; support for development of national green banks or facilities; and directed support for policy frameworks and enabling environments;
- **A framework for technical assistance, policy loans and knowledge sharing:** The GCF could adopt a policy framework or other guidance on the availability of grant funding for technical assistance, policy loans, and support for knowledge sharing as a component of funding proposals, to encourage conditions for paradigm shift, replication and scaling.

### Partnership and Leadership initiatives

In complement with programming of available resources, the GCF could over the first replenishment period to continue to build its global profile, strengthening its ability to serve as a bridge between diverse partners working on climate action, and as a broker for knowledge on climate finance.

Delivery of programming directions, responsiveness to developing country needs, and strategic impact could be heightened through work with other Funds to advance complementarity and coherence, and partnerships with key global and sectoral institutions. For example, the GCF can play a role in leading multi-donor initiatives, to pool financial resources for key impact areas and multiply the benefits of planning and learning.

In addition, the GCF could also explore opportunities to lead policy work in emerging areas of knowledge development or financing. This could include areas as developing financing instruments for implementation of energy efficiency measures under the Montreal Protocol Kigali amendment; support for sustainable stock exchanges, green banking networks, and engagement with standard-setting and regulatory bodies (e.g. Basel); promoting climate risk disclosure, especially via regulatory, accounting and rating agencies, allowing risks to be managed across private sector balance sheets; and engagement in education initiatives.

## VI. Operational implications

### Commitment to attaining operational excellence

The programming directions proposed for the GCF's first replenishment are designed to strengthen a full cycle approach to the implementation of transformational low-emissions, climate-resilient investments. Based on lessons from the IRM, the GCF would make up-front investment in countries' and institutions' implementation potential, serving to strengthen the design, quality, impact and scale of GCF-funded investments, with a view to delivering global climate goals. Realizing this investment approach to the fullest would also require strengthening aspects of the GCF's own operational framework and implementation potential, to enhance its ability to provide support to countries, entities and the broader climate agenda.

Through its first replenishment period, the GCF would strive for operational excellence as both a financier, technical adviser and policy and knowledge leader, building its capabilities and global profile. As a foundation to the specific points of operational reform identified below, and taking on board lessons from evaluations of the Fund's performance during the IRM, it is recommended that on the operational front, the GCF:

- Adopt an approach to planning the full utilization of resources and predictable investment programming over the replenishment period;
- Formally review the Fund's business model, modalities and policy frameworks under scheduled Board reviews;
- Improve the efficient delivery of readiness support through approval of second phase of the readiness and preparatory support programme;
- Continue to pursue measures to simplify access for countries, including elaboration of guidance, translation of key documents, provision of technical support, further streamlining of the Simplified Approval Process and cooperation with other climate funds to increase complementarity and coherence;
- Continue to strengthen its portfolio management and results management functions for all funded activities;
- Evolve systems to embed impact assessment in review, reporting and accounting methods across the GCF's operations, refine more GCF-representative performance indicators and strengthen results data collection, management and analysis;
- Further develop, with the Trustee, the Fund's own investment policies and treasury function;
- Continue to foster technical and strategic partnerships with other institutions to ensure the GCF's operations are informed by the best global expertise, and positioning GCF within global communities of expert practice as a climate finance knowledge leader, as well as building dedicated internal research, climate and economic analysis capabilities;
- Improve efficiency and effectiveness of Fund internal processes.

## Implementation potential of the GCF and its Partners

The programming directions set out above can be implemented under a range of different replenishment funding scenarios, based on the Fund's implementation capacity and the total volume of replenishment resources raised. This chapter analyses the GCF's current implementation potential, and identifies where there is need to increase implementation capacity, or deliver broader business model and operational reforms in order to realize increased scale of programming, impact and improved accessibility. It is noted at the outset that the implementation potential of the GCF's partners – countries, accredited entities and delivery partners – is also a significant factor in successful scaling of the Fund's operations and delivery of results.

The Secretariat proposes that a comprehensive review of the Fund's implementation capabilities be conducted in parallel with the development and conclusion of the Fund's replenishment programming directions. The analysis presented below offers initial reflections on the Fund's anticipated implementation potential, and areas where reform of operating modalities or additional capabilities may be necessary to realize GCF's catalytic potential and deliver operational excellence.

### ***Implementation of country engagement, readiness and preparatory support programmes, including support for Direct Access entities***

At present the Fund's country programming, readiness and preparatory support programmes and project preparation facility are administered principally by the Country Programming Division, with cross-cutting support across the Secretariat and some outsourced contractual services arrangements. In line with the Secretariat's 2019 work programme, with these capabilities and current levels of demand for the support programmes, the Secretariat estimates it will be able to annually approve 70 non-NAP (USD 45 million) and 25 NAP (USD 62.5 million) proposals in readiness approvals, and manage an active portfolio of 45 NAP and over 200 other readiness project in implementation. In addition, the Secretariat expects to be able to approve 32 PPF requests, provide over 300 days of technical assistance support to direct access entities in developing project Concepts and associated PPF applications, and deliver over 5 sector PPF trainings with partners.

The quality at entry of requests for support, including project Concept Notes to be strengthened by the PPF, and need for troubleshooting in implementation, are key factors influencing overall implementation potential. In short, the current model largely assumed that countries would know what they need in coming to the GCF for readiness support, and work with partners who are fully capacitated to deliver. Experience has shown this not always to be the case, requiring a much higher call on the GCF to support impactful design of activities, facilitate application writing and access to resources, and actively monitor implementation.

Delivery of the programming directions for country programming, readiness and preparatory support proposed are based on an assumed continuation of current response service standards and levels of support, with better targeted objectives and more effective administration consistent with the proposal made to the Board for implementation of a second phase of the readiness programme. Internal barriers to increasingly more effective and impactful delivery in these areas include:

- Minimal regional presence (through part-time consultants), limiting GCF's ability to support countries before request submission to access resources and improve quality and impact;



- Capacity to engage in value-adding strategic functions such as design of standard products and knowledge product development and dissemination;
- Capacity to provide review of country work programmes and facilitate development of identified concepts into PPF requests and funding proposals;
- Buffer capacity to absorb administration of a growing approved readiness portfolio, provide active management of disbursements and fund utilization;
- Buffer capacity to provide post-accreditation support to a growing network of Direct Access Entities for troubleshooting during project implementation.

To realize the full potential of proposed programming directions relating to transformational country programming, deployment of readiness for institutional transformation, and use of PPF as a key 'link' in the project development cycle, the Fund may consider:

- Establishing a small number of **GCF regional offices** across key regions, which could be co-located with related centres of excellence or international institutions;
- Expanding use of a '**centralised pool**' of **readiness funding**, out of the proposed readiness allocation, to support programme development activities, such as development of standard products, provision of technical support, training and knowledge management;
- An efficient combination of **increasing staff headcount, professional services budget and improved process efficiency** for the administration of country programming, readiness and PPF approval and implementation, and direct access support functions, with a corresponding undertaking to lift service standards.

### Implementation of the project cycle

At present the Fund's project cycle is administered across multiple divisions of the Secretariat, by iTAP and the Board. The Division of Country Programming leads engagement on country programming, country and entity engagement and PPF. The Divisions of Mitigation and Adaptation and Private Sector Facility engage on project design from the concept note to funding proposal stage, and lead cross-Secretariat teams through the project review process, Board approval, and FAA execution up to the point of first disbursement. The Independent Technical Advisory Panel reviews funding proposals just prior to Board submission. Implementation after first disbursement is taken up by the Office of Portfolio Management.

In line with the Secretariat's 2019 work programme, based on current staffing levels and programming settings, the Secretariat estimates that it will be able to annually programme between **USD 3.5 and 5 billion** of new investments moving ahead. This assumes a mix in the size of funding proposals being submitted to the Board: based on the Secretariat's estimate of being able to review and submit around **60 funding proposals each year**, this would imply an average funding proposal size of between USD 60-80 million. On the Secretariat's side, increasing the number of funding proposals reviewed, for example to accommodate a much higher number of SAP proposals, a significant increase in proposals from DAEs, or management of multiple RFPs, would require an

overall improvement in quality at entry, and further increase in staffing capacity, combined with efficiency improvements.

Implementation of the project approval process is also dependent on the capacity of iTAP and the Board. At present, **iTAP is processing around 12-15 funding proposals per batch** for a Board meeting. Without reform of iTAP arrangements to allow for more continuous rolling review, existing arrangements would limit work to a maximum of around 40-45 funding proposals cleared each year. Similarly, the Secretariat's estimated programming range of USD 3.5 – 5 billion dollars assumes Board consideration and approval of at least 20 funding proposals per board meeting.

On the basis of the above volumes, and taking account of the current portfolio, by the end of a four year replenishment period the GCF could be monitoring the implementation of an estimated portfolio of over 300 projects, across a diverse network of AEs. Substantial further investment in the GCF's **portfolio management capabilities** are expected to be needed to undertake troubleshooting during implementation, to monitor and manage results, and systematically capture and disseminate knowledge. The Fund's IEU will also play a key role in evaluation and learning.

To meet the Fund's ambitions to finance climate action at increasing scale, deliver an increased number of funding proposal approvals per year at the upper end of the estimated programming capacity (USD 5 billion) or beyond, and manage a growing portfolio, the Fund may consider taking steps to increase the capacity of the project cycle and make it more fit for purpose, including:

- **Completing outstanding investment and funding proposal policies** to provide clearer guidance to stakeholders on funding proposal design, assessment and eligibility criteria, to lift the overall quality at entry of funding proposals and fit with Fund investment criteria;
- Commissioning an **updated review of Secretariat capabilities and structure** once programming directions and desired scale of funding have been determined, and increasing headcount and/or services budgets across project cycle functions as needed to support programming and portfolio management at increased scale;
- Reviewing the **capacity of iTAP** and considering an update to iTAP arrangements to accommodate an increased number of funding proposal submissions;
- **Adopting arrangements for Board approval** of certain funding proposals between meetings, or delegating approvals of additional classes of projects, to ensure that approvals can continue to be managed in a timely and efficient manner by the Board;
- Further **streamlining access through SAP**, following the review of the pilot phase, including approvals of proposals between Board meetings;
- Elaborating the Fund's **results management, performance management and MRV frameworks**, to develop fit-for-purpose indicators, improve quality and consistency of information gathered through project performance monitoring, and facilitate measurement of performance against both Fund strategic and portfolio-level goals, and implementation of countries' NDCs and the Paris Agreement.

## **GCF's access modalities and instruments: reform to realize the Fund's full catalytic potential**

At present the GCF's access modalities and instruments are set by its Governing Instrument, and they are being implemented, in most cases, as operationalised by early Board decisions. Accreditation is a defining feature of the Fund's business model, with the Fund currently having a network of 75 accredited entities. The Fund is currently accrediting around 15-20 new AEs per year, suggesting the network could expand to 150 over 2019 and the next four-year period. The Fund's current instruments include grants, loans, equity and guarantees, with the potential to explore deployment of additional types of products as outlined above.

The Fund's access modalities and instruments have an immediate bearing on delivery of the proposed programming priorities, as they govern who the Fund can engage with to deliver its desired programming objectives, and how that cooperation can be undertaken. The GCF's experience during the IRM highlights that **reform of access modalities, and diversification of the use of instruments, is important** if the GCF is going to more fully realize its catalytic potential. This is particularly the case in areas where the GCF hopes to spur innovation, such as through the use of strategic RFPs, and catalyse funding at scale, attracting wider investment from the private sector.

To ensure the GCF can realize the full potential of proposed programming directions and improve accessibility, the Fund may consider:

- Completing the **review of the accreditation framework**, and considering reform to better target the profile and capabilities of the AE network to match priorities for concept note and funding proposal development in line with countries priorities;
- Developing a **framework for selecting and supporting AEs**, to help countries prioritize nomination of a maximum number of AEs, with the capabilities best suited to delivering expected country priorities, allowing the Fund to focus pre- and post- accreditation readiness support to where it will have greatest impact;
- Deploying **alternative access modalities** including a project-specific assessment approval, or direct investment approach, which would maintain fund standards while allowing the GCF to engage with a wider set of stakeholders on innovative and at-scale ideas;
- Strengthening the Fund's internal **product control, treasury and risk functions** to support the administration of new instruments.

## **Contributions management**

Moving into the first replenishment period, the Fund can also take a number of steps to strengthen its investment and contributions management approaches. These include further work on:

- **A cash investment strategy** to preserve liquidity to ensure the cash amount meets the financial needs of approved investment projects;
- **Working with the Trustee on asset allocation strategies**, after a new Trustee Agreement and operational guideline are established;



- **Exploring ways to manage contribution uncertainty risk**, including looking at deposit and encashment schedules, timely conversion of non-holding currencies to holding currencies on receipt of funds, matching the currency of funding sources with the currency of funding commitments, and preparing FX hedging options for Board consideration to lower the FX risk embedded in non-base currency assets of the Fund;
- **Building internal capabilities** through additional recruitment, as required, to support investment portfolio management, strategic cash investment and FX hedging.

