

Prepared for GEF's Science and Technical Advisory Panel (STAP)

Financing Innovation: Opportunities for the GEF

Recommendations for how the GEF, in the context of a new and rapidly evolving financial landscape, might benefit from innovative financial products and more effectively finance innovation in (i) technologies, (ii) business models, and (iii) policies during GEF-7.

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Introduction

“Innovation” is receiving increasing attention as a means of achieving economic, environmental, and social objectives. This interest is coming from many directions but arguably reflects the desire to harness the rapid evolution of technologies and business models driven largely by the creative energy of the private sector. In the development context, the desire to support and catalyze innovation is driven by the expectation that it will lead to greater impact, deployment of solutions to many of development’s most pressing needs faster, and will bring these impacts in partnership with a wider set of stakeholders. The interest in innovation is also often applied to development finance objectives, including dedicated financial mechanisms like the Global Environment Facility (GEF), most often with respect to greater engagement with the private sector, particularly in order to leverage greater resources, and promotion of new technologies. Often, however, innovation is promoted without clear definition, and thus is subject to a wide range of interpretations, let alone ways to measure its impact in the context of either (i) creation or promotion of new technologies or business models, or (ii) financial impact (or both).

Ahead of the GEF’s 7th replenishment cycle, the Scientific and Technical Advisory Panel (STAP) of the GEF is interested in exploring ways that innovation contributes to GEF objectives, and the GEF may promote innovation more effectively. The GEF is a unique global financial and multilateral partnership conceived *“to assist recipient countries in the protection of the global environment and promote thereby environmentally sound and sustainable economic development”* – with a more than 25-year history of supporting innovations in technologies, institutions, policies & regulations, as well as business models and practices. All GEF 18 implementing partners – a diverse mixture of organizations from the UN system, multilateral and national banks and global NGOs –have extensive experience in supporting technological, institutional and business innovation. However, to this day the GEF partnership has yet to articulate a clear vision and comparative advantage on how innovation could be used to help address the major global environmental challenges and how this vision and advantage could be transformed into workable solutions across partnership institutions, GEF focal areas, and regions.

This review is also timely insofar as the opportunities and challenges related to innovative approaches have changed dramatically since the GEF’s creation, starting as a pilot in 1991 and formalized by an Instrument in 1994. GEF responsibilities have greatly expanded, many additional agencies have been given access to GEF resources, and much has been learned about what does – and doesn’t work in response to global environmental challenges. Advances in technologies have created opportunities for new solutions. Perhaps most dramatically, the world of global finance has expanded enormously, particularly in the form of private investments and support for new technologies. The deliberations associated with GEF 7 thus call for a fresh look at the role of the GEF in this rapidly evolving financial landscape. This paper looks specifically at how GEF might identify and support innovative approaches for the GEF in relation to technology, business models, and policy, as well as opportunities associated with more creative use of financial instruments, particularly non-grant support.

Ch. 1: Background and Context

As a basic premise, the creation of the GEF was intended to be a new (“incremental”) source of funds for projects with global environmental benefits and thus “innovative.” As the financial mechanism for 5 major multilateral environmental agreements, including the United National Framework Convention on Climate Change (UNFCCC), the UN Convention to Combat Desertification (UNCCD), as well as the Minamata Convention on Mercury, the Stockholm Convention on Persistent Organic Pollutants (POPs), and the United Nations Convention on Biological Diversity (UNCBD), the GEF has proven that it can be a catalyst of financing to support environmental and climate-smart investment. However, the use of the term “innovation,” and indeed “innovative development finance,” differs in various contexts, across sectors, and in finance; further “innovation” itself is ever-evolving as development occurs. For GEF, ensuring its funding supports efforts and investments that promote the frontiers of environmental development is integral to its mission, and indeed the role and function of its funding.

While “innovation” is defined contextually in practice, a good general definition of innovation is that which:

“(R)efers to an idea, embodied in a technology, product, or process, which is new and creates value...To be impactful, innovations must also be scalable, not merely one-off novelties. Moreover, innovation is not only relevant for new technologies but also [important for] novel applications of these technologies and new business models that create economic and societal value.¹”

In addition to understanding innovation as a concept for technology or business practice, there has been growing discussion for more than a decade of the need for - and consequently the meaning of - “innovative development finance.” These discussions have been in part driven by the increasing recognition that public budgets alone are insufficient to solve major development challenges, and in part driven by the recognition that expanding beyond historic grant-based paradigms for delivering development finance might produce greater impact and results. For example, OECD and others have frequently written on the connections between innovation objectives and a greater link or emphasis on results.² Other frequently noted objectives include greater collaboration with a multitude of stakeholders, including the private

¹ The White House Office of Science and Technology Policy, “A Strategy for American Innovation,” Oct. 2015 (https://www.whitehouse.gov/sites/default/files/strategy_for_american_innovation_october_2015.pdf)

² Global Development Incubator (AFD; Citi; GDI; and Dalberg), “Innovative Financing for Development: Scalable Business Models that Produce Economic, Social, and Environmental Outcomes,” Sept. 2014; <http://2uqnr73tzny3sl15p2nqglls.wpengine.netdna-cdn.com/wp-content/uploads/2016/02/Innovative-Financing-for-Development.pdf> (hereafter “GDI”). From the summary: “The focus of innovative financing is shifting from the mobilization of resources through innovative fundraising approaches to the delivery of positive social and environmental outcomes through market-based instruments.” The OECD definition also includes “incentives designed to enhance aid effectiveness”, and the World Bank also discusses innovative finance to include those that enhance the “efficiency” of financial flows by reducing delivery time and/or costs, and make financial flows more “results-oriented”.

sector.³ Although not the focus of this paper, innovation is often used to refer to efforts to increase resource mobilization⁴ and/or to more effectively leverage existing donor resources – objectives often viewed as closely associated with greater private sector engagement.⁵ Finally, innovation frequently implies a greater emphasis on risk taking, particularly in the respect to new technologies, although increasing with new ways to structure and use development finance and funding.⁶ GEF has been at the center of discussions around both the need for more technological and business innovation, as well as the need for development finance to be more “innovative.”⁷

Although not always explicit, a key consideration of relevance to global environmental objectives – as embodied in the conventions – is to be *forward looking* -- taking into account future needs and circumstances. As will be discussed below, in the context of efforts to support environmental objectives in the context of the broader development agenda, this implies an increasing focus on:

- (i) engaging the private sector as the significant source of global investment;
- (ii) taking advantage of development opportunities associated with new technologies (e.g., mobile phone service, declining cost of solar cells, analysis of “big data”); and
- (iii) reaching out and collaborating with a wide range of experts from diverse sources, including the private sector and CSOs, to tap into the best knowledge and experience available, sometimes from fields that may not have been in existence when the GEF was created.

With STAP support, the GEF is in a unique position to support and promote innovation in technology, policy and business models through more effective use of its resources; further, GEF as a funding source, can be innovative with its financing, and can promote financial innovation. Through greater collaboration with the science and development community, the GEF can play a key role in helping catalyze those

³ GDI, 2014: “**Innovative financing** is the manifestation of two important trends in international development: an increased focus on programs that deliver results and a desire to support collaboration between the public and private sector.

⁴ GDI, 2014: “Innovative financing instruments complement traditional international resource flows—such as aid, foreign direct investment, and remittances—to mobilize additional resources for development and address specific market failures and institutional barriers.” UN: “This is when innovative financing mechanisms come into play to raise new sustainable funds based on a new economic logic that will come on top of ODA but certainly not replace it.” Philippe Douste-Blazy Special Advisor to the Secretary-General of the United Nations in charge of Innovative Financing for Development, Innovative Financing for Development: the I-8 Group Leading Innovative Financing for Equity, (Introduction), <http://www.un.org/esa/ffd/documents/InnovativeFinForDev.pdf>

⁵ ODI draft discusses development finance innovations to “better leverage existing resources”; McKinsey paper defines innovative as finance mechanisms that might “mobilize, govern, or distribute funds beyond traditional donor-country ODA”

⁶ S. Nakhooda and M. Norman, lead authors, *Climate Finance: Is It Making a Difference?* (2014) <https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9358.pdf>

⁷ See, e.g., *GEF2020 Strategy for the GEF* (2015). In her message, GEF CEO Naoko Ishi refers to the role of the strategy in addressing the “importance of supporting broad coalitions of committed stakeholders and innovative and scalable activities.”

activities that can further accelerate the innovation necessary across technologies, business models, and policies to help address global environmental challenges consistent with sustainable development.

Historic role of GEF

As the only environmental fund cutting across multiple issues, GEF financing has played a critical and unique role since its inception. Innovation has a long history in the GEF, virtually since it began. Some of the largest projects in GEF history supported technology innovation, and date to its beginning years and an early focus on new technologies in Operational Program 7 (OP7). The role of new technologies was key, for example, to the Multilateral Ozone Fund, the first dedicated global environment fund established by an agreement of the parties to the Montreal Protocol in 1990, and an influence on the GEF.⁸ However, this early interest arguably reflected a departure from traditional development practice and a culture of caution with respect to the introduction of new technology in developing countries.⁹

Expectations that GEF funded projects would include aspects of innovation have been a recurrent theme in the evolution of the GEF from its inception. An Independent evaluation of the GEF pilot phase – a precursor to the formalization of the GEF through adoption of the Instrument in 1994 – observed that *“Innovation was to have been a major factor in the selection of GEF activities. In the GEF context, innovation has been liberally interpreted to include any technology that had not been used in any developing country or in the developing country in which the technology was being introduced. . . . This feature should be one of the distinguishing features of the GEF, with further definition, examples, and dissemination.”*¹⁰

The negotiators who designed the GEF considered the very concept of the GEF funding mechanism – itself - as “innovative.” As noted by Helen Sjöberg in her GEF commissioned paper on the negotiations leading to the creation of the GEF, “(T)he most important factor was an international agreement on a new and innovative, even lofty purpose: the GEF was to fund activities to address environmental concerns of a global nature.”¹¹

⁸ A. Andersen, K. Sarma, and K. Taddonio, *Technology Transfer for the Ozone Layer* (2007).

⁹ As noted by Robert Williams, an early STAP member and advocate of GEF support for new technologies, “[C]onventional wisdom cautions against developing countries taking the lead in commercializing technologies not widely in use elsewhere, on the basis of the argument that, facing so many pressing needs, developing countries cannot afford to take the many risks associated with technological innovation. This perspective has been a hallmark of the energy development assistance community, which typically has not been willing to support projects that involve technological innovation for the energy sector.” R. Williams, “Addressing challenges to sustainable development with innovative energy technologies in a competitive electric industry”, *Energy for Sustainable Development*, Volume 5, Issue 2, (June 2001), pp. 48-73.

¹⁰ GEF, *Independent Evaluation of the Pilot Phase* (1994)

¹¹ Sjöberg, Helen, 1994, *From Idea to Reality: The Creation of the Global Environment Facility*, GEF Working Paper 10, Washington DC, GEF.

The initial “innovation” envisioned by the creation of the GEF was primarily that it would be both global in nature, and deliver its resources *through* existing institutions and be “innovative” because it leveraged the existing network of development agencies, mandates, and staff of those partner institutions. Early discussions on the creation of the GEF (led by the World Resources Institute with outreach to many experts and NGOs) primarily focused on concerns about the creation of new institutions. The challenge at the time was to enable a mechanism that could leverage existing institutions, while also creating opportunities for civil society participation.¹² Financial innovation beyond grants also formed a part of the early vision of the GEF, and discussions in the early days of GEF included debt for nature swaps (then a recently introduced concept), as well as alternative sources of finance (e.g., a CFC tax).¹³ Determining the focus of the GEF – in terms of scope, funding approach and application, and indeed how GEF would be “innovative” in promoting policies, sector transformation, business models, and technologies was a central debate from the earliest days of the GEF.

The Multilateral Ozone Fund from its inception put a primary focus on the role of technological innovation and technology transfer as central feature and premise of its efforts, and subsequently of GEF efforts related to the objectives of that fund¹⁴. While early discussions of the GEF concept included funding of CFC substitutes, the efforts to address ozone issues through the Multilateral Ozone Fund differed from those activities supported by GEF in that the chemicals and applications to be replaced were limited.¹⁵ These were thought to be much less integral to economic development and perhaps even more importantly, were the focus of a highly effective network supporting the transfer of technology.

”A significant part of the technology change achieved by the [Montreal] Protocol came through voluntary transfer of technologies, processes, and best practices through multinational enterprises, industrial and professional associations, and NGOs in both developed and developing countries. . . . The other part of the technology change came through the Protocol’s financial

¹² The first GEF CEO, Mohamed El-Ashry, often referred to the GEF challenge in attempting to influence large established international organizations through a relatively small amount of grant financing as “the tail wagging the dog” (personal recollection of one of the authors)

¹³ Internal World Bank discussion papers as early as 1988 summarized by Sjoberg focused on alternative funding options, generating some negative management reaction on the basis that such funding would compete with and divert funds from other priorities. Sjoberg, pp. 9-10

¹⁴ S. Andersen, M. Sarma, and K. Taddonio, *Technology Transfer for the Ozone Layer: Lessons for Climate Change* (2007).

¹⁵ As summarized by Andersen et al, there were several categories of CFC applications of most relevance in developing countries including refrigeration and air conditioning; foam blowing; and as solvents used in the manufacture of electronics. A subset of developing countries also had growing use of other ozone depleting chemicals including halons (fire extinguishants) and methyl bromide (a fumigant used for pest control in agriculture. Cooperative networks developed with industry around each of these applications, led in part by a Technology and Economic Assessment Panel (TEAP) operating under the Montreal Protocol empowered to evaluate the availability and performance of alternatives (no comparable body exists under the UNFCCC).

mechanism, which covers the incremental costs of technology transfer for developing country parties.¹⁶

Furthermore, in the early days much of what was initially considered innovative about the GEF was that:

- its funding be strictly for “global” purposes, and linked to efforts to address environmental challenges;
- that its funding be for “incremental” costs, separate from other development finance provided by its partner institutions, and
- that NGOs were given unprecedented access to governance deliberations.¹⁷

Which problems were “global” and which were of the highest priority was an issue in the early days of GEF operations. For example, not all agreed on whether and how to support and fund biodiversity activities, and support for adaptation was severely limited the first decade. The decision to avoid creating new institutions and to operate through only three primary development agencies – the United Nations Development Program (UNDP), United Nations Environment Program (UNEP), and the World Bank – was also part of the early debate regarding how the GEF should operate and the need to be innovative.¹⁸

Historic Role of GEF Supporting Innovation in Technology & Technology Transfer

Technological innovation can be transformative, and when applied to the most pressing global environmental concerns, has the potential to have significant positive impact. The evolution of technology is also rapid, and the pace of innovation has been dramatically accelerating over the last decade. Supporting innovation in technology has been at the forefront of GEF since its inception.

Discussions of how and when GEF financing would support innovative technologies began largely with respect to clean energy technologies and their applicability in developing countries at a time when wind, solar, and other renewable energy products were still relatively expensive and not always commercially proven.¹⁹ As these technologies improved, the issue became more about how and when to bring them to

¹⁶ Andersen et al at 295

¹⁷ N. Ishi, *25 Years of the GEF* (2016), p. 7.

¹⁸ Civil society organization reviews of the GEF have also typically focused more on operational matters such as additionality, predictability, and direct access and only secondarily on innovation, if at all. E.g., L. Schalatek and N. Bird, “The Principles and Criteria of Public Climate Finance - A Normative Framework” (ODI/HBS 2016), <https://www.odi.org/sites/odi.org.uk/files/resource-documents/11018.pdf>. An interesting recent exception from the Overseas Development Institute is I. Granoff et al, “Six Development Finance Proposals to Expand Climate Investment,” (ODI Policy Briefing, March 2017). While most of the authors proposals deal with financial products and strategies, their proposals also support greater investment in new energy technologies: “Innovative technologies with the potential to transform the economics of clean energy systems – such as grid-scale energy storage – need to move from research and development (R&D) into widespread adoption, as this will enable investors to learn what works in different commercial settings and start to replicate and scale success.”

¹⁹ As will be discussed below, while still very relevant to climate change mitigation, the potential for innovative technologies to contribute to other global environmental solutions is now of increasing interest.

emerging markets. In 2011, a background paper for the World Bank energy strategy discussed the issue of innovation in technology in some detail and made the point that what is “new” is often project specific and debatable:

“What constitutes a new energy technology is not always simple or obvious. Potential new technologies with environmental and efficiency benefits can be found in almost every sector at various stages of development, but much of the focus in energy is on renewable sources of energy and efficiency. In many cases, a new technology is an adaptation of an established technology for a substantially different application, rather than a fundamentally new idea. Pathways for technological development consequently vary with important implications for the form of assistance needed to accelerate technology diffusion.”²⁰

In the GEF context, this often means more specifically ideas that are new to the country context/market. They may be widely used and commercially proven elsewhere but not used in developing countries due to country-specific barriers, risks, or other complicating factors which require at least some adaptation to previously proven models.

The early focus on new energy technologies in Operational Program 7 had mixed results as the projects took much longer and encountered more implementation issues than expected, arguably in part due to the lack of implementing agency experience. As the projects were among the largest in the GEF portfolio – with several commitments of \$40 million or more – this proved controversial. A STAP review of the program in 2004 took note and while reiterating support for the approach concluded that further GEF investment in such projects should be approached carefully.²¹ Early experience demonstrated the importance of not just financing innovative technologies, and technology transfer, but also the necessity for international collaboration, donor assistance and further, domestic policy support if such projects were to be successful.

Recent Context: A Call to be “Innovative” in Development Finance

“Innovation” in development finance has been a key part of the international debate for some time and is a key component of the discussions about how to achieve impact more quickly, and at a larger scale. The definition of “innovation” in this context is itself still evolving. Does it imply greater administration

²⁰ A. Miller and A. Eil, “Promotion of New Clean Energy Technologies and the World Bank Group: Background Paper for the World Bank Energy Strategy” (2011), http://siteresources.worldbank.org/INTESC/Resources/Clean_tech_background_paper.pdf. See also related discussion below in Text Box: A Recurrent Challenge for Innovative Projects: When to Introduce/Adapt New Technologies, Business Models, and Policies in Emerging Markets?, page 26.

²¹ A STAP Review of OP 7 in May 2004 (GEF/C.23/Inf.16) concluded that promoting innovative low GHG emitting technologies should “remain fundamental to the GEF’s work” but recommended more focus on policy/enabling environment, less on “buying down” capital costs; more emphasis on partnerships with the private sector; and more long-term strategic commitments to address slippage.

efficiency? Does it effectively use of different financial instruments or approaches? Simply a larger allocation in areas where other sources of finance are lacking (such as accelerating the development – and even in-country research – of potentially groundbreaking technologies)? Is it the ability to ensure development finance itself is being put to more effective use(s)? Or, is it a combination of the above?