## APPENDIX 1: Modelling assumptions

Given that many aspects of the GCF's first replenishment period have not yet been defined, the simulation model analysis makes the following assumptions to present scenarios for the consideration of the Board and the replenishment process:

- 2019 is a “transition year” between the IRM and replenishment, that will not be covered by the replenishment programming strategy or accounted for as part of the replenishment resources;
- As the replenishment period is still to be decided by the Board, the modelling presents figures for four years over the range 2020 to 2023, with an indicative longer-term horizon to 2030;
- 2018 is taken as an indicative baseline for the GCF's implementation potential, with average programming of USD 1.06 billion per Board meeting;
- Growth in implementation potential is projected in line with the Secretariat's 2019 work programme estimate of future programming capacity at USD 3.5 – 5 billion per year, with achievement of the higher end of the range expected to become the norm;
- From 2020, three Board meetings per year considering funding approvals are assumed;
- Impact estimates are based on projected figures provided by accredited entities;
- The Fund would maintain its current resource allocation settings, including aiming for a 50:50 balance between mitigation and adaptation.

Impacts have been analyzed based on the Fund's core indicators under its Results Management Framework (RMF), namely:

- **Tonnes CO2 reduced or avoided (tCO2eq).** For comparative purposes across scenarios, stated as Tonnes CO2 reduced per billion dollars invested in mitigation;
- **Number of beneficiaries reached:** For comparative purposes across scenarios, stated as beneficiaries reached per billion dollars invested in adaptation;
- **Volume of public and private funds catalyzed by the Fund** (Co-financing ratio).

## APPENDIX 2: ‘Continuing Business’ Scenario

### Introduction

As described above, the “continuing business” scenario posits that the Fund continues to carry out its operations through its first replenishment period as per current or ‘business-as-usual’ modalities, and projects potential impacts based on similar average results through the IRM. Those conditions and modalities include the Fund’s current business model, its approach to accreditation, second-level due diligence, operational capacity levels (e.g. staff resources of approx. 250 FTEs) and the rolling over of RFPs such as MFS, EDA, REDD+, MSME and the continuation of the Simplified Approval Process (SAP).

### Analysing the GCF’s impact during the IRM

The *Status of the GCF Portfolio: Approved Projects and Fulfilment of Conditions* provides regular portfolio performance reporting to the Board and presents portfolio-level indicators of the Fund’s expected impacts in terms of mitigation and adaptation. These are summarised on the next page in Figure 4.1.

The Fund’s portfolio performance is broadly in line with the resource allocation objectives adopted by the Board in B06/05, Policies and Procedures for the Initial Allocation of Fund Resources to:

- strive for a 50:50 balance between mitigation and adaptation,
- maintain a floor of 50% of adaptation funding to the most vulnerable countries (SIDS, LDCs and African states),
- maintain geographic balance and
- maximise private sector engagement

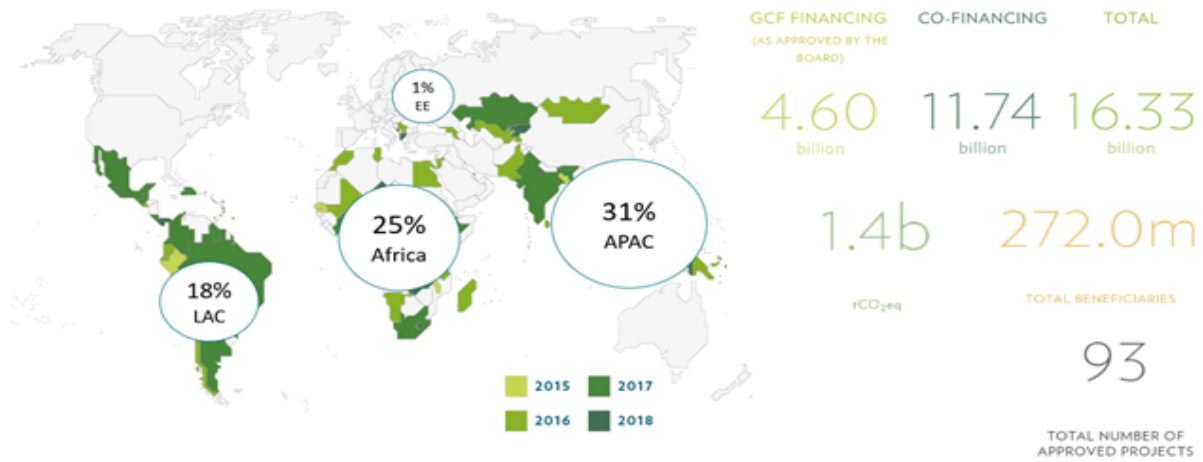
A breakdown of funding by instrument shows that the Fund principally invests through grants and senior loans, with opportunities to increase the use of equity, guarantees and other instruments. The Fund’s programming capacity has been steadily growing, with an average of USD 1.06 billion allocated per Board meeting approving funding proposals in 2018.

In terms of investments per result area, the Fund allocated the largest share of resources in the mitigation results areas in energy access & power generation, followed by buildings, cities and industries. In the adaptation results areas, investments were spread across most vulnerable peoples and communities; health, well-being and food and water security; and infrastructure and built environment. Forestry, low emissions transport and ecosystems services were least represented. Breaking the portfolio down further into sector allocation, private sector investments have a strong track record in the energy sector while public sector investments are more equally distributed across all result areas.

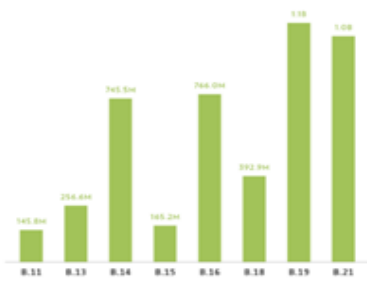




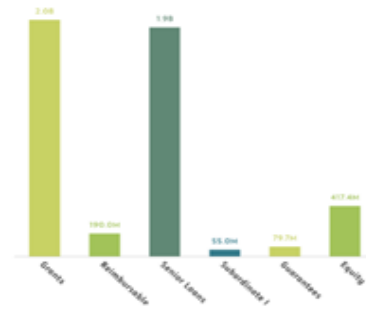
Figure 4.1: GCF Portfolio results over the Initial Resource Mobilization Period (GCF)



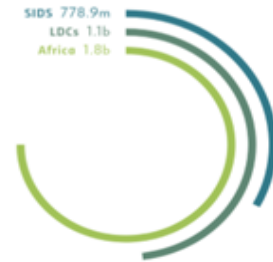
BREAKDOWN OF VALUE BY BOARD MEETING



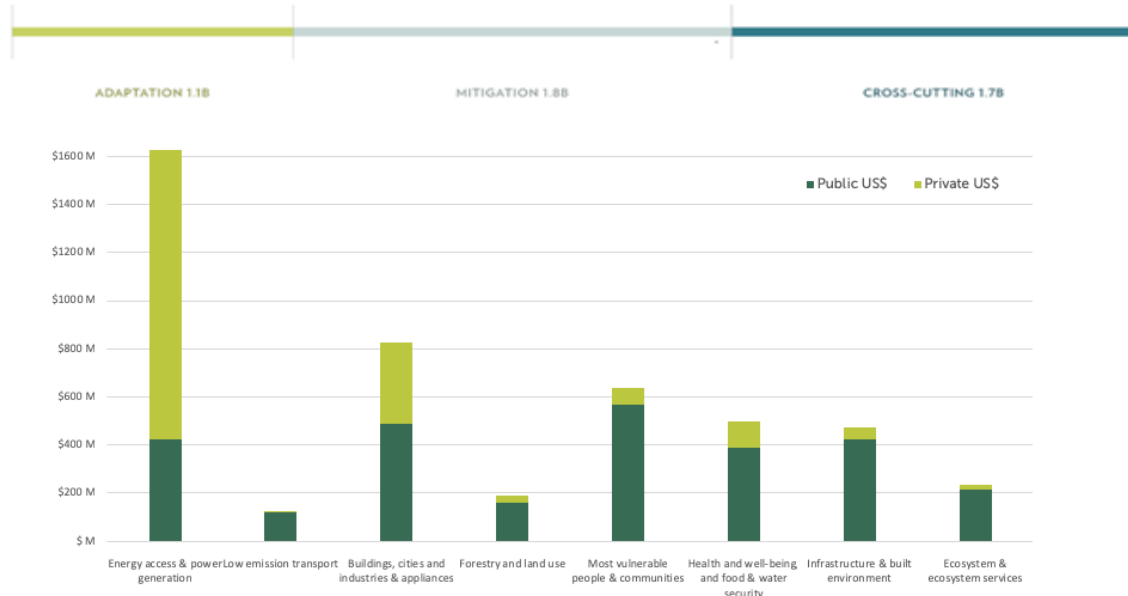
BREAKDOWN OF FINANCIAL INSTRUMENTS



APPROVED PROJECTS VALUE FOR SIDS, LDCs, AFRICA



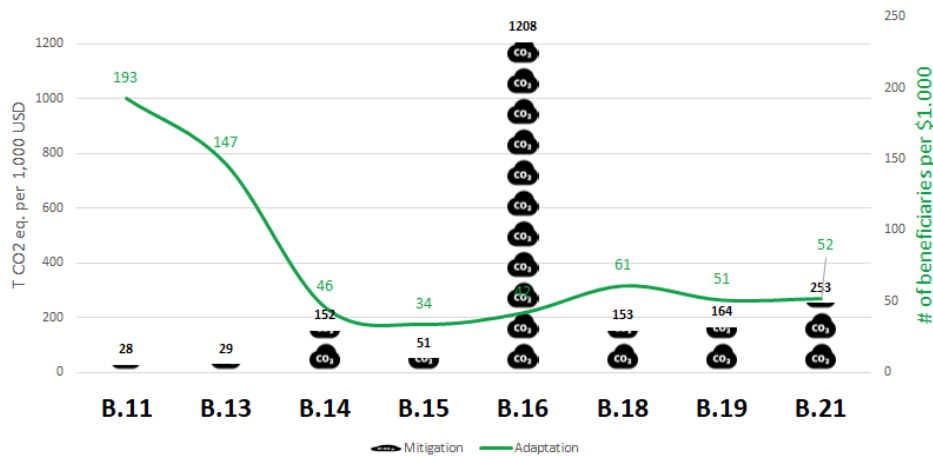
BREAKDOWN OF APPROVED PROJECTS VALUES BY THEME





Further analysis is required to draw a more meaningful picture of the GCF's impact across results areas, and within the context of specific projects and contexts. As shown in the below Figure 4.2, to date, no clear impact trends have emerged across the GCF portfolio. Specific high-projected impact proposals, such as is shown in the B.16 figures, significantly influence the overall picture.

Figure 4.2: Impact per 1,000 Dollar invested over different board meetings, B.11-B.21 (GCF)



Source: Data compiled through GCF iPMS – As of October 31<sup>st</sup> 2018

To develop a picture of the GCF's potential mitigation and adaptation impact for replenishment under a 'Continuing Business' scenario and taking account of the limitations and uncertainties described above, the Secretariat has analysed **performance averages** across the mitigation and adaptation, and public and private sector windows for each billion invested by of the Fund. These are summarised in the table below:

Table 4.1: Breakdown of impact per billion for public/private and mitigation/adaptation windows

Sector	Adaptation (beneficiaries)	Mitigation (Mt CO <sub>2</sub> -e)
Portfolio	150 million	512 Mt
Public	155 million	331 Mt
Private	132 million	646 Mt

Note: The adaptation and mitigation totals include the relevant cross-cutting portion  
Source: GCF iPMS as of October 31<sup>st</sup> 2018

In terms of co-financing (direct, primary), every dollar invested by the GCF is mobilizing on average USD 2.56 in additional resources. Sector wise, public sector projects have an overall co-financing ratio of 2.35, while that of private sector projects is 2.87, as indicated in Table 4.2 below. In terms of impact by funding window, the adaptation co-financing ratio is higher for public-sector investments, while the mitigation co-financing ratio is somewhat similar across sectors. It is important to note that the numbers below don't include the leveraged co-finance (indirect, secondary), which, if were to be included, would increase the private sector ratios significantly, especially on the mitigation side. By



strictly looking at mitigation and adaptation impacts only (incl. cross-cutting), the mitigation co-financing is 3.06, while that of adaptation is 1.73.