Many recent reports and analyses have addressed the need for - and proposed definitions of - innovative development finance in general and global environmental finance more specifically. The most common usage is in the context of advocating ways to mobilize greater resources,²² to more effectively engage and partner with the private sector (including companies and private capital), and to place a greater emphasis on measuring and rewarding results. Advocates for improving the impact and efficiency of development finance often use the term “innovation” with several meanings. For example, a UN Report in 2011 noted “the absence of an internationally agreed definition of innovative financing” and the differences between those used by the OECD and World Bank. OECD defines innovative finance as:

“mechanisms of raising funds or stimulating actions in support of international development that go beyond traditional spending approaches by either the official or private sectors and distinguishes them from innovative uses of traditional development finance (e.g. counter-cyclical lending, debt swaps and issuing guarantees)” and “incentives designed to enhance aid effectiveness” (e.g. results-based aid and cash-on-delivery). In contrast, the World Bank considers innovative finance to be any financing approach that helps to generate funds by tapping new funding sources or by engaging new partners, including those that enhance the “efficiency” of financial flows by reducing delivery time and/or costs, and make financial flows more “results-oriented.”²³

Moreover, finally, the Global Development Incubator provided this definition in 2014:

“Innovative financing is the manifestation of two important trends in international development: an increased focus on programs that deliver results and a desire to support collaboration between the public and private sector. Innovative financing instruments complement traditional international resource flows—such as aid, foreign direct investment,

²² For a recent example in the context of funding for climate adaptation, see C. Warnecke et al, *Innovative Financing for the Adaptation Fund: Pathways and Potentials* (report by the New Climate Institute and Germanwatch, Jan. 2017), <https://newclimate.org/2017/02/16/innovative-financing-adaptation-fund/>

²³Sixty-sixth session Item 18 of the provisional agenda* Follow-up to and implementation of the outcome of the 2002 International Conference on Financing for Development and the 2008 Review Conference Innovative mechanisms of financing for development Report of the Secretary-General, 1 Sept 2011, http://www.un.org/ga/search/view_doc.asp?symbol=A/66/334&Lang=E. A 2013 McKinsey review of the subject similarly defines innovative development finance as “mechanisms that might mobilize, govern, or distribute funds beyond traditional donor-country ODA.” E. Bensoussan et al, “Innovative Development Financing,” McKinsey Quarterly, Aug. 2013; <http://www.mckinsey.com/industries/social-sector/our-insights/innovative-development-financing>

and remittances—to mobilize additional resources for development and address specific market failures and institutional barriers”.²⁴

Key Insights from Chapter 1

- The creation of the GEF was considered “innovative” in purpose and design, with the focus on newly recognized *global* environmental challenges, the provision of funding for the “incremental” costs of addressing these issues, and formalized opportunities for participation by civil society organizations as well as scientific and technical experts.
- Much of the early focus on innovation centered on support for funding of new, often costly technologies. This strategy proved difficult to implement and achieved mixed results, in part due to the recognition that a wider range of partnerships would often be necessary to achieve success.
- Innovation has assumed an increasingly important role in discussions of development finance, sometimes with multiple meanings but most often having to do with a desire for greater impact, a related desire for more engagement with the private sector, and frequently a related focus on greater financial leverage (as measured by co-financing) and financial sustainability post-project.

Ch. 2: GEF and the Evolving Landscape for Financing Innovation

More than 25 years after the creation of the GEF, the landscape of finance relevant to global environmental problems has changed dramatically.²⁵ The GEF was effectively a unique source of risk capital for global environmental projects at the time of its creation. There are now multiple climate funds, and the expectation is that the new Green Climate Fund will become the dominant player in this sphere very soon. [See Text Box: Multilateral and Bilateral Climate Funds] Much larger sums are going into “green” investments, some consistent with conventional risk/return criteria while a small but growing sector accepts some combination of financial and “social” return. Financial creativity is also reflected in new financial products like green bonds and performance guarantees to “de-risk” investments and attract private investors to environmental projects. Donors have joined with commercial banks to screen innovative financing ideas and provide seed funding.²⁶ As an estimated \$100 trillion is held globally in long-term assets, even a relatively small shift in the investment strategies would be sufficient to address global environmental needs.²⁷ These changes in the financing landscape encompass both the sources of

²⁴GDI, 2014.

²⁵ References to a “new financial landscape” have been part of the literature on global finance since about the time the GEF was created. See OECD, *The New Financial Landscape: Forces Shaping the Revolution in Banking, Risk Management and Capital Markets* (1995). However, a focus on the implications of this trend for development seems to have come later. See, e.g., W. Grais and Z. Kantur, *The Changing Financial Landscape: Opportunities and Challenges for The Middle East and North Africa* (World Bank Policy Research Working Paper, 2003).

²⁶ Global Innovation Lab for Climate Finance, <http://climatefinancelab.org/>. See further discussion of this initiative below, p. 41-42.

²⁷ See generally OECD, *Institutional Investors and Long-Term Investment* (May 2014), <http://www.oecd.org/finance/OECD-LTI-project.pdf>. The challenge and opportunity associated with appealing to long-term investors as a source of investment for green growth in developing countries is reviewed in IFC,

funding, as well as the landscape of how and through which instruments those funds are used. While the design and marketing of financial products have traditionally been viewed as “non-technical” and thus arguably not matters for STAP, the existence of an expanded and less risk averse financial system has changed the context for GEF operations in ways highly relevant to GEF strategy, and thus also important for STAP deliberation.²⁸ As will be discussed, some opportunities for innovative technologies, business models, and policies are derivative of, or closely linked to, this new financial landscape.²⁹

TEXT BOX: Multilateral and Bilateral Climate Funds

One of the most striking features of the changing financial landscape since the creation of the GEF has been the rise of multiple targeted environmental funds. This has been especially true for climate change, an international agreement with 165 signatories and 197 Parties, most of whom contribute relatively small amounts of greenhouse gases but are at great risk from sea level rise, more severe droughts, and other climate impacts. Donor funding and other “mobilized” investment has consequently become central to the climate regime, leading to multiple climate funds, bilateral as well as multilateral, with overlapping objectives and eligibility criteria.³⁰ While many are quite small, many of these funds were established to support investment in mitigation or adaptation efforts that are innovative and can catalyze sustainable investment. The diversity of funds creates opportunities for risk-sharing, shared learning, and collaboration, particularly in areas that support innovative technologies, business models, policies. The Overseas Development Institute and their partners track the status of the multilateral and bilateral climate funds shown below, which illustrates the diversity of sources and aims:

“Mobilizing Public and Private Funds for Inclusive Green Growth Investment in Developing Countries” (2013), pp. 53-62.

²⁸ The GEF Instrument and STAP Terms of Reference do not define the boundaries of “scientific and technical” issues and broadly empower STAP to convene expert working groups to advise on “specific technical aspects of project design and provide advice on *technological options, cost-effectiveness and related social issues.*” (TOR, par. 11) STAP is further to “advise the GEF Council regarding contemporary issues of the global environment and how to address them; *provide a forum for integrating expertise on science and technology, including their social, economic and institutional aspects; function as an important conduit between the GEF and the natural and social science communities and relevant technologists, and, synthesize, promote and galvanize relevant and up to date contributions from them.*” (TOR, par. 13)

²⁹ While discussions of “innovative financing” often focus on the instruments used (e.g., green bonds), this paper will highlight how creative financing approaches address specific market failures, allow risk sharing and/or transfer among various parties, and the opportunity for blending level public and private resources to greater effect.

³⁰ See generally, WRI, *The Future of the Funds: Exploring the Architecture of Multilateral Climate Finance* (March 2017), http://www.wri.org/sites/default/files/The_Future_of_the_Funds_0.pdf

Fund	Fund Type	Fund focus
Adaptation for Smallholder Agriculture Program	Multilateral	Adaptation
Adaptation Fund	Multilateral	Adaptation
Amazon Fund	Multi Donor National	REDD+
Australia's International Forest Carbon Initiative	Bilateral	REDD+
Biocarbon Fund	Multilateral	REDD+
Clean Technology Fund	Multilateral	Mitigation - General
Congo Basin Forest Fund	Multi Donor Regional	REDD+
Forest Carbon Partnership Facility Carbon Fund	Multilateral	REDD+
Forest Investment Program	Multilateral	REDD+
GEF Trust Fund (GEF 4)	Multilateral	Multiple Foci
GEF Trust Fund (GEF 5)	Multilateral	Mitigation - General
GEF Trust Fund (GEF 6)	Multilateral	Multiple Foci
Germany's International Climate Initiative	Bilateral	Multiple Foci
Global Climate Change Alliance	Multilateral	Multiple Foci
Global Energy Efficiency and Renewable Energy Fund	Multilateral	Mitigation - General
Green Climate Fund	Multilateral	Multiple Foci
Indonesia Climate Change Trust Fund	Multi Donor National	Multiple Foci
Least Developed Countries Fund	Multilateral	Adaptation
MDG Achievement Fund	Multilateral	Adaptation
Norway's International Climate and Forest Initiative	Bilateral	REDD+
Partnership for Market Readiness	Multilateral	Mitigation - general
Pilot Program for Climate Resilience	Multilateral	Adaptation
Scaling Up Renewable Energy Program	Multilateral	Mitigation - General
Special Climate Change Fund	Multilateral	Adaptation
UK's International Climate Fund	Bilateral	Multiple Foci
UN-REDD	Multilateral	REDD+

Source: ("Climate Finance Update," ODI/HBS, as of Oct. 2016)

Whether financing innovative technologies or business models, these types of activities are most often undertaken by companies or entrepreneurs that are in their early stages and need funding that can play a specific role in the establishment, growth and scale up of the innovation they are developing. For GEF, as well as its partner agencies, this is a critical concept, in large part because supporting innovation – whether it be in technologies or business models and perhaps even for innovative policies – will require funding that can be provided to companies in early stages, where other sources of mainstream finding (whether development finance or other sources of commercial finance) are lacking.

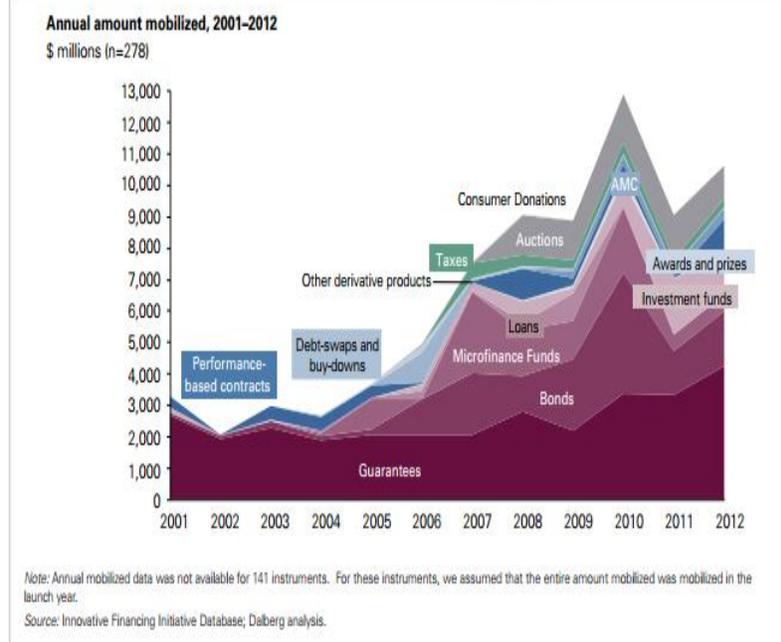
Financing Innovation Versus “Innovative Finance”

Financing innovation is not the same as innovative finance. In its 2014 report titled *Innovative Finance for Development: Scalable Business Models that Produce Economic, Social and Environmental Outcomes*, Dalberg Global Development Advisors articulated a vision of innovative finance as that which:

“(E)ncompasses a broad range of financial instruments and assets, including securities and derivatives, results-based financing, and voluntary or compulsory contributions.” And “Our definition of the “innovation” aspect of innovative financing includes the introduction of new products, the extension of existing products to new markets, and the presence of new types of investors.”³¹

When speaking about “innovative finance,” there is a tendency to mean new financial products or structures. However, in practice “innovative finance” involves financing through existing products, or moving financing to new markets or crowding in new types of investors. The Dalberg report notes that more than 65% of “innovative finance” is provided through established and typical financial instruments, such as debt or loans, guarantees, and bonds.