Table 4.2: Summary of Co-financing Ratios as of B.21

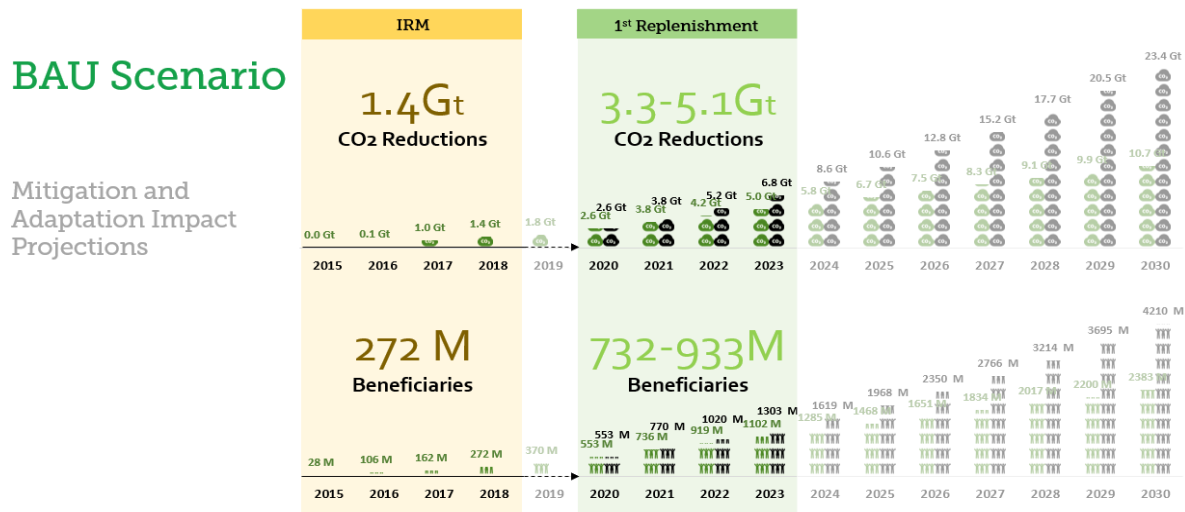
Sector	Portfolio	Adaptation	Cross-Cutting	Mitigation
Public	2.35	1.51	2.24	3.59
Private	2.87	1.02	2.27	3.43
Portfolio	2.56	1.50	2.26	3.51

Source: GCF iPMS as of October 31<sup>st</sup> 2018

### Projecting potential impact for replenishment based on 'Continuing Business'

Extrapolating the above average impact in terms of mitigation, adaptation and co-financing into the period 2020-2023, based on the assumptions outlined above, would result in additional GHG emission reductions in the range of 3.3 to 5.1 Gt, and additional beneficiaries in the range of 732 to 933 million. This is based on the assumed continuation of funding approvals per Board meeting in line with present levels (1.06 x 3 Board meetings / year) and at the trend rate of portfolio growth seen between 2015 and 2018 (i.e. the average of 1.06 – X.XX per Board meeting over the period 2020-2023). As 2019 projected approved funding levels are expected to be capped at \$1.3 billion due to the Fund’s commitment authority being limited at that level, that data point was not included in the analysis.

Figure 4.3: Mitigation and Adaptation impact projections under BAU Scenario



Note: The cumulative impact over the indicative replenishment period (2020-2023) is calculated by subtracting the cumulative impact achieved in 2019 from the cumulative impact by 2023, e.g. 6.8 Gt – 1.8Gt = 5.1 Gt

Source: Analysis by the Secretariat replenishment team



---

## **Limitations, lessons and further work required**

It should be emphasized that the continuing business scenario model gives only an indicative view of potential mitigation and adaptation impact. Even on an assumption of continuing business settings, projected IRM results and performance during the replenishment period would be expected to vary depending on the mix of funding proposals brought forward by countries and entities under a country driven approach and subsequently approved by the Board. Further work on analysing portfolio impact, and progress in implementation and results monitoring, are needed to build higher confidence in impact estimates. And the portfolio of open policy decisions by the Board will influence the Fund's ability to program toward the lower or higher ends of the scenario.

It also is expressly acknowledged that the quantitative impact analysis presented above, based on the Fund's current core indicators, only presents a partial picture of the Fund's overall impact. Beneficiaries remain a limited proxy for measuring adaptation impacts. There are presently insufficient methodological tools to anticipate or measure paradigm shift. Further work is also needed to capture the impact of the Fund's readiness and capacity investments, including in strengthening climate rationale, institutional capabilities, policy frameworks and knowledge.

The Secretariat's analysis under Scenario 1 highlights the urgent need for the Board to re-consider the Fund's results management and MRV frameworks, including the 'Update on the further development of some indicators in the performance measurement frameworks' which will allow for the collection of data which can be used to support a more representative picture of the Fund's impacts through an improved set of indicators. It would also enable the Fund, moving forward, to be more impact-focused especially with regard to data collection, management, analysis and reporting.

## APPENDIX 3: 'Upper Frontier' Scenario

### Introduction

The upper frontier scenario seeks to characterise an ambitious possible pathway for the GCF, by shedding light on what the financial needs are to reduce CO<sub>2</sub> emissions for the world to a level consistent with the goal of the Paris Agreement, keeping global temperature rise well below 2°C and what this implies in the GCF's context. Acknowledging that GCF is only one actor among others intervening in developing countries in the climate finance landscape, the scenario estimates metrics that would see the GCF align itself to a 2°C pathway.

The upper frontier scenario is based on available (limited) data from literature and the GCF, and its results are intended to be illustrative – while the magnitude of forecast results is presented with acknowledgement of uncertainty, the overall direction of results is clearer. The results of this scenario are intended to serve as a reference point only – not to be used in evaluation of individual funding proposals. Even at a portfolio level, there are reasons why the GCF portfolio performance would not necessarily meet these cost-benchmarks, as described in the framing section above.

### Modelling a least-cost pathway to well below 2°C and implications for GCF

The goal of the Paris Agreement is to keep global temperature rise this century to well below 2°C above pre-industrial levels, aiming for efforts to limit the temperature increase even further to 1.5°C. The IPCC's recent Special Report on Global Warming of 1.5°C highlights significant climate change impacts that could be avoided by limiting global warming to 1.5°C compared to 2°C, or more (IPCC, 2018). The report also finds that limiting global warming to 1.5°C would require "rapid and far-reaching" transitions in land, energy, industry, buildings, transport, and cities. Global net human-caused emissions of CO<sub>2</sub> would need to fall by about 45 percent from 2010 levels by 2030, reaching 'net zero' around 2050.

This section presents a global perspective of the finance implications for the mitigation needed to achieve these goals, and the measures needed to adapt to the consequences due to unavoidable climate change, drawing out for GCF purposes the implications for developing countries. Several analyses based on top down global scenario modelling research continue to show that although room is narrowing fast, it is still feasible to successfully achieve a low-greenhouse gas emission transition by 2050 to keep global warming well below 2°C. Most of these analyses suggests that low carbon investments will need to markedly increase if the world is to achieve these agreed goals under the Paris Agreement.

For the purposes of this analysis, the Secretariat reviewed available literature on global incremental financing needs associated with a well below 2°C pathway and investigated what this could mean for the GCF under assumptions comparable to IPCC least cost-effective scenario. .

*Mitigation: Low-emission energy access and power generation, Low emission transport, and Energy efficient Buildings, cities and industries*

Estimates for the financial needs for a low carbon scenario are not available by GCF result area, but it is possible to reasonably disaggregate expected climate finance based on current literature

classifications. As cited above, the Global Commission on the Economy and Climate estimates a business-as-usual infrastructure investment of US\$89 trillion will be required through 2030 worldwide. They also estimate an additional US\$13.5 trillion (additional 15% compare to the BAU) will be needed for this investment to be climate compatible and in-line with 2°C. Their focus was on infrastructure investments which corresponds to three of GCF result areas in mitigation, namely, energy access and power generation, transport, and energy efficient buildings, cities and industries. These estimates translate into annual financial needs in developing countries of US\$ 201 billion, US\$ 192 billion, and US\$ 183 billion respectively <sup>4</sup>.

#### *Mitigation: Sustainable land-use and forestry management*

Agriculture, Forestry and Other Land Use (AFOLU) are responsible for close to a quarter of global greenhouse gas (GHG) emissions: 10–12 GtCO<sub>2</sub>e/year. The international community recognizes this and has set ambitious goals for forest and landscape restoration (FLR), including reaching land degradation neutrality by 2030 (SDG Target 15.3) (FAO and UNCCD, 2015). To reach this objective, the participation of a wide range of investors and FLR stakeholders will be necessary as well as financing that could be more than US\$318 billion for land degradation neutrality per year. In other words, for the result area Sustainable land-use and forestry management, US\$318 billion is needed annually to transition to land degradation neutrality<sup>5</sup>.

#### *Adaptation result areas*

Many countries, cities or communities are not adequately adapted to existing climate risks, subjecting them to a current adaptation gap that is likely to widen if significant efforts are not realized to meet global mitigation goals consistent with 2/1.5-degree C. In the literature, the current adaptation gap is defined as the difference between the current state of a system and a state that minimizes adverse impacts from existing climate conditions and variability.

An assessment of national and sector-based studies concluded that current adaptation costs are in the range of US\$56 to US\$73 billion per year, but by 2030, adaptation costs are likely to be in the range of US\$140 to US\$300 billion per year, and USD 280 and USD 500 billion by 2050 (UNEP, 2016). Taking the average over that period provides an annual adaptation cost of US\$142 billion per year from now until 2030. Unfortunately, no estimates are available by GCF result area, so the estimate provided is for all four GCF result areas in adaptation. As noted previously, adaptation needs and thus finance needs, are emissions dependent. Adaptation costs in 2030 could be higher if mitigation ambition is insufficient to keep the world on a 2°C path.

The challenge of keeping global temperature rise this century to well below 2°C or less and adapting to its unavoidable effects is daunting but not insurmountable. The analysis here points to a total climate investment for developing countries of more than a trillion dollars per year (see table 4.3).

---

<sup>4</sup> According to (McCollum et al, 2018), 64% of total investment will be needed in the developing countries from 2015 to 2030 and beyond. This ratio was used to render a developing country finance value from the global values in the NCE report. Other reports (NCE, 2014; NCE, 2016) have developing country shares between 52% and 70%. McCollum et al share of 64% was chosen as it is recently cited in the IPCC Special report on Global Warming of 1.5 °C (IPCC, 2018) report and as it lies in the middle range of estimates.

<sup>5</sup> This estimate has been adopted in this paper as a default proxy value for the investment needs in developing countries for the AFOLU sector to be consistent with keeping global average warming below 2°C in the absence of more precise data.

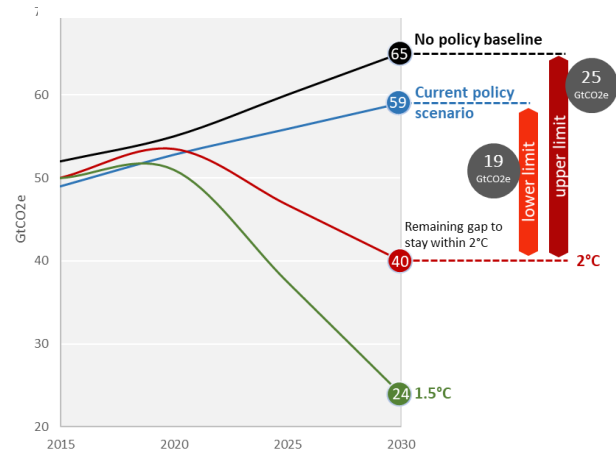




**Table 4.3: Estimated finance needs in a 2°C scenario by result area, 2015 to 2030 and annual**

Result Area	Global 2015-2030	Dev Countries 2015-2030	Dev Countries Annual
<b>Mitigation</b>			
Low-emission energy access and power generation	\$4,702	\$3,009	\$201
Low emission transport	\$4,500	\$2,880	\$192
Energy efficient Buildings, cities and industries	\$4,289	\$2,745	\$183
Sustainable land-use and forestry management	\$4,770	\$4,770	\$318
<b>Mitigation total</b>	<b>\$18,261</b>	<b>\$13,404</b>	<b>\$894</b>
<b>Adaptation</b>			
Enhanced livelihoods of the most vulnerable people, communities, and regions			
Increased resilience of health and well-being, and food and water security	\$3,328	\$2130	\$142
Resilient Infrastructure & built environment			
Resilient Ecosystem & ecosystem services			
<b>Grant Total</b>	<b>\$21,589</b>	<b>\$15,534</b>	<b>\$1,036</b>

**Figure 4.4: emission paths by 2030**



It is clear that the level of finance needed to put developing countries on the path to 2°C, or lower, is well beyond the capacity of the GCF to deliver. The analysis is however illustrative for the GCF, because if the world is to reach the Paris Agreement goals, climate finance actors in the landscape will need to be striving to shift flows in line with the well below 2°C target. In other words, the GCF, as well as other public and private finance entities, would target mitigation impact that aligns with delivering the 2°C goal.

Figure 4.4 presents the global greenhouse gases in 2030 by emissions path. Currently, the world is on an emission path between a *no policy baseline* of 65 GtCO<sub>2</sub>e per year and a *current policy scenario* of 59 GtCO<sub>2</sub>e per year by 2030 with a goal to reach 40 GtCO<sub>2</sub>e per year on a path to 2°C by 2030 (UNEP, 2018). This leaves us with gap of 19 to 25 GtCO<sub>2</sub>e per year. By dividing the climate finance needed to put the world on a path to 2°C by the expected emissions gaps of 19 to 25 GtCO<sub>2</sub>e per year, we obtain an upper and lower metric for which climate finance actors, such as the GCF, should target for all to be consistent with a 2°C pathway. The upper and lower limits are US\$ 812/tCO<sub>2</sub>/year and US\$ 1,069/tCO<sub>2</sub>/year<sup>6</sup>. In other words, if all climate finance actors set a mitigation target between these metrics, our common path to a 2°C will be more likely attainable. The GCF’s performance as measured by the total finance for mitigation projects in the portfolio over the expected annual mitigation is at a higher cost of US\$ 1,452/tCO<sub>2</sub>/year<sup>7</sup> or 512 MtCO<sub>2</sub> per billion dollars invested.

<sup>6</sup> From table 4.3, developing country climate finance needs for the years 2015 to 2030 are US\$13,404 billion. This figure is divided the developing country portion of the emission gap (25 GtCO<sub>2</sub>) x (developing country share of 66%). So for the upper limit, the metric is calculated as (13,404) / (25 x 0.66) = 812. Similarly, for the lower limit, (13,404) / (19 x 0.66) = 1069. This is total finance for 15 years over annual emissions. This was chosen because there is no annual GCF finance for projects, so we compare total GCF finance by project to annual emission mitigation.

<sup>7</sup> This metric is calculated by dividing the total finance (GCF and co-finance) for a project by the expected annual emission reduction for mitigation projects only.

## Projecting potential impact for replenishment based on the ‘Upper Frontier’

If the GCF wished to pursue impact targets consistent with a cost-effective pathway to 2°C, it could improve its mitigation results per dollar, or increase its co-finance ratio, thereby increasing the overall impact, or a combination of both strategies. Table 4.4 displays a few alternatives for these combinations of strategies and although these estimates are based on the GCF’s performance during the IRM period, they should be viewed as illustrative.

Currently, the GCF generates USD 3.06 billion in additional co-financing for every billion dollars it invests in mitigation projects. If it were to maintain this ratio, it would have to improve its mitigation impact results between 42% and 84% to be consistent with cost effectiveness estimated to be consistent with the 2°C. Conversely, if the GCF wanted to maintain mitigation impact, it would have to improve its co-finance ratio by 4.9 to 6.7 for mitigation projects. It could, of course, decide to both improve its co-finance ratio and its mitigation impact results as illustrated in alternatives 2 and 3 on table 4.4

**Table 4.4: alternatives for improving the co-finance ratio or mitigation impact results**

	Co-Finance ratio	Improved mitigation results from baseline scenario US\$ 812/tCO <sub>2</sub> /year	Improved mitigation results from current policy trajectory scenario US\$ 1069/tCO <sub>2</sub> /year
Current to B21	3.1	<b>Upper limit</b>	<b>Lower limit</b>
Alternative1	3.1	84%	42%
Alternative2	3.5	75%	33%
Alternative3	4.0	64%	21%
Alternative4	4.9	43%	0%
Alternative5	6.7	0%	

Figure 4.5 illustrates the impact on mitigation if the GCF were to pursue a policy of increasing its co-finance ratio or improving its mitigation results in-line with estimated cost effectiveness associated with a 2°C pathway. Assuming the same GCF funding as under the BAU scenario (scenario 1), the GCF could expect cumulative mitigation results of 5.1 to 9.6 GtCO<sub>2</sub>, or 716 - 1,111 MtCO<sub>2</sub> per billion dollars invested by the GCF over the 1<sup>st</sup> replenishment period. This is an improvement over the BAU scenario which could expect cumulative mitigation results of 3.3 to 5.1 GtCO<sub>2</sub><sup>8</sup> or 512 MtCO<sub>2</sub> per billion dollars invested. The adaptation results are assumed to be the same under both scenarios.

<sup>8</sup> The graph illustrates the cumulative CO<sub>2</sub> reductions over time under an upper and lower limit consistent with a 2°C pathway. The range of 5.1 to 9.6 GtCO<sub>2</sub> is the isolated CO<sub>2</sub> reduction for the 1<sup>st</sup> replenishment period and is evident by subtracting 6.8 and 11.4 respectively in 2023 by the cumulative CO<sub>2</sub> reduction from the GCF’s IRM in 2019.



Figure 4.5: Mitigation impact projections under 2°C frontier and BAU



Note: The cumulative impact over the indicative replenishment period (2020-2023) is calculated by subtracting the cumulative impact achieved in 2019 from the cumulative impact by 2023, e.g. 11.4 Gt – 1.8Gt = 9.6 Gt

Source: Analysis by the Secretariat replenishment team

### Working at the frontier on adaptation

The upper frontier described above includes estimated financing needs for adaptation based on a 2-degree scenario, where the intensity and frequency of extreme events continue to increase, but the world avoids the most catastrophic impacts of climate change.

Working “at the frontier” on adaptation depends, however, on planning for a range of different potential temperature scenarios, variable climate impacts and associated adaptation needs. Attaining an upper frontier for mitigation would also optimise adaptation outcomes, by reducing climate impacts and the associated need for adaptation investments. The IPCC SR1.5 report emphasised, for example, that the difference between a 1.5 and 2°C pathway is material to reducing climate risk. If the mitigation upper frontier is not achieved, the world will need much more far-reaching adaptation investments.

Global adaptation costs are projected to be broadly similar between scenarios up to 2040 but diverge strongly by the end of the century. Costs could be multiple times higher by 2050 under a 4°C scenario, compared to a 2°C scenario. For example, Hof et al. (2014) reports that global adaptation costs without mitigation (>4°C) will be about five times higher than a 2°C scenario by the end of the century. Below an illustration of impacts could vary under higher degree of temperature warning.

Although there is very little evidence on the costs of adaptation for a 1.5°C scenario, it could be expected that the costs of adaptation should be lower for such a scenario. Economic losses are also projected to increase exponentially if the world ends up following higher temperature pathways.



Figure 4.6: Illustration of climate impacts under different temperature scenarios (IPCC, 2007) <sup>9</sup>

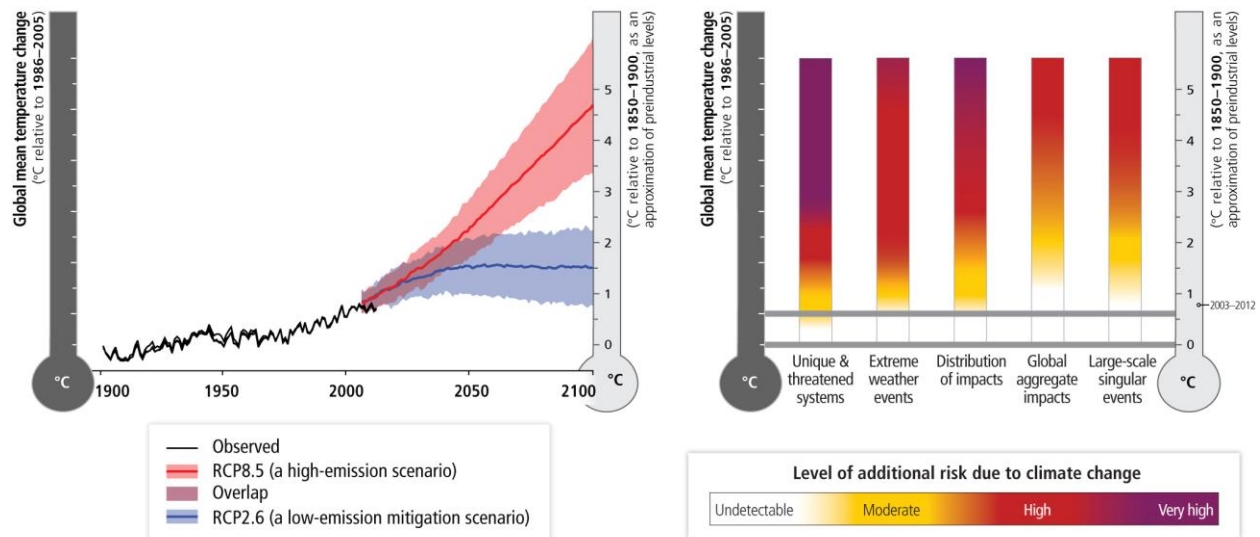
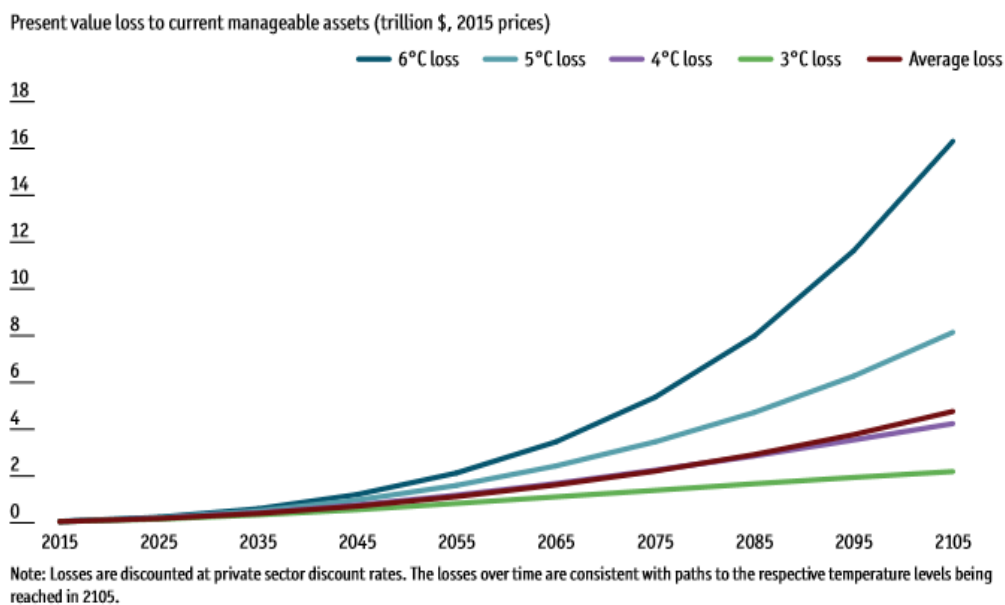
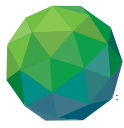


Figure 4.7: The cost of inaction: Recognising the value at risk from climate change, The Economist Intelligence Unit, 2015



<sup>9</sup> Author: (IPCC, 2007) A global perspective on climate-related risks. Risks associated with reasons for concern are shown at right for increasing levels of climate change. The color shading indicates the additional risk due to climate change when a temperature level is reached and then sustained or exceeded. Undetectable risk (white) indicates no associated impacts are detectable and attributable to climate change. Moderate risk (yellow) indicates that associated impacts are both detectable and attributable to climate change with at least medium confidence, also accounting for the other specific criteria for key risks. High risk (red) indicates severe and widespread impacts, also accounting for the other specific criteria for key risks. Purple, introduced in this assessment, shows that very high risk is indicated by all specific criteria for key risks. [Figure 19-4] For reference, past and projected global annual average surface temperature is shown at left, as in Figure TS.5. [Figure RC-1, Box CC-RC; WGI AR5 Figures SPM.1 and SPM.7] Based on the longest global surface temperature dataset available, the observed change between the average of the period 1850–1900 and of the AR5 reference period (1986–2005) is 0.61°C (5–95% confidence interval: 0.55 to 0.67°C) [WGI AR5 SPM, 2.4], which is used here as an approximation of the change in global mean surface temperature since preindustrial times, referred to as the period before 1750. [WGI and WGII AR5 glossaries]



It is also important to note strong differences in regional residual damage and adaptation costs, which are masked if global studies alone are considered. The distribution of damage and adaptation costs will remain profoundly unequal, irrespective of the stringency of the mitigation effort and the possibility of adapting to climate change. The timing of mitigation also influences adaptation costs and residual damage (Admiraal et al., 2015).

As the GCF is mandated to maintain a balance in its mitigation and adaptation investments, the task for the Fund in “working at the frontier” on adaptation is to help countries plan to minimise the impacts of climate change across a range of credible temperature scenarios. This means working with countries on adaptation investments that will reduce risk, minimise losses and more fundamentally, encourage change in systems, policies and behaviours to build resilience.