Figure 8: Innovative financing has grown through the introduction of new instruments



³¹ Global Development Incubator (AFD; Citi; GDI; and Dalberg), “Innovative Financing for Development: Scalable Business Models that Produce Economic, Social, and Environmental Outcomes,” Sept. 2014; <http://2uqnr73tzny3sl15p2nqglls.wpengine.netdna-cdn.com/wp-content/uploads/2016/02/Innovative-Financing-for-Development.pdf>

What is more important about “innovative finance” is not the instrument(s) that is deployed, but how specifically such financing addresses specific market failures, allows risk sharing and/or transfer among various parties, and the level of and coordination among sources of public and private financing. In these projects where financing is “innovative,” the instruments used (e.g. debt/loans, guarantees, grants/convertible grants, etc.) are most often effective if the structures are relatively simple³². Further, Dalberg report notes that the focus on innovative financing is shifting from a focus on the sources of funds to be raised (e.g. “crowding-in” new types and categories of investors) to one focused on the delivery of “positive social and environmental impacts”, including approaches that deliver such impact through market-based instruments wherever possible. The figure below shows how a variety of financial products have been used in innovative ways to expand into new markets or attract new investors.

Figure 3: Innovative financing instruments introduce new products, expand into new markets, and attract new participants

	What is innovative?			How does it support development?		
	New Product	New Market	New Participants	Mobilize Resources	Financial Intermediations	Deliver Resources
Securities and Derivatives						
Bonds and Notes			X	X	X	
Guarantees		X	X		X	
Loans	X			X		
Microfinance Investment Funds		X	X		X	
Other Investment Funds		X		X	X	
Other Derivative Products	X	X		X	X	
Results-based Financing						
Advanced market commitments	X	X			X	
Awards and Prizes	X				X	
Development Impact Bonds	X					X
Performance-based contracts			X			X
Debt-swaps and buy-downs	X			X		
Voluntary contributions						
Carbon Auctions (voluntary)	X	X	X	X		
Consumer Donations			X	X		
Compulsory charges						
Taxes	X			X		

Source: Global Development Incubator (AFD; Citi; GDI; and Dalberg), “Innovative Financing for Development: Scalable Business Models that Produce Economic, Social, and Environmental Outcomes,” Sept. 2014³³

Over the last two decades, GEF has engaged in new ways to deploy its own financing, including by moving beyond simply grant making into non-grant instruments, including debt, guarantees, some equity and

³² Ibid

³³ Ibid.

performance-based grants/loans. In addition to GEF, most donor governments and some philanthropies have been critical in the field of “innovative finance,” and have helped catalyze new types of investing.³⁴

In parallel (and sometimes in tandem), the field of impact investing for emerging markets, particularly with a focus on environment and social impacts, has grown over this same timeframe. Impact investments are “investments made into companies, organizations, and funds with the intention to generate measurable social and environmental impact alongside a financial return.”³⁵ A recent survey of 62 investors defined by these criteria found that the value of impact investments under management had increased from \$25.4 billion in 2013 to \$35.5 billion in 2015 – a growth rate of 18% per year. Over 60 percent was dedicated to emerging markets, and approximately 70 percent was allocated to private debt and private equity. The market of impact investing was approximately \$8.7 trillion in the US in 2016, up 33% from 2014 and reflecting growing interest from investors.³⁶ The *2016 Biennial Report on US Sustainable, Responsible and Impact Investing Trends* from the US Forum for Sustainable and Responsible Investment notes that:

“Much of this growth is driven by asset managers, who now consider environmental, social or corporate governance (ESG) criteria across \$8.10 trillion in assets, up 69 percent from \$4.8 trillion in 2014.”³⁷

While this trend appears to be most advanced in developed countries; there are exceptions. For example, in South Africa, pension funds are legally required to consider ESG considerations along with ROI in their management.³⁸

³⁴ See IEO Brief on Non-Grant Instruments (March 2017) and GEF Programming Directions for GEF-7 sections on Green Finance (pp. 70-73), Green Infrastructure (pp. 74-77), and the Balance Between Grants and Concessional Loans (pp. 181-83).

³⁵ Global Impact Investing Network, 2016. About half the investments were based on expectations of risk-adjusted market returns; the rest were defined by “closer to market rate” and “capital preservation”. Participating institutions were a diverse group including major commercial financial companies and public development finance institutions. *Impact Investing Trends*, https://thegiin.org/assets/GIIN_Impact%20InvestingTrends%20Report.pdf

³⁶ *The 2016 Biennial Report on US Sustainable, Responsible and Impact Investing Trends from the US SIF Foundation*, <http://www.greenmoneyjournal.com/january-2017/the-2016-biennial-report-on-us-sustainable-responsible-and-impact-investing-trends-from-the-us-sif-foundation/>. A broader definition of sustainable investing including all (1400) institutions signing the UN Principles of Responsible Investment approaches \$60 trillion in assets under management but arguably is a weak indicator of behavior. R. Kropp, “Many Large Mutual Funds Continue Failure to Address Climate Change,” *Sustainability Investment News*, Jan. 7, 2017, <http://www.socialfunds.com/news/article.cgi/4224.html>

³⁷ Forum for Sustainable and Responsible Investment, “[2016 Report on Sustainable and Responsible Investing Trends](http://www.ussif.org/trends), <http://www.ussif.org/trends>. While the universe of ESG criteria is broad, the same survey reports that the most often cited concerns are “restrictions on investing in companies doing business in regions with conflict risk (particularly in countries with repressive regimes or sponsoring terrorism) and consideration of climate change and carbon emissions.”

³⁸ <http://sustainablereturns.org.za/southern-african-pension-funds-tackle-responsible-investing/>

In addition to the rise in direct impact investing in emerging markets, several other options for supporting and financing innovation have emerged over the last several years including prizes and competitions; crowdsourcing; and emerging market and private equity funds. There are also specialized advisory firms like Convergence and Aligned Intermediary that attempt to attract additional private capital towards investments that deliver social, economic, and environmental impact; philanthropic initiatives like Shine targeted to specific causes like energy access for all.

Implications of “Innovative Financing” for the GEF

The financial community has demonstrated considerable interest and creativity in the design of instruments to attract greater investment in projects with social and environmental aims. Some of these involve making available conventional financial instruments such as **early stage private equity** which typically would be difficult to obtain for products and services designed to serve emerging markets and address environmental issues due to the perception of uncertain market demand and higher risks. The IFC has over time entered this field building on its initial focus on project finance and experience developing targeted country funds (securities based on a pool of companies from a specific country or region), as a basis for emerging market private equity and venture capital funds.³⁹

Most often the funding required to support the establishment and scale up of innovative technologies and business models is akin to angel or venture capital-type financing and comes in the form of **seed funding** or **early stage funding**.⁴⁰ The former is often relatively small amounts of grant or other capital that is given to entrepreneurs to finance the development of a new product or service, frequently to support product development, market research, business model development and the creation of the management team of the company. Early stage funding is critical for businesses not yet fully commercial, to begin and build out operations, and prove their business models. Early stage funding includes both (i) **start-up funding**: funding that supports product development, initial marketing, and for businesses that have not yet sold products in the market, and (ii) **first-stage funding**: funding that is provided to support commercial manufacturing and sales. Most entities that receiving this type of funding are less than 3 years old and have a product in pilot production.

Historically, development finance institutions generally did not provide seed or early stage funding, and this has been a significant gap in those institutions (and some of their partners, such as GEF) to support innovative technologies and business models. Some DFIs and MDBs are beginning to provide this type of financial support in limited ways. For example, IFC started making early stage venture capital investments more than a decade ago and recently announced it plans to double its portfolio of such investments to

³⁹ According to a recent IFC publication, IFC made the first ever commitment to an emerging market private equity fund in 1978, the basis for a portfolio now more than \$7 billion in more than 280 funds. IFC, *The First Six Decades* (2016), pp. 48-49

⁴⁰ *The Stages in Venture Capital Investing - CFA Level 1 | Investopedia* <http://www.investopedia.com/exam-guide/cfa-level-1/alternative-investments/venture-capital-investing-stages.asp#ixzz4Z8kXuO73>

more than \$1 billion.⁴¹ The IFC approach includes direct investments in technologies, companies, and incubators where there is a gap in early stage financing, as well as support for funds that provide early stage financing.

Another recent development has been the emergence of **targeted solicitations for proposals to address social and environmental problems**, often accompanied by the promise of technical support for proposal refinement and review by potential donors and investors – potentially from a mix of public, philanthropic, and private sources. While the specific structures vary, a leading example is the Global Innovation Lab for Climate Finance, created by a consortium of donor agencies, IFIs, and private financial institutions to invite proposals that address climate change mitigation or adaptation. According to its website (<http://climatefinancelab.org/>), “The Lab identifies, develops, and pilots transformative climate finance instruments.⁴² It aims to drive billions of dollars of private investment into climate change mitigation and adaptation in developing countries.”⁴³ Spin-off “Labs” have been launched in India and Brazil.

Some examples of other initiatives based on this approach include:

- ***Sustainable Finance Collective Asia***, a collaborative funding platform seeking proposals focused in Asia related to the circular economy, sustainable energy, and social impact⁴⁴, and
- ***Shine Investment***, a new initiative aimed at attracting funding from pension and large endowments for energy access. This initiative builds on a partnership from the faith, development, and philanthropic sectors⁴⁵.

⁴¹ A. Shen, “IFC’s Venture Capital Head Nikunj Jinsi: “We Are at a Critical Moment in History”, Huffington Post, Sept. 19, 2016, http://www.huffingtonpost.com/anna-shen/ifcs-venture-capital-head_b_12029208.html

⁴² When an idea is selected by the Lab for development and support, proponents work with a working group of analysts, key stakeholders, and experts to develop or refine the mechanics of their idea; survey similar instruments, ensuring the final instrument is innovative and impactful; develop financial sustainability; assess and document potential social and environmental impacts; map risks and risk mitigation strategies; develop a detailed implementation plan; produce promotional content; present their idea to donors and investors; and potentially receive endorsement from the Lab.

⁴³ Two examples of Lab approved projects are:

- The Water Financing Facility mobilizes large-scale domestic private investment from institutional investors such as pension funds and insurance companies in support of countries’ national priority actions on adaptation and mitigation in the water sector, and
- The Energy Efficiency Enabling Initiative, developed by the Inter-American Development Bank, will mobilize equity finance and deploy technical assistance for energy efficiency in developing countries. Main pillars are: a one-stop-shop fund with a donor-provided public finance equity component; a guaranteed-risking facility to cover losses beyond a share borne by the equity investor; and a technical assistance package that would target energy service providers.

⁴⁴ Sustainable Innovation Finance Collective Asia (<http://www.sfc-asia.com/>)

⁴⁵ Shine Invest (<https://www.shineinvest.org/>)

Prizes and competitions are another creative way to use funds to attract interest in solving problems⁴⁶. Some of the benefits of prizes include public interest (and sometimes free publicity), the potential for attracting a much wider range of effort including actors from unrelated fields and backgrounds; and the fact that payment is made only to the best idea(s) while other efforts are uncompensated. Historically, prizes helped bring about technology to determine a ship's longitude and a technique for canning food to support Napoleon's army.⁴⁷ Such prizes can be used for social as well as commercial purposes. The XPRIZE platform, for example, describes itself as "a highly leveraged, incentivized prize competition that pushes the limits of what's possible to change the world for the better."⁴⁸ Prizes have been awarded for diverse objectives including some related to the environment, e.g., for a method to improve how acidification is affecting the oceans and innovative ways to speed the recovery of seawater recovery from oil spills,⁴⁹ as well as such socially relevant aims as affordable housing, desalination, and safe drinking water.⁵⁰ GEF collaboration with an organization specializing in prizes for social good, Prize Capital, resulted in the commitment of \$50 million to the IFC for the Earth Fund in 2007.⁵¹

GEF could identify initiatives addressed to global environmental objectives and appealing as a partner, providing know-how in the administration of such competitions and potentially cost-sharing prizes. GEF is also well placed to invite one of those organizations to run GEF-specific competitions as/when GEF is seeking solutions to significant climate challenges. GEF could also consider providing resources for scaling up prize-winning concepts that require further financial support. Some competitions such as the Global Innovation Lab provide an endorsement and support for developing requests for funding but no assurance of the financing project developers require. In others, some funding may be awarded but only for a modest initial pilot. This has resulted in some entrepreneurs forgoing the time and effort to participate in the competition, in part because the process is more than six months long. GEF funding could play a key role in catalyzing the concepts that win these competitions and providing seed funding or financing for concepts to scale-up, greatly enhancing the value of such awarded. Furthermore, sponsoring these

⁴⁶ See generally R. Hotz, "Need a Breakthrough? Offer Prize Money!", Wall St Journal, Dec. 13, 2016.

⁴⁷ S. Lohr, "Change the World and Win Fabulous Prizes," NY Times, May 21, 2011, <http://www.nytimes.com/2011/05/22/technology/22unboxed.html>

⁴⁸ www.xprize.org

⁴⁹ <http://www.xprize.org/past-prizes>

⁵⁰ In 2013, XPrize founder Peter Dimandis and several colleagues created HeroX, a platform to enable anyone, anywhere in the world, to create a challenge that addresses any problem or opportunity, build a community around that challenge and activate the circumstances that can lead to a breakthrough innovation. A current competition, the Designing an Abundant Clean Energy XPRIZE Competition, asks competitors to help design a competition that best creates this incentive. <https://herox.com/news/723-this-design-competition-tackles-humanitys-most-dir>

⁵¹ http://www.prizecapital.net/Prize_Capital/History.html. Notably, the project did not itself operate through the competitive award of prizes but rather as a non-grant fund for private sector focused global environmental projects. A link to the terminal evaluation, dated Aug. 2016, can be found at the GEF website: <https://www.thegef.org/project/gef-earth-fund-ifc-earth-fund-platform>

competitions could give GEF visibility into a larger number of potentially innovative concepts addressing climate change.

Crowdsourcing funding in the context of development financing is most often used to describe the process of seeking to fund for development projects by online postings seeking donations or loans. One of the more established examples is a nonprofit organization, Kiva, founded in 2005, which operates through loans as small as \$25 with borrowers in more than 80 countries; total loans exceed \$930 million for over 2 million borrowers, and the repayment rate exceeds 97 percent.⁵² Operating costs are covered by donors so that all public contributions go toward loans. A more risk-tolerant program, Kiva Labs, provides loans with more flexible terms to allow testing new ideas. Kiva-supported projects have included loans to communities in Kenya to connect to microgrids and funding for an NGO in Ghana training entrepreneurs to produce and market clean cookstoves.⁵³ The potential for use of this approach based on very small initial funding suggests potential for GEF collaboration with CSOs using small grants.

GEF Support for Innovation in Financial “Products”

Over the years there has been increasing diversification of financial products used by IFIs and commercial financial institutions, as well as those Agencies that engage with the GEF. There is a long history within the GEF of testing “non-grant instruments.” Non-grant instruments comprise only about 1 percent of all projects approved (see Text Box: GEF Experience with Non-Grant Instruments). These have allowed flexibility for GEF Agencies to develop creative financial approaches to catalyzing investments. As previously mentioned, “innovative financing” is less about the instruments used, and more about how specifically such financing addresses specific market failures allows risk sharing and/or transfer among various parties, and the level of and coordination among sources of public and private financing.

Much of the interest in financial innovation in general, and non-grant instruments, especially, has been the potential for reflows, a potential source of additional GEF resources,⁵⁴ and a closely related desire to leverage additional resources by attracting private investment to ventures otherwise considered too risky and/or producing inadequate returns. However, another rationale potentially of relevance to STAP consideration is the belief that for many purposes non-grant approaches are likely to be more effective and sustainable. The founder of the Acumen Fund, Jacqueline Novogratz, describes the shift in strategy from grants to loans based on experience showing that “grants typically weren’t as effective as equity and loans, especially when trying to create markets for the poor.” And further “Loans and equity also would

⁵² Information from the Kiva website, www.kiva.org [search January 29, 2017].

⁵³ <https://www.kiva.org/about/impact/labs/closingtheenergygap>

⁵⁴ A review by the GEF Secretariat presented at the TAG meetings identified only [17] of 97 projects incorporating non-grant instruments included provision for reflows to the GEF. According to an analysis by the GEF Evaluation Office dated March 2017, “To date \$8.2 million in reflows has been received. It should be noted that GEF-5 and GEF-6 projects have not yet begun generating reflows, and the long time frames involved in the activities financed means that reflows would be generated 10–20 years into the future.” IEO Brief, “The GEF Non-Grant Instrument” (March 2017).

impose a market discipline that could lead to raising more traditional forms of capital over time – and that, we knew, was key to growing the innovations we wanted to support.”⁵⁵ This perspective suggests an issue for evaluation and technical analysis: under what circumstances are non-grant instruments likely to be more effective, and how can such instruments be integrated more effectively in GEF Programming?

TEXT Box: GEF EXPERIENCE WITH NON-GRANT INSTRUMENTS

GEF experience with non-grant instruments is relatively small, notwithstanding the emphasis by GEF on engaging the private sector and getting more innovative approaches to mitigation and adaptation through the GEF pipeline. Of the more than 9,000 projects GEF has funded since its inception, only about 97 projects have used GEF funding in non-grant instruments, less than 1% by

Type	Reflow Expected	No Reflow Expected	Total Number
Debt	5	11	16
Equity	6	5	11
Mixed	2	7	9
Risk	4	35	39
Revolving Fund		22	22
Total	17	80	97

number of projects approved. Of these, only 17 have included provisions for “reflows,” or return of funds to the GEF. The most recent effort to promote the use of non-grant instruments in GEF projects was a GEF-6 set aside of \$100 million outside country allocations through the STAR, as experience has shown that countries rarely wish to use their allocations for private sector projects even when some bonus or incentive is provided. A summary of projects approved under this program shows a total of 9 projects, 8 full size and one medium-size (MSP), using \$97.4 million in GEF funding and attracting co-financing of \$1,637 million. Four were based on equity investments, one a loan, one a risk guarantee, and one a reimbursable grant (funding for project development to be reimbursed if developers obtain financing). Four relate to energy, one to biodiversity, two for forestry and land restoration, and two for fisheries management.⁵⁶ The projects have been approved too recently to allow any assessment of outcomes.

Source: GEF. Non-Grant Instruments web page (<http://www.thegef.org/content/non-grant-instruments>). A table showing the GEF-6 Non-Grant Instrument Portfolio is included as Annex B to this paper

As summarized in a recent review by the GEF Independent Evaluation Office, GEF support for innovative non-grant instruments dates from the earliest days of its operation. Such support includes clean energy finance projects, the use of guarantees to support greater balance sheet leverage by DFIs and blended finance approaches and funds such as the Earth Fund with IFC.⁵⁷ The IEO brief identifies three “issues to address”:

⁵⁵ J. Novogratz, *The Blue Sweater* (2011), p. 228.

⁵⁶ “GEF-6 Non-Grant Instrument Portfolio” (summary prepared by GEF Secretariat) – copy included as an annex to this paper

⁵⁷ IEO Brief, “The GEF Non-Grant Instrument” (March 2017). See also IEO Brief, “GEF Engagement with the Private Sector (March 2017) (both available at the IEO website (<http://www.gefio.org/>))

- (i) Diversification: the climate finance landscape is crowded, but the GEF “can distinguish itself and continue to support private markets in biodiversity and land degradation where external financing is a viable growth option for private firms and where the GEF remains one of the few financiers of other Convention areas.”
- (ii) Complexity in financial structures, and consequently transaction costs, are an issue. “A number of terminal evaluations point to the challenges involved in implementing innovative structures, and advocate for simplicity in design.”
- (i) “Many nongrant projects set overly ambitious targets for implementation results which require midcourse correction, resulting in implementation delays and additional transaction costs.” Reflow projections seem overly optimistic.