For transformational change, adaptation interventions will need to be designed at systems level - not just address specific areas of risk and vulnerability – and be based on aligned policies, legal and institutional frameworks, as well as national budget decisions. The design of interventions to protect people’s lives, livelihoods and health would optimally consider benefits and trade-offs, and look in an integrated way at adaptation and mitigation impacts. Investment in climate information and effective adaptation policy and planning processes would be the foundation for this – without which adaptation costs would be expected to be much higher.

Additional adaptation metrics are needed to calibrate the Fund’s adaptation impact, beyond the number of beneficiaries. More granular information is needed on people’s income levels and livelihoods, mortality, life expectancy, water security, food security and nutrition, with baselines and projections of climate impacts on these metrics where possible, related to and building upon development metrics as measured through the SDGs. Adaptation impact could then be tracked through improvements in these specific metrics relative to the projections, and including broader measures of vulnerability and resilience. Finally, adaptation in the enabling environment could be tracked through climate-related adjustments as tabled in national and sectoral policies, plans and budgets.

### **Limitations, lessons and further work required**

The upper frontier faced data limitation from the literature and from the GCF. Every attempt was made to maintain a robust analysis, but its predictions are intended as illustrative. However, although the magnitude of the forecasted results may be tentative, the direction of the results is more certain.

As noted above and in the framing section, there are reasons integral to the GCF’s mandate and business model as to why GCF portfolio performance may not align with global cost-effectiveness benchmarks. This scenario is accordingly presented as a reference point scenario to indicate a potential ‘direction of travel’ for the GCF. The results of this scenario are expressly not intended to be applied in the assessment of individual funding proposals.

## APPENDIX 4: Pursuit of Impact

### Cross-cutting considerations

Three overarching objectives can guide GCF's pursuit of impact during replenishment. Firstly, GCF can build on its current portfolio and pursue an integrated model of investments that aim to create, organize and develop value chains for systemic change. This would require a strengthened scope of readiness support to countries to underpin institution- and knowledge- building and integrated planning; the creation of communities of knowledge and communities of practice for results areas; the selection, targeting and development of projects and programmes that pro-actively build resilient value-chains; and operational modalities that incentivize ease of access to GCF resources.

Second, GCF can help countries strengthen the enabling environment for mitigation and adaptation and build well-functioning markets for sustained impact at the country level. This would require capacity building of NDAs and other stakeholders and enabling effective policy, institutional and regulatory frameworks that pave the way for transformational climate interventions. Financial systems, social protection, the insurance landscape, climate risk and information sharing, access to micro-finance, and support to aggregator platforms are all aspects where GCF can play a distinct and catalytic role.

Thirdly, GCF can leverage impact by mobilizing partnerships and crowding in capital from climate finance providers that can help build scale. Scenario 3 highlights, at a sectoral level and in alignment with IPCC recommendations and country needs and priorities, where GCF sees its greatest potential for impact, paradigm shift and value creation through key supported interventions. Annex I further outlines concrete interventions which can generate paradigm shift in key sectors focusing on systemic shifts, building enabling environments and mobilizing finance and partnerships.

### Results Area analysis

#### *Forests and Land Use: Demonstrating how to shift incentives in the forest landscape value chain*

Forests and land use represent a critical sector for achieving low-cost and near-term emissions reductions. Agriculture, Forestry and Other Land Use (AFOLU) are responsible for close to 25% of global GHG emissions, of which forest represents 12%. Forests also play an important role in preserving the water cycles that regulate global and local climate. High co-benefits are associated with conservation and restoration of forests. While a high priority for forest countries, particularly in Latin America, Africa and South East Asia, forest sector investments remain underrepresented in GCF's current portfolio. Forests represent an opportunity for climate impact in mitigation through carbon capture and storage, and in adaptation through improved land use and management of forest-adjacent lands, as well as livelihood support for communities reliant on forest systems.

Paradigm shift requires a redefinition of the economic relationship between forests and development to slow, halt and reverse loss of forest cover and forest carbon. This will involve investments to address drivers of deforestation that consider forests as part of a wider landscape approach, looking in parallel at food and agriculture value chains. Government actors will play a vital role by establishing and enforcing necessary enabling environments. Equally important is the involvement



of local communities, indigenous peoples, civil society organizations and the private sector to scale action and drive change.

Key interventions to drive impact will include promoting country-owned, cross-sectoral and landscape level planning, supporting regulatory frameworks (including land rights) and stakeholder engagement, and investments to shift forest value-chains through incentives for afforestation and REDD+, including agroforestry. Agroforestry can support retaining forest cover, as well as partial reforestation of deforested areas, while supporting livelihoods of the people settled in the deforested areas. GCF has key levers to pursue this through its country-driven approach, readiness activities and by leading collaboration to deploy investments in complement with other sources of REDD+ funding. In particular, GCF is uniquely placed to realize the potential of the UNFCCC REDD+ framework through its support for results-based payments, while developing prototype private sector investments and supporting the evolution of markets for REDD+. GCF can also incentivize securing high carbon content in indigenous territories, developing the enabling environment for transformation through partnerships in policy formulation, sector planning and value creation, and incentivizing regional interventions to achieve impact.

### ***Energy Generation and Access: Opening markets and catalysing scale***

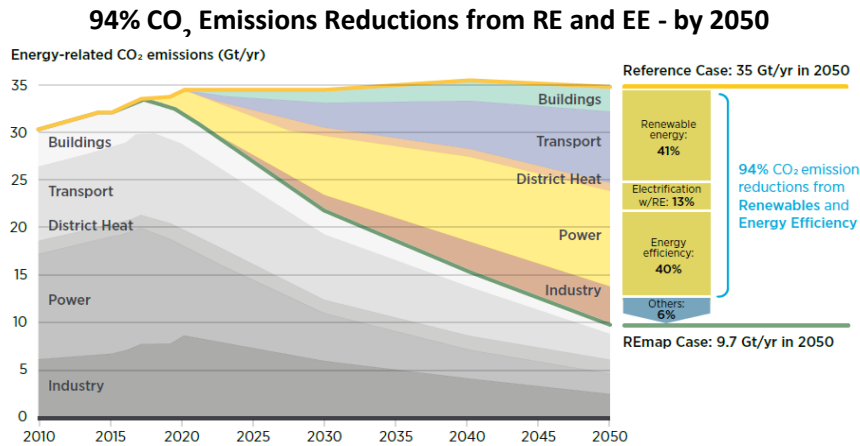
Climate compatible pathways depend on urgent decarbonization of world energy supply, requiring both the turnover of existing energy stock and ensuring that new infrastructure built to meet the world's rising energy demands is zero carbon. Developing low-carbon and renewable energy systems is almost universally identified as a priority for action in developing countries NDCs and is strongly represented in the GCF pipeline. It is estimated that CO<sub>2</sub> emissions reductions of up to 9.7Gt/yr by 2050 are achievable from renewable energy and energy efficiency improvements. Energy generation and access are currently well represented in GCF's portfolio however a vast scaling up in deployment of wind, solar, hydropower, geothermal and other renewable generation is still required globally, including to provide clean energy to people who currently lack energy access. Energy storage solutions and other technologies represent areas for further growth and innovation.

Paradigm shifting impact in this sector relies on continuing reductions in technology costs, an aggressive shift in planning and policies toward renewables, and the spread of investment at scale, particularly private-sector driven investment. While MDBs and other concessional lenders are active in this sector, the GCF, particularly through its private sector facility and de-risking instruments, has a critical role to play in proving investments in countries where markets are nascent or least mature, providing appropriate institutional, planning and policy support to build the public sector's focus on clean energy access and generation mix, mobilizing institutional investors to scale up impact, and advocating for removal of fossil fuel subsidies, while creating subsidies for renewables.

In least developed countries, to bridge the gap in energy access GCF investments can help create access to clean energy, utilizing smart grids and efficient distribution methods, and demonstrating potential to scale. GCF can also provide incremental funding for power infrastructure resilience building. Concurrently, GCF can promote investment opportunities in technology, storage, digitization and innovation seeking to deploy its concessionalality to make technically sound projects economically viable and investable. Carbon Capture and Sequestration (CCS) is another potential area of investment, including through monitoring and CO<sub>2</sub> re-use in high emission energy sources or industrial applications. CCS projects are often constrained by the low economic cost-benefit of earlier



approaches, and low level of new investment in CCS owing to a shift in focus to renewable energy, but pilot projects could support innovation in the technology.

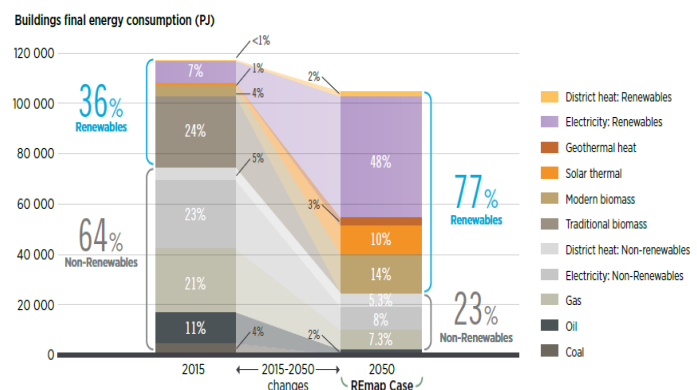


Gielen, Dolf. (2018). GLOBAL ENERGY TRANSFORMATION - A Roadmap to 2050.

**Energy Efficiency: Potential for policy and investment partnerships**

Despite significant global potential, low cost emissions reductions through energy efficiency improvements have proven difficult to capture in many jurisdictions. Support for energy efficient pathways in buildings, industries and appliances can take various forms, and unlock significant financial savings and emissions reduction potential. GCF involvement in energy efficiency to date has been through stand-alone projects, credit line development and subsidized investments into key projects. While the GCF can continue working with entities to deliver these kinds of investments, greater paradigm shift is achievable through developing the enabling environment for energy efficiency at the country level, influencing market development and government subsidies, upscaling energy efficient equipment uptake and influencing emissions reduction through behavioral change.

**Buildings Final Energy Consumption Reduction by 2050**



The GCF can pursue impact in this sector by working with countries to build enabling environments through both readiness funding and technical support frameworks, and by working in partnership with organizations that have developed energy efficiency in tandem with regulatory and policy shift. Similarly, GCF can promote innovation in technologies for energy efficiency, such as refrigeration and cooling, and in financial products for projects and facilities that target impact at scale.

***Buildings, Cities, Industries & Appliances: A cities challenge***

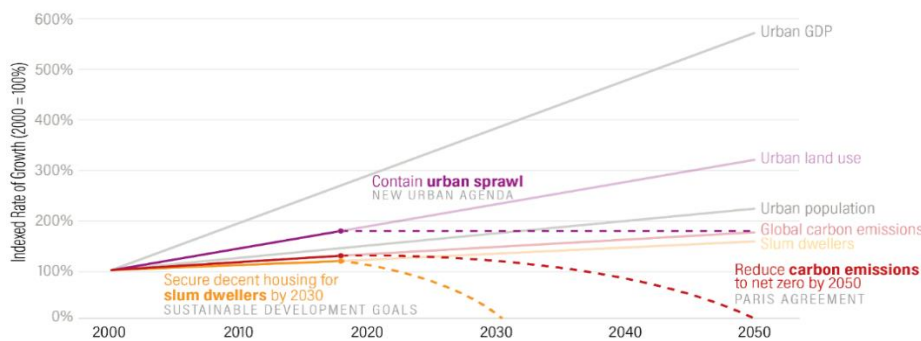
Cities are a locus of economic activity, demographic growth, GHG emissions and climate vulnerability. Cities are also a critical source of innovation and impact in building resilience of economies, communities and societies through adaptation and reduced vulnerability to climate-induced disasters. Investments in the urban sector are widely identified as a need in developing countries’ NDCs and national plans, and cities require financing at scale to program integrated interventions. Building on its current portfolio of urban investments, GCF has potential for a highly significant programmatic pipeline with sizeable investment volume and climate impact.

Paradigm shift in the context of cities requires integrating urban planning, regulation, governance and codes and developing dedicated sub-national financing facilities. Paradigm shift also requires emissions reductions and resilience-building through green buildings, urban mobility, multimodal transport systems, green infrastructure, and water and waste management investments.

Key interventions by GCF would seek to embed urban greening and resilience action into NAPs, into readiness support, and in donor supported project preparation facilities. Cities would also be a key impact area for attracting private sector investment to build scale and replication of successful interventions. GCF could seek to unlock highest impact approaches via a ‘Green Cities Challenge’ call for funding proposals, project preparation funding for cities projects, and by supporting innovation in financing through guarantee facilities that enhance the economic profile of urban interventions.

**Buildings, Industries & Appliances: Emissions Reductions Potential by 2030**

**Reaching 3 Global Goals Means Major Change for Cities**



*Notes:* This graph is for illustrative purposes only, showing 2050 trajectories for select indicators and what’s needed to reach relevant global goals. **Urban GDP** is for the world’s 750 largest cities. An increase in **urban sprawl** is almost inevitable, but should be managed and minimal. **Net global carbon emissions** are used as a proxy for urban emissions. **Slum dwellers** includes developing regions only.