The design of non-grant instruments for biodiversity and land degradation projects, an opportunity the IEO highlights, may be suitable for STAP consideration as these projects often involve a mix of technical and financial issues. Some recent partnerships in this space illustrate the types of non-grant instruments recently announced for natural resource objectives. The ***Coalition for Private Investment in Conservation*** was announced jointly in September 2016 by the International Union for the Conservation of Nature, the Nature Conservancy, Credit Suisse, and Cornell University.⁵⁸ The announced premise of the Coalition is that projects with good environmental and financial returns can make a significant contribution to the estimated \$200 - \$300 million annual funding gap in conservation investment. Another example is ***Debt Conversion for Marine Conservation and Climate Adaptation in the Seychelles***. An innovative financial agreement facilitated by NatureVest, the investing unit of the Nature Conservancy, is supporting the creation of a marine reserve through a loan to the government of the Seychelles allowing purchase of \$21.6 million in sovereign debt at a discount.⁵⁹ Debt payments will repay the loan and fund marine conservation and climate adaptation efforts.

Key Insights from Chapter 2

- At the time of its creation, the GEF was almost unique – the one exception being the Multilateral Ozone Fund, a much more targeted fund limited to a single issue. The challenge was seen by many as demonstrating that relatively small payments for “incremental” costs could bring about much larger commitments by the World Bank and UNDP. In recent decades, the financial landscape has changed dramatically, with multiple environmental funds (especially for climate), a dramatic growth in the global financial market including long-term assets under management; the creation of investment funds with some focus on non-financial, social returns; and new forms

⁵⁸ IUCN, “New coalition launches to scale private conservation investment at IUCN World Conservation Congress,” Sept. 3, 2016, <https://www.iucn.org/news/new-coalition-launches-scale-private-conservation-investment-iucn-world-conservation-congress>

⁵⁹ <https://convergence.finance/knowledge-detail/3p1S3pSTVKQYYC2ecwaeiK>

of fund raising utilizing social media. To date, relatively little of these new financial pools have been directed toward global environmental needs in developing countries and GEF goals.

- In this new, expanded financial landscape, the challenge for addressing global environmental problems is to shift a relatively small share of the trillions of dollars under management to “green” investments in developing countries. While finding attractive instruments such as green bonds are part of the answer, more often solutions are to be found in the application of established means of financing (debt, guarantees, equity) to new markets, through new partnerships engaging new participants, with creative means of risk-sharing. The OECD, financial analysts, and other experts are tracking this trend and reporting on the opportunities and challenges.
- New initiatives with donor, commercial, and even philanthropic support are soliciting innovative, commercially sustainable solutions to environmental and development challenges. These programs are critical for the early, highest risk stage of new ventures and often provide support for guiding, mentoring, and piloting ideas that otherwise would have little chance of mainstream funding.
- The GEF has been largely a grant-making entity since its creation with relatively limited experience using non-grant instruments. Making non-grant projects attractive for recipient countries has not always been easy or consistent with other strategies such as country allocations. With the growth of other funders in this space – especially the Green Climate Fund – there is also a question about what GEF can do of unique value⁶⁰. Some of the most significant opportunities may be with respect to natural resources and biodiversity, as commercial approaches to these sectors has been much slower to develop than with respect to climate change. There is a perception that non-grant approaches may achieve better and more sustainable outcomes for addressing many problems.

Ch. 3: GEF Experience Financing Innovation

Whether financing innovative technologies, business models or policies that support innovation or using its funding in “innovative” ways, the GEF has had an interest since its inception in promoting innovation. These examples illustrate both the established role of the GEF as a sponsor of innovative projects but also some of the associated challenges, including constraints due to other GEF priorities (e.g., the country allocation system) as well as the complexity and risks inherent in such efforts.

⁶⁰ The IEO notes that among the issues raised by non-grant instruments is added complexity and transaction costs. A reliance on grants may be a key reason why, as a recent WRI paper notes, the GEF has lower administrative costs (despite longer approval times) than the other major climate funds. J. Thwaites and N. Amerasinghe, *The Climate Finance Architecture the World Needs* (Blog), March 10, 2017, <http://www.wri.org/blog/2017/03/climate-finance-architecture-world-needs>

Building on the discussion of the changing financial landscape described in the previous chapter, this chapter reviews the lessons of GEF support for innovation along three areas of frequent relevance to GEF objectives:

- Funding to support innovative technologies,
- Funding to support innovative business models, and
- Funding to support policy innovation.

(Innovation can take other forms, although often overlapping with those discussed – see Text Box: Institutional and Social Forms of Innovation.) In some cases, GEF support was critical to advance the adoption or scaling of a specific type of technology or business model. More often, GEF support was critical to promoting innovation across a number of these aspects, including not just a new approach, but also new ways of financing those activities (e.g. financial innovation).⁶¹

Text Box: Institutional and Social Forms of Innovation

While a comprehensive review of innovation in all its dimensions is beyond the scope of this paper, two additional elements are of sufficient relevance to the GEF to merit brief discussion. Each is often closely associated with the three topics discussed below.

One is *institutional* innovation – the organization of government to facilitate greater effectiveness in the management of global environmental objectives. GEF may also wish to explore giving more focus to the role of institutions as contributors to an enabling environment for innovation. Since 2007, a consortium of public and private organizations with a shared belief in the importance of innovation for promoting economic development and solving global problems have produced an annual ranking of countries by their innovation capabilities and results.⁶² A key tenet of this effort is that it is possible to measure innovation capacity – the report is based on approximately 80 indicators – and that international cooperation, public-private partnerships, and national policymaking can improve prospects for innovation in developing countries.⁶³ Promising examples are given from Sub-Saharan

⁶¹ It should be noted that for many large renewable energy projects, despite declining costs, finding sources to “de-risk” the commitment of large amounts for long time periods remains a fundamental problem most likely beyond the resources of the GEF. For example, at a cost of \$685 million the Lake Turkana wind project was the largest single private investment in the history of Kenya, expected to add between 15 and 20 percent to the country’s generating capacity when completed in 2017. The World Bank had initially agreed to cover risks associated with transmission line delays but withdrew, and the project was only able to close when the Africa Development Bank and EIB stepped in. The US Overseas Private Investment Corporation (OPIC) also played a key role with an agreement to provide up to \$250 million in investment guarantees. P. Cookson, J. Kuna, and E. Golla, “Benefits of low emission development strategies: The case of Kenya’s Lake Turkana Wind Power Project,” LEDS in Practice, Jan. 2017, <http://ledsgp.org/wp-content/uploads/2017/01/Kenya-Benefits-Case-Study-FINAL.pdf>

⁶² Cornell University, INSEAD, and World Intellectual Property Organization, The Global Innovation Index 2016: Winning with Global Innovation (2016), <https://www.globalinnovationindex.org/gii-2016-report>

⁶³ Ibid, pp. xxiii-xxiv.

Africa⁶⁴ and detailed case studies provide additional insights into the types of actions that have proven effective in countries such as Singapore.⁶⁵

Institutional issues have been a focus of many GEF projects, often closely associated with challenges related to technical capacity and/or policy barriers. In the biodiversity context, the weakness of public institutions and the feasibility of effective community management options have been recurrent themes, with recurrent efforts for resources and technical assistance to enhance both.⁶⁶ Similarly, an issue for climate change planning under the Paris Agreement has been support for national climate agencies and planning processes.⁶⁷ Institutions with good technical capacity and adequate resources have also been a critical issue for sustainable fisheries management.⁶⁸ A UNDP GEF LDCF project aims to modernize African weather services through a strategy that includes expanding the skills and objectives of weather agencies to include business outreach and tailored weather products with the potential for revenue generation, a transformation that may require some combination of a revised mandate, new staff, and commitment to move in new directions.⁶⁹

Community engagement and outreach, or *social* innovation, represents another frequent focus of GEF projects. For example, the World Bank Africa Community Outreach Programme for Conservation and Sustainable Use of Biological Resources was a medium-size project to conserve biological resources of global significance through a public education and awareness program using local and traditional means of communication to promote incentives for local community participation in implementing the objectives of the Convention.⁷⁰ A UNDP GEF climate adaptation project in Bhutan organized local workers to manually reduce the threat of outbursts from glacial lakes, protecting downstream communities while also creating local employment.⁷¹

⁶⁴ Ibid, pp. xxv-xxvi

⁶⁵ Ibid, pp. 133-39.

⁶⁶ C. Barret et al, "Conserving Tropical Biodiversity Amid Weak Institutions," *Bio-Science*, June 2001, vol 51, pp. 497-502,

https://www.researchgate.net/profile/Christopher_Barrett2/publication/228264694_Conserving_Tropical_Biodiversity_Amid_Weak_Institutions/links/0fcfd50cf0f576dfc7000000.pdf

⁶⁷ See, e.g., website of the Partnership on Transparency in the Paris Agreement, <https://www.transparency-partnership.net/>. ("The Partnership promotes ambitious climate action through peer-to-peer learning on transparency and NDC implementation. It promotes best practice for enhanced transparency on GHG mitigation and adaptation strategies. It continues to serve as a platform for promoting the exchange of experience between developing, emerging and industrialized countries in order to build mutual trust through transparency and to contribute to closing the ambition gap.")

⁶⁸ MRAG, *Towards Sustainable Fisheries Management: International Examples of Innovation* (2010), http://www.pcfisu.org/wp-content/uploads/2010/12/MRAG-report_best-practice-examples1.pdf

⁶⁹ UNDP, *A New Vision for Weather and Climate Information Services in Africa* (2016).

⁷⁰ <https://www.thegef.org/project/africa-community-outreach-programme-conservation-and-sustainable-use-biological-resources>

⁷¹ UNDP, *Reducing Climate Change Risks and Vulnerabilities from Glacial Lake Outburst Floods in Bhutan* (undated website, <http://www.undp.org/content/bhutan/en/home/ourwork/ccaadaptationandrr/successstories/glofprevention.html>).