*Sources:* Angel et al., 2011; Oxford Economics, 2015; UN DESA, 2014; UN Habitat, 2016; World Bank, 2017

Sector <sup>10</sup>	Category	Emission reduction potential in 2030 (GtCO <sub>2</sub> eq)	Aggregate potential (GtCO <sub>2</sub> eq)
----------------------	----------	---	--

<sup>10</sup> Table ES 1: Overview of emission reduction potential in 2030 (GtCO<sub>2</sub>eq per year)

BUILDINGS	New Buildings	0.68 – 0.85	1.9 (1.6-2.1)
	Existing buildings	0.52 – 0.93	
	Renewable heat – bio	0.39	
	Renewable heat – solar	0.21	
	Lighting	0.67 (indirect emissions)	
	Appliances	3.3 (indirect emissions)	
INDUSTRY	Energy Efficiency - indirect	0.68 – 0.85	5.4 (4.2 – 6.6)
	Energy Efficiency - direct	0.52 – 0.93	
	Renewable heat	0.39	
	Non CO <sub>2</sub> greenhouse gases	0.21	
	CCA	0.67 (indirect emissions)	

***Transport: Supporting planning to reach untapped potential***

Climate impact from mitigating GHG emissions from the transport sector globally is significant. While well represented in NDCs as an area of investment need, the sector remains under-represented in GCF’s portfolio and therefore presents a critical area for growth. Current research shows that urban passenger, intercity and road or rail emissions represent the highest share of emissions in the sector.

Paradigm shift in the sector therefore requires holistic urban mobility planning to enable planning for a low-cost and low emissions future and shift towards multimodal transport strategies needed. Paradigm shift also requires widespread electrification, and fuel and technology alternatives that in turn rely on a reduction in technology costs. Key interventions for GCF could focus on supporting new technologies, multi-modal and low carbon transport systems, and project design that incorporates holistic planning principles, and supports behavioural changes to allow systemic change in the transport sector.

**Pursuit of action to reduce vulnerabilities and build resilience**

***Climate Information and Early Warning Systems: building the foundation for climate investments***

Climate information and early warning systems provide the critical, cross-cutting basis for delivering adaptation, as well as mitigation interventions for developing countries across all sectors and result areas. It is estimated that weather related losses in 2017 amounted to approximately USD 320 billion, with particular impact in SIDS, LDCs and countries often ill equipped to plan for loss-avoidance through early warnings. Action in this space has measurable impacts across sectors, particularly those supporting agriculture, food security, livelihoods and resilience-enabling services. This impact is realised by developing partnerships with stakeholders and end users of the climate products and services. For example, climate services need to reach end-users such as farmers and fishers, with products that they can understand and apply.

Paradigm shift in climate information and early warning systems requires the design and implementation of end-to-end multi-hazard early warning systems, moving from existing capital-



based infrastructure to service-oriented approaches, and supporting monetization of climate information services. Estimates show that climate investments can achieve returns of 1:3-40, demonstrating the commercial opportunity present in climate services.

The GCF is already building partnerships to lead the way in this space. Key interventions would promote partnerships with the scientific community, technology providers and private sector to deliver quality services across the climate services value-chain. GCF can also support country uptake of updated data models and innovative technologies and inform data-driven weather insurance and other financial services solutions. GCF interventions can also support air pollution forecasting to impact health indicators, and strengthen the monitoring, valuation and reporting of GHG for the NDC global stock-take. Climate information and early warning systems present a core area of impact, disaster risk reduction benefits, paradigm shift and transformation for GCF through the replenishment period.

**Socio-Economic Benefits of Meteorological and Hydrological Services Benefit Estimates by Sector<sup>11</sup>**

<b>Energy</b>	<b>100%</b> increase in net weekly income for wind energy producers in Europe with medium-range forecasts <b>\$1-6.5 billion</b> in decadal hydropower benefits for Ethiopia with perfect ENSO-based precipitation forecast
<b>Transportation</b>	<b>\$11 million</b> in avoided costs of carrying extra fuel for Qantas Airlines in Australia due to improvements in terminal aerodrome forecast information <b>\$56.1-60.1 million</b> in avoided costs to Swiss economy with use of weather services in the transportation sector
<b>Water</b>	Up to <b>11.6 million</b> in annual welfare benefits with perfect ENSO forecasts in the Northern Taiwan regional water market <b>\$100-350 million</b> in annual benefits to Georgia in drought years with the use of water management strategies based on precipitation index forecasts
<b>Fisheries</b>	<b>\$901,000</b> in average annual total welfare benefits related to Pacific Coho salmon fishery with use of perfect ENSO forecast

***Agriculture and Food Security: Shift to climate resilient agriculture, while insuring against risk***

Agriculture, including farming, livestock, aquaculture and agricultural work, provide the main source of livelihoods, food and incomes for 78% of the world’s poor people living in rural areas, and is also highly vulnerable to climate hazards, in particular rainfall variability. Food production will need to increase by 70% by 2050 to meet the demand of a growing more urbanized population, presenting a critical challenge for both resilience and emissions, with expanding agricultural production also a key driver of deforestation and forest degradation. Between 2005 and 2015 natural disasters cost the agricultural sectors of developing countries \$96 billion in damaged or lost crop and livestock production. Not surprisingly, 93% of developing countries include adaptation in agriculture as a top priority in their NDCs. In GCF current portfolio (B.11-B.20), 750 million or 20% of total financing is allocated to agriculture projects, with funding focused on Africa and LDCs.

<sup>11</sup> Sources: Roulston et. al. 2003, Block, 2011; Weiher et. al. 2005, Frei et. al., 2012; Costello et. al., 1998; Quiroga et. al., 2011; Steinemann, 2006; Anaman et. al., 1997; Ebit et. al., 2004

Paradigm shift in agriculture and food security requires planning and developing climate resilient and low emissions agricultural value chains, in alignment with countries' development pathways. To achieve scale, it will be necessary to reorient domestic financing to agriculture and incentives to resilient agriculture and to deploy the technical and financial capacities of international and domestic finance providers. Participation of local communities and indigenous peoples in innovating and implementing technologies and practices will also be critical. For harvesting mitigation benefits, changes in farming practices, better grazing land management, and restoration of degraded lands can reduce GHG emissions at low costs. On the supply side, changes in diet and reduction in food losses and wastes have significant mitigation potential.

Key interventions for GCF in this sector will seek to leverage the role of aggregators, including farmers cooperatives and national financial institutions. GCF can seek to unlock finance and innovation through, for example, a programme of financing for agricultural productivity impacted by climate change, bringing in public and private sector involvement to transition to resilient staple and cash crops, livestock, aquaculture, and promote agroforestry. GCF can also deploy at scale climate information and services tailored for agriculture and agricultural insurance products that enable risk-management and build resilience of communities vulnerable to the impact of climate change on agriculture and livestock. The GCF could encourage planning of interventions that integrated agricultural water management, working at landscape/watershed scale.

***Water security: Pursuing integrated water resources management and private sector participation***

Water security is the capacity of a population to safeguard sustainable and resilient access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability.

Water is a very high priority for adaptation in developing countries, with widespread cross-sectoral impact, and particularly significant for SIDS, water-scarce and drought-prone regions, fragile mountain environments, coastal and delta regions, as well as megacities. Most developing countries face water-related challenges, either due to sea level rise, melting glaciers and permafrost, changing rainfall patterns and extreme events, floods, or droughts and desertification. Significant challenges need to be addressed in water resource management, efficiency of use, agricultural irrigation practices, wastewater treatment and sanitation. It is estimated that there will be a 40% gap between water demand and water availability by 2030, exacerbated by climate change. It is evident that achieving SDG targets on water should be pursued in synergy with climate investments.

Paradigm shifts towards climate-smart water management will require a range of actions across the whole water sector. These include ensuring water use efficiency and demand management; cross-sectoral water management at basin level with conjunctive use of rainwater, surface water and groundwater; as well as innovative financing and technology. Substantial co-benefits can be realised through landscape approaches prioritising ecosystem integrity, as the retention of water in the landscape facilitates carbon capture and storage in soils and vegetation, as well as moderating temperatures and buffering against floods and droughts. All these actions need to take place within a stable governance system that provides an effective enabling environment for change to take place. GCF interventions in the water sector aim to promote integrated water resource management (IWRM), ensuring a synergistic approach to tackling the water-energy-food security nexus.



Furthermore, GCF can aim to stimulate private sector investment in water resources development and in water supply and sanitation, focusing particularly on LDCs and SIDS. GCF also supports the scaling-up of innovative technologies and financing models for water management.

***Ecosystems and Ecosystem Services: Accounting for nature-based solutions***

Ecosystems support human livelihoods and are a critical buffer against climate shocks. Temperatures rise above 2 C presents a risk of extinction of species and inability of ecosystems to adapt. The most severe impacts are expected to be on coastal ecosystems and semi-arid areas, causing increased desertification. Moreover, the loss of ecosystems services endangers livelihoods.

Paradigm shift in this area requires mainstreaming ecosystem-based adaptation, adopting nature-based solutions, and integrating ecosystems services assessment into national planning through Natural Capital Accounting. Key interventions for GCF include capacity building for the explicit quantification, valuation and attribution of ecosystems services in investment proposals. GCF interventions can also focus on mitigation impact through carbon sequestration in peatlands, mangroves and other coastal ecosystems, and semi-arid grasslands, implemented by better land management at the watershed and landscape levels, , and expressed by the identification and development of mitigation co-benefits in adaptation projects.

***Infrastructure: Shifting investments from ground zero***

Increasing populations and urbanization is placing significant demands on existing infrastructure and creating an urgent need for new infrastructure to be built that meets the needs of growing populations and is, by design, well adapted to the impacts of climate change. Trillions will be invested in infrastructure over the coming decades, with the challenge for paradigm shift being to ensure that these investments take full account of climate risks as well as emissions impact.

Infrastructure projects among IFIs and other actors focus both on mitigation and adaptation aspects. However, they do not fully incorporate climate rationale methodologies, which possibly results in lock-in of climate vulnerable infrastructure. Only GEF incorporates the concept of incremental costs for adaptation in its projects; however, this has not been fully applied to the resilient integrated infrastructure sector. Additionally, there is no value-chain approach used within project preparation methodology consistently across MDBs.

Paradigm shift in infrastructure requires embracing a value-chain approach that is centred on a clear climate rationale, resilience and incorporates available ecosystems-based adaptation options. This approach can enable designing of more resilient and complex infrastructure systems involving ports, airports, roads, and coastal integrated built-in structures. Paradigm shift will also require developing and incorporating methodologies for project development that systematically seek to crowd-in private sector capital and expertise. In prioritizing key interventions in this sector, GCF can support climate proofing codes, policies and regulations that incentivize adaptation measures. Interventions would also prioritize better integration of planning, implementation, and operations and maintenance arrangements in projects. GCF can also support demonstration projects and programs that work along the infrastructure value chain and seek to build resilience through complementary initiatives rather than stand-alone interventions.

### ***Health and Well Being: Integrating consideration of health impacts***

Climate change has the potential to impact health and well-being of global populations, exacerbating strains on vulnerable populations, compromising economic productivity of countries and in cases, reversing the development gains achieved in recent decades. Accordingly, there is strong global need for well-being to build resilience and sustainability.

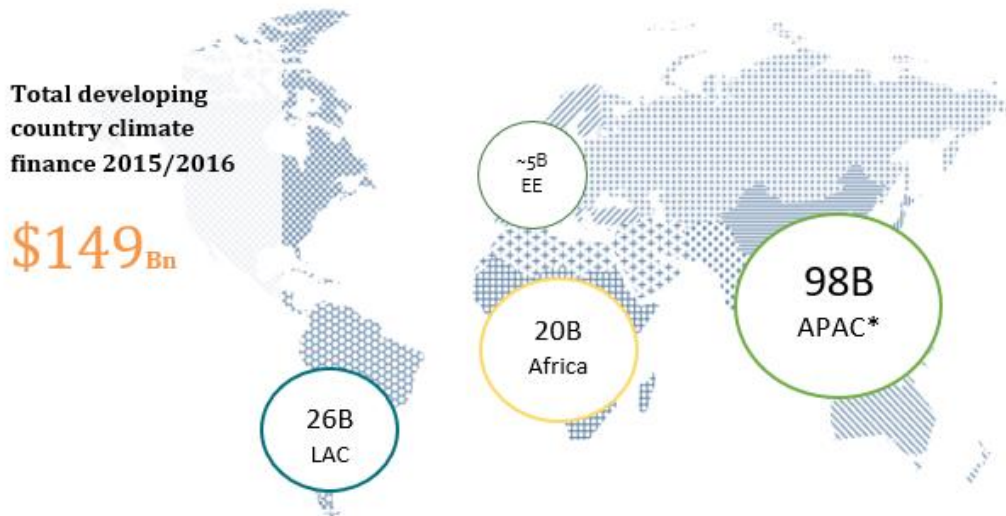
Paradigm shift in health and well-being requires mainstreaming health considerations in adaptation and mitigation policies. In addition, it requires a focus on equity and inclusiveness such that universal health coverage remains available despite climate change impacts. Key interventions by GCF would seek to promote partnerships for whole-government approaches, support disaster-risk insurance applications for health, and integrate climate and health in early warning systems. Critically, GCF can ensure that economic and social benefits of integrating health and well-being considerations are appreciated beyond the project sphere of influence.