GEF Support for Innovation in “technologies”

For the purposes of this paper we define technological innovations as follows:

Definition: **Technological innovations** comprise new products and processes and significant **technological** changes of products and processes. An **innovation** has been implemented if it has been introduced on the market (product **innovation**).

As already discussed, support for new technologies was among the earliest GEF priorities – and a source of both some successes and failures. This was largely a response to the lessons of the pilot phase (1991-94), which made clear that GEF resources were inadequate to significantly impact GHG emissions with a strategy based on paying the incremental costs of short-term response measures.⁷² There is still clearly an awareness and interest in new technologies to address global environmental challenges – both for mitigation and adaptation needs - and there are few international sources of development finance that can specifically lend their support to financing innovative technologies.

There were several challenges with this approach, including difficulties engaging the relatively small number of private firms involved in making the new technologies – most of which were in early formation, start-up or just at the beginning of their “growth.” These entities presented a combination of challenges for GEF and its implementing Agencies, including the simple fact that the financing required for these types of firms was smaller, and more aligned with early stage-type of funding. Also, the lack of strong government sponsors prioritizing the technologies meant that each effort came with more risk, as well as

⁷² “The GEF expects that technological learning and economies of scale (also called cost “buy-down”), achieved at least in part through GEF projects, will reduce long-term costs to commercially competitive levels. Such industrial “learning curves” have been documented for a range of technologies and have been applied to renewable energy technologies as well. This program assumes that when technology costs decline sufficiently, technologies will be adopted and replicated by the private sector. For many technologies in this program, the “buy-down” process will take many years or even decades; the GEF’s goal is to accelerate this process.”⁷² E. Martinot and O. McDoom, Promoting Energy Efficiency and Renewable Energy: GEF Climate Change Projects and Impacts (2000), http://www.martinot.info/Martinot_McDoom_GEF.pdf

high(er) transaction costs for project implementation.⁷³ (See also TEXT BOX: A Recurrent Challenge for Innovative Projects: When to Introduce/Adapt New Technologies, Business Models, and Policies in Emerging Markets?)⁷⁴

Following a review of this experience, STAP recommended in 2004 that the GEF largely abandon the effort to buy-down first costs and instead to “play more of a facilitating role, for example, by entering into more partnerships with the private sector. And more attention should be paid to developing

A Recurrent Challenge for Innovative Projects: When to Introduce/Adapt New Technologies, Business Models, and Policies in Emerging Markets?

The mixed experience with GEF support of solar thermal power plants versus efficient lighting and solar lamps points to one of the vexing issues in technology transfer programs: when is an emerging technology ready for transfer/adoption in developing countries? Two examples of clean energy technologies receiving substantial investment in developed countries are offshore wind energy and battery storage. The first offshore wind farm, a little smaller than 5 MW, was built in Denmark in 1991; last year a 700 MW project off the coast of the Netherlands was approved at a cost of over \$2 billion. Interest from financiers has grown as well, with interest from long-term investors like pension funds replacing higher cost equity and commercial banks.

While the market for battery storage is very different from that of offshore wind, declining costs associated with increasing production has followed a similar pattern; prices dropped to \$350/kwh in 2015 from \$1,000 in 2010. Estimates are costs may drop a further 16 to 20 percent with each cumulative doubling in manufacture. (Landberg, 2016) Electric vehicles have been the largest source of demand due to tax incentives in the US, but with price declines applications are increasing for utilities and distributed energy systems. However, regulatory incentives may be needed to promote demand in a wider range of applications.

While this issue may be most obvious for the introduction of new technologies, the same issue arises with respect to other forms of innovation. When and how should global environmental funds promote new products and ideas in emerging markets? The answer may come partly from the climate plans (NDCs) being prepared by developing countries in response to the Paris Agreement but will no doubt also be influenced by the availability of funds to reduce the risks and lower the costs of initial investments.

⁷³ SOLAR THERMAL PORTFOLIO: A STATUS REPORT (prepared by the World Bank), GEF/C.23/Inf.9, April 22, 2004, https://www.thegef.org/sites/default/files/council-meeting-documents/C.23.Inf_9_World_Bank_Solar_Power_Report_FINAL_5.pdf

⁷⁴ Reference for projections of future battery costs: R. Landberg, “Battery Cost Plunge Seen Changing Automakers Most in 100 years,” Bloomberg Technology (online), Oct. 11, 2016, <https://www.bloomberg.com/news/articles/2016-10-11/battery-cost-plunge-seen-changing-automakers-most-in-100-years>

supportive policy and regulatory frameworks which reduce the cost of energy services. . .⁷⁵ The definition of who to partner with, and what these “partnerships” should look like remained less clear. As recommended by STAP, more recent GEF support for new technologies has largely been in the form of projects addressed to removing barriers to financing, testing new business models, and reforming policies. (But see Text Box: Time for a Fresh Look at “Breakthrough” Technologies?)

Time for a Fresh Look at “Breakthrough” Technologies?

While GEF support for innovative technologies has become more limited and targeted, private sector-led initiatives may indicate a need for a fresh look at the opportunities in this approach. One example is the Gates Breakthrough Energy Coalition, established to promote investment in “breakthrough energy innovation based on four criteria: climate impact; the potential to attract capital; scientific merit; and filling gaps.”⁷⁶ The Coalition distinguishes its approach from both traditional public sector support and private sector technology investors, and seeks “a different kind of private investor who is willing to put truly patient and flexible risk capital to work in service of a long-term commitment to new technologies.” The existence of an organization of private investors with this philosophy suggests it may now be possible to address some of the earlier barriers to OP7 projects, particularly the need to engage with the private sector and to mobilize much larger sources of risk capital. Thus, some reconsideration of the conclusions reached by STAP in 2004 may now be timely.

The non-grant set aside within GEF consists entirely of projects based on these principles. Sometimes the challenge was more about adapting technology to local needs and circumstances as opposed to the creation of something truly *new*. Technology “transfer” was, in part, key to the support GEF provided, as many truly technological innovations in the early days of GEF were made in developed markets, but support was lacking for their transfer and application in emerging contexts. For example, the GEF was a very early and major supporter of concentrating solar power projects – some of the largest projects in the history of the GEF. While slow to achieve success, these projects provided a foundation of knowledge and political support that was fundamental to projects that followed and additional funding provided by other funds including the CIF. Some additional examples from the GEF portfolio include:

1. **Biodiversity Technologies:** GEF support for biodiversity-related technology was included in a project to support engagement with industries such as cosmetics, agriculture, and pharmaceuticals. The first project is an effort in Panama (GEF ID:4780) to prospect for nature-based products of interest to the pharmaceutical and agro-chemical industries; the project

⁷⁵ Statement of Julia Carabias, Chair of the Scientific and Technical Advisory Panel (STAP) to the Global Environment Facility (GEF) at the GEF Council meeting, Washington DC, May 19, 2004, <http://www.stagef.org/sites/default/files/stap/wp-content/uploads/2013/05/May-2004.pdf>

⁷⁶ <http://www.b-t.energy/ventures/>

engages major private sector partners to transfer technology and is a direct response to the signing of the Nagoya Protocol on Access and Benefits Sharing.⁷⁷

2. **Technology Transfer Centers & Needs Assessments:** Another way GEF has supported technology development and deployment has been through the support of technology needs assessments, knowledge sharing, and capacity building. The GEF-4 Poznan Strategic Program on Technology Transfer, a response to a decision at COP13, was a \$50 million effort that included support for needs assessments, associated projects, and knowledge sharing. In GEF-5, GEF agreed to support Climate Technology Centers and a Climate Technology Network as a means of building capacity and sharing knowledge.⁷⁸
3. **Technological Innovation in Building Materials Efficient Brickmaking:** A project to transfer and adapt technology for energy efficient brick-making (a very energy-intensive process) in Bangladesh builds on an earlier project in China, and included sharing of experience through an on-site visit of a team from a Bangladeshi university.⁷⁹ The enhancement in local capacity is considered perhaps as important as the short-term improvements in processes, illustrating the often close relationship between capacity building and technology transfer.
4. **Agriculture Innovation: Drought-Resistant Seeds:** GEF adaptation projects have supported the introduction of drought-resistant seeds and sharing of knowledge on water harvesting and management. This type of technology adaptation and transfer has been done in East Africa,⁸⁰ while in Bangladesh the need has been for seeds tolerant of high salinity due to salt-water intrusion.⁸¹

Many emerging technologies appear to offer the potential for helping address global environmental challenges, particularly digital technologies as discussed in the 2016 World Development Report: Digital Dividends and explored in a 2013 GEF Forum.⁸² Mobile phone communication is now reaching even remote areas in Africa providing access to banking services, emergency weather alerts, and a range of other information. In many countries, these are provided for free and available through verbal menus

⁷⁷ GEF IEO, "GEF Engagement with Private Sector," par. 86.

⁷⁸ GEF, "Transfer of Environmentally Sound Technologies,"

https://www.thegef.org/sites/default/files/publications/GEF-TechTransfer-lowres_final_2.pdf

⁷⁹ Ibid.

⁸⁰ <http://www.africa.undp.org/content/rba/en/home/ourwork/climate-and-disaster-resilience/successstories/ethiopia-climate-change.html>

⁸¹ <http://www.africa.undp.org/content/rba/en/home/ourwork/climate-and-disaster-resilience/successstories/ethiopia-climate-change.html>

⁸² <http://www.worldbank.org/en/publication/wdr2016>. The GEF, with STAP support, organized a forum on enhancing the use of Information, Communication and Technology to address global environmental challenges in December 2013, hosted by IBM.

that avoid the need for literacy.⁸³ For example, a program in Niger is allowing farmers to control their irrigation systems remotely by mobile phone while also collecting real-time weather and climate data, improving agricultural productivity and water management.⁸⁴ A combination of low-cost sensors, the Internet, and high-speed data processing is enabling new conservation services such as much better watershed management⁸⁵ and tracking endangered species to facilitate protective efforts.⁸⁶ Application of remote sensing has also created new opportunities to provide information to rural communities. For example, a Swiss Re program in Kenya uses satellites to monitor vegetation available to livestock and triggers financial assistance for feed, veterinary medicines and water trucks when drought gets so bad that animal lives are at risk.⁸⁷

GEF Support for Innovation in “business models”

As a recent analysis in the Harvard Business Review concluded, “In emerging markets, developing a new and innovative business model often is far more important to achieving revenue goals than is technological superiority or being a technological innovator.”⁸⁸ The GEF experience is very much in line with this assessment, especially with problems that present challenges very different from those in developed countries – e.g., selling to very poor populations, overcoming weak infrastructure, addressing cultural barriers, reaching rural areas without established distribution systems. While the GEF has -- and is -- supporting many efforts to address these challenges, there are as in the other types of innovation new models and opportunities emerging from the private sector and civil society that offer the potential for new partnerships. For the purposes of this paper, we define innovation in business models as follows:

Definition: **Business model innovation** is the development of new, unique concepts supporting an organization's financial viability, including its mission, and the processes for bringing those concepts to fruition.