### **Shifting financial flows**

As highlighted in the section on the global finance landscape and developing country needs, engagement of the private sector and shifting broader financial flows will be essential to meeting the challenge of financing paradigm shift to underpin low carbon and climate-resilient development. At the country level, the mobilization of private capital can promote transformation of economic sectors primarily in private hands, discouraging GHG lock-in and maladaptation. As a multiplier of domestic public spending, it can increase policy effectiveness and increase fiscal sustainability by freeing up tax revenues for more needy sectors. Globally, private capital is essential to redirect existing flows of funds to low carbon activities and unlock new sources of capital for climate compatible development.

As of 2015/2016, only about 32 % (USD 149 billion) of annual global climate finance flows are currently invested in developing countries (see Figure below).

### **Figure X: Global Climate Finance flow by region, 2015/2016 annual average**



\* Excluding China, which alone invested on average USD 103 Bn in 2015/2016: Source: CPI 2018

**Barriers and private sector needs**

In order to scale up climate investments, the underlying causes of private sector underinvestment need to be addressed. In many of developing countries, more advanced markets as well as LDCs and SIDS, high investment risks – both real and perceived – are still very common. Investors face difficulties in funding bankable climate projects due to narrow capital markets, regulatory ambiguities, long lead times and a wide range of commercial and political risks. Standard investment practices have proven inadequate in mitigating such risks. Thus, accomplishing green growth objectives will entail identifying – and scaling – innovative approaches to project structuring and risk mitigation in order to attract significant funds from commercial and institutional investors. Table X breaks down some of the barriers, gaps and opportunities for private sector engagement across different region.

**Table X: Market Observations based on country consultations**

Key Gaps in Financial Ecosystem	Gaps in Focus and Topics	Private Sector Needs
<ul style="list-style-type: none"> <li>&gt; Financing for smaller scale projects (between \$500k - \$10M)</li> <li>&gt; Financing for projects targeting BOP</li> <li>&gt; Support for early-stage project preparation and technical assistance</li> <li>&gt; Affordable low-cost debt in local currency</li> <li>&gt; Guarantees and off-taker risk support</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Investment in adaptation and resilience</li> <li>&gt; Investment in small-scale, off-grid renewable energies</li> <li>&gt; Investment in grassroots organizations providing last mile delivery or support for BOP</li> <li>&gt; Investment in LDCs/SIDS</li> <li>&gt; Investment in forestry, land use and low-carbon transportation</li> <li>&gt; Incubation of new climate finance vehicles, inc. project preparation support</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Private sector interventions require speed (weeks not years) and clarity in all transactions.</li> <li>&gt; Simpler and more efficient way to access and engage with the GCF</li> <li>&gt; In addition to capital, private sector investors expect co-investors or partners to offer additionality e.g. ESG know-how and access to government stakeholder</li> </ul>

Source: GCF / CCAP, 2018

Policy and regulatory barriers, where the public sector must take the lead, are often associated with: (a) the lack of an appropriate conducive and regulatory framework; (b) inconsistent policy support, such as a direction shift or an interruption of regulatory and market incentives; and (c) the lack of long-term commitment by governments to support climate-related industries and markets.

The familiarity of NDAs with private sector stakeholders, modalities and opportunities; presence of institutions, particularly at national level, that are able to blend international public and private sector finance; maturity of business models and technologies; local currency financing; and design of vehicles and instruments that can mobilize institutional investors at scale represent additional challenges and opportunities to increase mobilization of private sector investment to meet the climate investment needs of developing countries.

### ***Existing Instruments***

In taking on constraints to private sector climate action, the GCF can deploy flexible financial instruments (including debt, equity, and guarantees). It can combine these instruments with concessional financing through the provision of long-term tenors, below market pricing and subordinated positions to enhance the financial attractiveness of projects by:

- De-risking investments, including foreign exchange and investors' default;
- Supporting first movers by taking an anchoring role for co-investors;
- Using credit enhancement tools to increase the financial feasibility of projects;
- Providing expertise to help assess the potential benefits of climate solutions;
- Bundling small projects into portfolios, providing scale and making them attractive to institutional investors;
- Supporting capacity building amongst different groups and local institutions;

Given sufficient private sector interest in investing, GCF concessional capital can be blended with other capital sources to achieve benefits such as decreasing the cost of capital for co-financiers, some of which are subject to compliance with stringent capital regulations. In turn, access to such private sector investments helps the GCF address at least some of the specific barriers that affect investment levels, in particular those related to de-risking, which has been identified as a key barrier.

In keeping with the unique mandate which the Fund can play in mobilizing impact from the private sector, the GCF will continue to work with its NDAs and AEs partners to accelerate the flow of private and institutional funding from international, regional and local sources toward the development of projects and programmes to support green growth in developing countries. This will include work to develop MSMEs, promote access to finance and financial inclusion, as well as raise participation by institutional investors in climate financing. It is further recognized that

### ***Options to move funding at scale***

To become a better broker and bridge builder in shifting the trillions, the GCF needs to bring together NDA and private sector perspectives, aligning country ownership and impacts with efficiency and returns. Such efforts could support removing policy and regulatory barriers as they relate to the eight GCF results areas revolving around inadequate public strategic and regulatory frameworks for several sectors (energy, agriculture, urban, forestry, etc.). These are often coupled with retrograde policies (e.g. policies that provide incentives for fossil fuels and carbon-intensive products and services). In addition, it needs to be emphasized that change and paradigm shift require a long-term commitment by governments to support climate-related businesses and market development, which ultimately requires strong public institutions and local government structures.

For adaptation-related results areas, one solution is to help GCF recipient countries overcome the barriers caused by a lack of technology. Increased attention can also be paid to the integration and transfer of knowledge for adaptation in businesses alongside the uncertainty, unfamiliarity and limited understanding regarding climate adaptation risks and the tangible investments that can be made to address them. Barriers associated with knowledge and capacity gaps can also be identified to complement the regulatory strengthening effort.

Moreover, it is also recognized that private sector adaptation investment should be carried out in an accelerated and flexible manner, including targeted direct equity and credit, technical assistance, and broader market-creating vehicles like funds. Further solutions to enhance the volume and impacts of adaptation programmes and investments also include, among others, using risk transfer products such as insurance to cover the residual costs of risk, and utilizing blended finance and public-private partnership structures to address market failures and incentivize private sector participation.

To improve impact during the 1<sup>st</sup> replenishment period and leverage more private capital at scale, the Fund could explore potential new modalities of private sector engagement that allow it to act more proactively as a risk-inclined and impact-oriented keystone institution in the climate finance space. Strategic orientation would focus on the following four key areas (see Table X):

1. **Taking on more project and portfolio risk** to crowd in finance for paradigm shift, including by primarily financing in local currency and taking more equity positions to ensure that the GCF plays a complementary, impact-oriented role within the wider climate finance architecture;
2. **Supporting the development of climate-compatible national financial systems** by strengthening local institutions and markets through readiness and financing of national green banks as well as national and regional capital markets for “green” securities;
3. **Acting as “market maker” for sector transformation** by deploying support to identify and implement national policy priorities for private investment, whether as readiness for GCF country programs or through targeted financial mechanism and RfPs to implement national sector priorities through enhance public-private partnerships;
4. **Exploring further options to support policy reforms** that can improve impact and engagement with the private sector, including short-term options such as policy- or results-based financing in the Readiness Programme and funding proposals for specific deliverables that unlock and remove some of the identified barriers, starting with quantitatively measurable results areas.

## Sectoral interventions for paradigm-shift

	INVESTMENT FOR SYSTEMIC CHANGE	ENABLING ENVIRONMENT	LEVERAGE FINANCE & PARTNERSHIPS
<b>Investing in Forests &amp; Land Use</b>	<ul style="list-style-type: none"> <li>• Landscape level and integrated approaches, including forest restoration, increased efficiency of agriculture and forest conservations in country programs.</li> <li>• Performance based incentive mechanisms for securing high carbon content in indigenous communities' lands.</li> <li>• Scale up REDD+ implementation.</li> <li>• Set up country-to-country REDD+ emission trading mechanism (e.g. JCM)</li> <li>• Develop REDD+ private sector prototype investments.</li> <li>• Launch Biome-level initiatives (e.g. Amazon, Congo basin, Indonesia peatlands).</li> <li>• Launch Forest for Life initiative to promote replication of Bhutan for Life approved project.</li> <li>• Promote deforestation-free jurisdictional-level programs.</li> </ul>	<ul style="list-style-type: none"> <li>• Facilitate cross-sectoral discussion in countries, stakeholders including private sector.</li> <li>• Support securing indigenous and communities' land rights in tropical forest countries.</li> <li>• Through readiness funding, support countries in developing financial plans at sector level for full implementation of REDD+, aligned with NDCs.</li> <li>• Promote collaboration among countries in achieving NDCs through REDD+.</li> <li>• Forest and land use (including REDD+) financial plans at country level integrated in country programs.</li> </ul>	<ul style="list-style-type: none"> <li>• Promote complementarity and coherence with other sources of funding for forests.</li> <li>• Establish partnerships with existing platforms promoting deforestation-free supply chain &amp; commodities.</li> <li>• Launch multi-donor initiative on REDD+ RBP.</li> <li>• Promote integration of interventions sharing the same Biome (e.g. Amazon biome)</li> </ul>
<b>Decarbonizing Energy Systems</b>	<ul style="list-style-type: none"> <li>• De-risk RE investments via financial mechanisms that encourage grater private sector participation.</li> </ul>	<ul style="list-style-type: none"> <li>• Support capacity building, policy &amp; regulatory developments (FiT, auctions, RE target setting in NDCs)</li> </ul>	<ul style="list-style-type: none"> <li>• Maximize synergies and complementarity with MDBs and other RE investors and donors.</li> </ul>



- 
- Support programmatic approaches on power generation and clean energy access.
  - Deliver RE infrastructure via RfPs for public/pvt sector.
  - Support innovation in digitalization and storage.
  - Finance retrofitting projects aligned with GCF criteria.
  - Blend financial instruments to deliver scale.
  - Build climate change resilience of RE infrastructure via incremental finance of adaptation costs.
  - Finance renewable based greenfield projects.
  - Support PPPs to deliver access to clean energy.
  - Support high-impact opportunities such as mini-grids
  - EE: Provide catalytic financing that will create or stimulate sustainable markets for EE and prove business model to investors and market.
  - Devise a thematic readiness window for EE, supporting the development of enabling environment.
  - Sponsor demonstration projects, combining guarantees, TA, and dedicated credit to scale up EE investments.
  -
- at early stage via Readiness Support
  - Promote sector reforms through funded projects
  - Leverage DAEs to accelerate institutional transformation, policy & regulatory reform.
  - Enhance delivery capacity of GCF partners.
  - TA for countries in relevant RE technologies.
  - Scale-up RE frameworks that deliver infrastructure resulting in cleaner generation mix.
  - Support regulatory environment to substantially increase % of energy use covered by codes and standards addressing gap of 68% uncovered.
  - Package GCF support to cover planning, policy and regulatory transformation alongside projects.
  - Support establishment of regulatory developments to facilitate private sector investments on commercial basis.
  - Devise appropriate PPP structures to attract private sector and deploy appropriate instruments.
  - Industry: Promote Minimum Energy Performance for electric motor systems, mandatory adoption of variable speed motors,
- Catalyze private sector driven markets on energy access.
  - Mobilize energy access donor finance in alignment with countries energy access plans.
  - Maximize coherence, synergies and complementarity with MDBs and other climate finance donors for EE.
  - Support domestic FIs and banks on EE facilities.
-

		energy audits, incentives for heat pumps for low-temperature heating.	
		<ul style="list-style-type: none"> <li>Buildings: Promote MEPs to phase out low-efficiency refrigeration, appliances, heating and cooling equipment. Increase insulation.</li> </ul>	
<b>Cities</b>	<ul style="list-style-type: none"> <li>Promote project and programmatic interventions to avoid path dependencies on resource intensive and high-carbon urbanization processes.</li> <li>Develop holistic, long-term investment solutions in cities in areas of EE, transport, green urban infrastructure, urban water and waste management.</li> </ul>	<ul style="list-style-type: none"> <li>Address policy and regulatory reform to incentivize climate action at sub-national or city level.</li> </ul>	<ul style="list-style-type: none"> <li>Dedicated PPF or Fund, Green Cities Guarantee Facility, strategic pipeline with local currency access or RfPs to crowd-in capital.</li> <li>Promote access to affordable finance in cities and municipalities to cover high upfront cost of climate focused infra investment.</li> </ul>
<b>Transport</b>	<ul style="list-style-type: none"> <li>Transport: Develop urban, inter-urban passenger transport systems with mode-shifting potential.</li> <li>Support project-level shift towards lower emissions per unit of transport, low carbon vehicles, efficient tires, improved load-factor, improved roads, improved logistics, intelligent transport systems.</li> </ul>	<ul style="list-style-type: none"> <li>Promote policy measures in mass low-carbon transport, e.g. efficiency measures, eco-driving, fiscal measures (fuel, road taxes), etc.</li> <li>Support Holistic Integrated Mobility (HIMP) planning, considering non-motorized transport.</li> </ul>	
<b>Resilient Agricultural Markets, Food Security and Livelihoods</b>	<ul style="list-style-type: none"> <li>Target investments into climate-resilient and stress-tolerant practices, and improved crops and seeds.</li> <li>Index-based insurance schemes in livestock and crop production for farmers and small-holders.</li> </ul>	<ul style="list-style-type: none"> <li>Address farmers' vulnerabilities, e.g. lack of access to land, credit, inputs and markets.</li> <li>Reduce barriers along production value chain.</li> <li>Support policies to build synergies cross-sectors, e.g. agri-food/water/energy nexus,</li> </ul>	<ul style="list-style-type: none"> <li>Leverage private sector for resilience of agricultural value chains.</li> <li>Leverage insurance and risk guarantee/finance markets.</li> <li>Crowd-in external finance via GCF's de-risking instrument, supporting</li> </ul>

	<ul style="list-style-type: none"> <li>• Invest in digital climate information services to improve long and short-term forecasting.</li> <li>• Curb emissions via management of livestock, grazing land, cropland and paddy rice.</li> <li>• Support restoration of degraded land and soil nutrient.</li> <li>• Develop mitigation &amp; adaptation co-benefits in projects.</li> </ul>	<p>Forestry/REDD+ and agriculture, and resilience/water/food security for smallholder farmers.</p> <ul style="list-style-type: none"> <li>• Enabling environment and tackling the last mile.</li> <li>• Re-orient agricultural subsidies.</li> <li>• Support policy environment for climate information and ancillary solutions, e.g. index-insurance.</li> </ul>	<p>PPPs and blended finance opportunities.</p>
<p><b>Building Climate Info. &amp; Early Warning Systems</b></p>	<ul style="list-style-type: none"> <li>• Better deploy climate information to complement climate rationale in GCF projects.</li> <li>• Invest in infrastructure for instrumentation; data and information; communication; services.</li> <li>• Support decadal and long-term science and ICT</li> <li>• Support Disaster alert and coordination systems at global, regional, national and community level.</li> <li>• Promote weather derivatives market via CIEWS</li> <li>• Help countries establish air pollution and GHG monitoring infrastructure.</li> </ul>	<ul style="list-style-type: none"> <li>• Strengthen country capacity building for CIEWS</li> <li>• Support PPP development for hydro-met efficiency and effectiveness.</li> <li>• Support NMHS quality management systems and certifications to support industry/aviation.</li> </ul>	<ul style="list-style-type: none"> <li>• Catalyze multi-institutional and trans-disciplinary expertise at global level.</li> <li>• Promote partnerships in science and ICT.</li> </ul>
<p><b>Water</b></p>	<ul style="list-style-type: none"> <li>• Support projects for maintenance, rehabilitation and re-engineering of existing infrastructure.</li> <li>• Finance strategic and multi-purpose infrastructure that is climate-resilient and reduces disaster risk.</li> </ul>	<ul style="list-style-type: none"> <li>• Promote integrated water resources management, building synergies to water-energy-food-security.</li> <li>• Adjust operation, monitoring and regulation practices to</li> </ul>	<ul style="list-style-type: none"> <li>• Pursue active partnerships to promote IFI, MNC, investor, private sector funding into water.</li> <li>• Strengthen advocacy by engaging with water sector organizations to galvanize action and mobilize finance.</li> </ul>

	<ul style="list-style-type: none"> <li>Stimulate projects by de-risking, using GCF guarantee instruments, bridging gaps in financing, supporting profitability of water sector projects.</li> <li>Introduce new technologies (desalination, biotech, drip irrigation, recycling, etc.)</li> <li>Support disaster-risk insurance applications in water.</li> <li>Support enterprise development in DRR, transfer and recovery, disaster clean-up waste management and use of waste.</li> </ul>	<ul style="list-style-type: none"> <li>accommodate new uses, conditions.</li> <li>Manage water demand via cost-reflective pricing, regulation, eco-system services, basin planning, consumer awareness.</li> <li>Promote development of effective water tariff structures.</li> <li>Promote national and/or basin water planning via SAPs in LDCs and SIDs.</li> </ul>	<ul style="list-style-type: none"> <li>Scale up innovative models and technologies by leveraging partnerships with water/sanitation trust funds, private sector,</li> <li>Increase advocacy for WASH, water quality, gender impact by engaging with IWMI, Global Water Partnership, Stockholm International Water Institute, World Water Council, etc.</li> </ul>
<b>Health</b>	<ul style="list-style-type: none"> <li>Evaluate causal pathways for direct/indirect health impacts in projects to improve sectoral projects that determine health and well-being</li> <li>Support projects that build resilient health systems.</li> <li>Promote awareness, reduce ambient pollutants, build integrated health and early warning systems.</li> </ul>	<ul style="list-style-type: none"> <li>Promote enabling environment for health systems in NAPs, readiness support.</li> <li>Promote health in all sector policies.</li> </ul>	<ul style="list-style-type: none"> <li>Initiate partnerships and strengthen advocacy for health in climate change by engaging health sector organizations.</li> <li>Maximize synergies between climate finance and health finance for more catalytic investments</li> </ul>
<b>Ecosystems</b>	<ul style="list-style-type: none"> <li>Promote explicit quantification, valuation and attribution of ecosystems services in investment proposals.</li> <li>Support ecosystems-services &amp; payments projects.</li> <li>Fund proposals for mitigation in management of peatlands, semi-arid grasslands and animal husbandry.</li> </ul>	<ul style="list-style-type: none"> <li>Support wide adoption of principles for ecosystems quantification, valuation, attribution of services, e.g. via Natural Capital Accounting (NCA).</li> <li>Develop country capacity to incorporate NCA into national planning, and support payments for ecosystems services.</li> </ul>	<ul style="list-style-type: none"> <li>Leverage and incentivize private sector through monetizing ecosystems, e.g. via payments for ecosystems services.</li> <li>Develop bankable pipeline of projects, involving provisioning services (e.g. agri/forestry/tourism/hydrological services)</li> </ul>

## REFERENCES

- CPI, 2017. Barbara K. Buchner, Pdraig Oliver, Xueying Wang, Cameron Carswell, Chavi Meattle, and Federico Mazza. Global Landscape of Climate Finance 2017
- GIZ, 2016. Climate Change Policy Brief – (I)NDC Adaptation Components and NAP, Retrieved from [https://www.adaptationcommunity.net/?wpfb\\_dl=356](https://www.adaptationcommunity.net/?wpfb_dl=356)
- Global Commission on the Economy and Climate, 2018. Unlocking the Inclusive Growth Story of the 21st Century: Accelerating Climate Action in Urgent Times. New Climate Economy, London and Washington, DC. Available at: [https://newclimateeconomy.report/2018/wp-content/uploads/sites/6/2018/09/NCE\\_2018\\_FULL-REPORT.pdf](https://newclimateeconomy.report/2018/wp-content/uploads/sites/6/2018/09/NCE_2018_FULL-REPORT.pdf)
- H. de Coninck, A. Revi, M. Babiker, P. Bertoldi, M. Buckeridge, A. Cartwright, W. Dong, J. Ford, S. Fuss, J.C. Hourcade, D. Ley, R. Mechler, P. Newman, A. Revokatova, S. Schultz, L. Steg, T. Sugiyama, 2018, Strengthening and implementing the global response. In: 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 [V. Masson-Delmotte, P. Zhai, H. O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, T. Waterfield (eds.)]. In Press
- 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. Report available at: <https://www.ipcc.ch/sr15/>
- IGES (2016). Analysis of Financial Components of Intended Nationally Determined Contributions (INDCs) - Lessons for future NDCs.
- McCollum, D. et al, 2018. *Energy investment needs for fulfilling the Paris Agreement and achieving the Sustainable Development Goals*. Nature Energy. Nature Energy Volume 3, pages 589–599
- M. R. Allen, Heleen de Coninck, Opha Pauline Dube, Ove Hoegh-Guldberg, Daniela Jacob, Kejun Jiang, Aromar Revi, Joeri Rogelj, Joyashree Roy, Drew Shindell, William Solecki, Michael Taylor, Petra Tschakert, Henri Waisman, Sharina Abdul Halim, Philip Antwi-Agyei, Fernando Aragón-Durand, Mustafa Babiker, Paolo Bertoldi, Marco Bindi, Sally Brown, Marcos Buckeridge, Ines Camilloni, Anton Cartwright, Wolfgang Cramer, Purnamita Dasgupta, Arona Diedhiou, Riyanti Djalante, Wenjie Dong, Kristie L. Ebi, Francois Engelbrecht, Solomon Fifita, James Ford, Piers Forster, Sabine Fuss, Bronwyn Hayward, Jean-Charles Hourcade, Veronika Ginzburg, Joel Guiot, Collins Handa, Yasuaki Hijioka, Stephen Humphreys, Mikiko Kainuma, Jatin Kala, Markku Kanninen, Haroon Kheshgi, Shigeki Kobayashi, Elmar Kriegler, Debora Ley, Diana Liverman, Natalie Mahowald, Reinhard Mechler, Shagun Mehrotra, Yacob Mulugetta, Luis Mundaca, Peter Newman, Chukwumerije Okereke, Antony Payne, Rosa Perez, Patricia Fernanda Pinho, Anastasia Revokatova, Keywan Riahi, Seth Schultz, Roland Sférian, Sonia I. Seneviratne, Linda Steg, Avelino G. Suarez Rodriguez, Taishi Sugiyama, Adelle Thomas, Maria Virginia Vilariño, Morgan Wairiu, Rachel Warren, Guangsheng Zhou, Kirsten Zickfeld, 2018, Technical Summary. In: 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 [V. Masson-Delmotte, P. Zhai, H. O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, T. Waterfield (eds.)]. In Press.
- NCE, 2016. *The sustainable infrastructure initiative*. The New Climate Economy. Report available at: <https://newclimateeconomy.report/2016/>
- NCE, 2014. *Better growth, better climate*. The New Climate Economy. Report available at: <https://newclimateeconomy.report/2014/>

- 
- Schletz, M. C., Konrad, S., Staun, F., & Desgain, D. D. R. (2017). Taking stock of the (I)NDCs of developing countries: regional (I)NDC coverage of mitigation sectors and measures. United Nations Environment Programme.
- Standing Committee on Finance, 2018. Biennial Assessment and Overview of Climate Finance Flows. Technical Report. United Nations Framework Convention on Climate Change, Bonn. Available at: <https://unfccc.int/sites/default/files/resource/2018%20BA%20Technical%20Report%20Final.pdf>
- UNEP, 2018. The Emissions Gap Report 2018. United Nations Environment Programme, Nairobi. Available at: <https://www.unenvironment.org/resources/emissions-gap-report-2018>
- UNEP, 2016. The Adaptation Finance Gap Report 2016. United Nations Environment Programme (UNEP), Nairobi
- UNFCCC, 2016. INDCs and technology, A synthesis of technology issues contained in intended nationally determined contributions. See: <http://unfccc.int/ttclear/tna/ndcs.html>
- United Nations, 2014. World Urbanization Prospects: The 2014 Revision, Highlights (ST/ESA/SER.A/352). Department of Economic and Social Affairs, Population Division, New York. Available at: <https://www.compassion.com/multimedia/world-urbanization-prospects.pdf>
- FAO and UNCCD, 2015. *Sustainable financing for forest and landscape restoration: Opportunities, challenges and the way forward*. Discussion paper. Rome.
- World Bank, 2013. *Turn down the heat: Climate extremes, regional impacts and the case for resilience*, Report No.2, June 2013
- World Bank, 2018. Groundswell: Preparing for Internal Climate Migration. World Bank, Washington, DC. Available at: <https://openknowledge.worldbank.org/handle/10986/29461>
-