An example that illustrates the importance of business models, particularly when promoting products and services for poor populations, is the record of donor projects attempting to promote adoption of cookstoves with designs and construction that are more fuel efficient, faster cooking, and much less polluting. Technologies that meet these objectives have been demonstrated for many years and have

⁸³ Such services are being facilitated in a growing number of countries by an NGO, Human Network International (www.hni.org).

⁸⁴ M. Astruc, “African entrepreneurs lead the way in climate change adaptation,” WIPO Magazine, Dec. 2016, pp. 12-19

⁸⁵ S. Harper, “Big Data’s Big Handprint,” Env’tal Forum, March/April 2017, pp. 22-27, chesapeakeconservancy.org/wp-content/uploads/2017/03/harper.pdf

⁸⁶ “Born to be Wild,” Smithsonian, April 2017, p. 19.

⁸⁷

http://www.swissre.com/global_partnerships/insurance_payout_helps_herders_save_drought_stricken_livestock_in_kenya.html

⁸⁸ HBR Analytic Services, Business Model Innovation in Emerging Markets: New Opportunities and Challenges, April 2016, https://hbr.org/resources/pdfs/tools/17129_HBR_Qatar_White%20Paper_FNL.pdf

been shown to reduce deforestation and improve the health and safety of children who currently suffer from the air pollution and fires associated with traditional stoves⁸⁹. Low quality cooking fuels cause an estimated 4 million deaths per year, as well as significant emissions of black carbon – a potent contributor to global warming.⁹⁰ Recognizing the potential global environmental benefits, GEF has supported multiple projects in different countries supporting the cleaner cook stove agenda (some through the Small Grants Programme).⁹¹ A World Bank study in 2012 reviewed 19 projects addressed to fuelwood management or improved stoves implemented by the World Bank over 20 years at a cost of \$1.2 billion, many with GEF support. The Bank invested a comparable amount in biogas for cooking with limited impact: “Despite the recognized benefits of clean cook stoves for health, local environment and climate change, their large-scale adoption and sustained use are not yet occurring.”⁹² While technology failures are an issue, the primary barriers have been non-technical – lack of local awareness, affordability issues, poor distribution channels, and cultural resistance to changes in cooking practices. The design of good projects also faces practical challenges including the need for detailed, time-consuming upstream studies with high transaction costs relative to the volume of lending leveraged.⁹³

⁸⁹ The Global Alliance for Clean Cookstoves, announced in 2010, responds to the needs of the estimated 3 billion people who rely primarily on wood, charcoal, or dung as fuel for cooking and heating their homes. REFERENCE

⁹⁰ Sims, R., V. Gorsevski and S. Anenberg, Black Carbon Mitigation and the Role of the Global Environment Facility (STAP Advisory Document, 2015), <http://www.stapgef.org/node/1607>. See generally V. Dehejia, “The Cookstove Conundrum,” NY Times, April 23, 2012, https://india.blogs.nytimes.com/2012/04/23/the-cookstove-conundrum/?_r=0; M. Gunther, “These cheap, clean stoves were supposed to save millions of lives. What happened?,” Washington Post, Oct. 29, 2015, https://www.washingtonpost.com/opinions/these-cheap-clean-stoves-were-supposed-to-save-millions-of-lives-what-happened/2015/10/29/c0b98f38-77fa-11e5-a958-d889faf561dc_story.html?utm_term=.77993fc24ba9

⁹¹ E.g., Rwanda (http://cleancookstoves.org/resources_files/charcoal-value-chain-and.pdf); Mali (<https://www.thegef.org/news/clean-cookstoves-save-lives-reduce-carbon>); India (<http://cleancookstoves.org/partners/item/21/874>); Pakistan (<http://www.sgppakistan.org/Downloads/New%20SGP%20Brochures/SGP%20EE%20Cook-Stove%20-%20Manual.pdf>); Cambodia (<http://www.geres.eu/en/dissemination-of-improved-domestic-cookstoves-in-cambodia>); and Nigeria (<http://www.un.org/esa/ffd/ffd3/commitments/commitment/ethanol-gel-clean-cookstoves.html>)

⁹² K. Ekouevi, “Scaling Up Clean Cooking Solutions” (IFC, 2013), <https://www.ifc.org/wps/wcm/connect/84f1630042bd9584b2e3be0dc33b630b/Scaling+Up+Clean+Cooking+Solutions+-+Koffi+Ekouevi.pdf?MOD=AJPERES>. Post-project studies have found new stoves are often abandoned: “When journalist Meera Subramanian visited a village in northern India that had been declared “smoke-free” after a nonprofit distributed biomass cookstoves there, she found that women had stopped using the stoves because they didn’t like the design or because the stoves broke, burned more wood (not less, as intended) or didn’t get foods hot enough.” M. Gunther, “These cheap, clean stoves were supposed to save millions of lives. What happened?” Oct. 29, 2015, https://www.washingtonpost.com/opinions/these-cheap-clean-stoves-were-supposed-to-save-millions-of-lives-what-happened/2015/10/29/c0b98f38-77fa-11e5-a958-d889faf561dc_story.html?utm_term=.7b900d8d3e3d

⁹³ Ekouevi, 2013. Partnerships with NGOs and social enterprises able to devise very localized programs have had more success. One example is a Grameen Shakti program in Bangladesh combining soft credit, adaptive

Some examples of the effort to develop effective business models from the GEF portfolio:

1. **Public/Private Collaboration on Climate Information Services:** Sometimes the challenge is to convince public agencies to more effectively engage with the private sector to deliver public goods – a process broadly described as public-private partnerships or PPPs. An example from the GEF LDCF portfolio is the UNDP program Climate Information for Resilient Development in Africa (CIRDA).⁹⁴ This project aims to improve weather and climate information in Africa, including emergency warnings of extreme events, by a combination of low-cost, automated weather stations, modern software systems for weather forecasting, and mobile phone communication essential for climate change adaptation. One option being tested is to place stations on cell phone towers to address security and power needs and facilitate maintenance, all common problems in Africa. The link to ICT creates further opportunities for innovation; the project sponsored a “hackathon” that supported the design of software products feasible if -- and when -- good weather data becomes available.⁹⁵ The hardware and computer systems are widely used and proven outside Africa; the challenge in their implementation has largely to do with the need for institutional arrangements and public-private partnerships that are new to Africa.⁹⁶

technology to lower costs, maximization of income generation, effective after sales service, and consumer-friendly options, such as a buy-back system.

⁹⁴ <http://adaptation-undp.org/projects/programme-climate-information-resilient-development-africa-cirda>

⁹⁵ UNDP press release, UNDP Climate Action Hackathon Accelerates Innovative Approaches to Provide Weather Information to Vulnerable Communities in Africa, Mar 24, 2016, <http://www.undp.org/content/undp/en/home/presscenter/pressreleases/2016/03/24/undp-climate-action-hackathon-accelerates-innovative-approaches-to-provide-weather-information-to-vulnerable-communities-in-africa-.html>

⁹⁶ “While the hardware is relatively straightforward, it can only be applied fully and effectively if the public sector takes the lead to engage a new group of private-sector actors that are working in the climate and weather services space. From a big picture perspective, these partnerships provide an essential ingredient in supporting the enabling environment necessary to increase the sustainable uptake of end-to-end solutions. These partnerships can be leveraged to foster long-term support for the maintenance and integration of climate monitoring systems within existing systems to guide national, sub-national and sector-based planning and budgeting, improve value propositions, and support sustainable revenue generation.” UNDP, *A New Vision for Weather and Climate Services in Africa*, 2016, <http://adaptation-undp.org/resources/communications-products/new-vision-weather-and-climate-services-africa>. The same challenges are likely to confront recently approved GCF projects for improving hydromet services in Mali and Malawi. GCF, “Status of the GCF Portfolio: Pipeline and Approved Projects” (CCF/B.15/Inf.10, Dec. 5, 2016) (Table 4),

[https://www.greenclimate.fund/documents/20182/490910/GCF_B.15_Inf.10 -](https://www.greenclimate.fund/documents/20182/490910/GCF_B.15_Inf.10_-_)

[_Status_of_the_GCF_portfolio_pipeline_and_approved_projects.pdf/11512d24-3902-4840-82b5-dccd4395ff38](https://www.greenclimate.fund/documents/20182/490910/GCF_B.15_Inf.10_-_Status_of_the_GCF_portfolio_pipeline_and_approved_projects.pdf/11512d24-3902-4840-82b5-dccd4395ff38).

Cf. World Bank, “Modernizing Meteorological Services to Build Climate Resilience Across Africa,” Nov. 10, 2016, <http://www.worldbank.org/en/news/feature/2016/11/10/modernizing-meteorological-services-to-build-climate-resilience-across-africa> (describing multi-agency, multi-donor initiative to improve hydromet services in Africa with GCF support).

2. ***Taking Tropical Deforestation Out of Commodity Supply Chains:*** Three commodities, soy, beef, and palm oil, are estimated to account for close to 80 percent of tropical deforestation worldwide.⁹⁷ In response, GEF is supporting an integrated program that aims to turn the sustainable production of key commodities from a niche market and non-scalable specialized operations to mainstreamed business practices – to invent a new business model based on cooperation between the major producers, governments, civil society organizations, and consumers. Transformational change will require success across several strategies including capacity for tracking and reporting, supportive policies, and finance for sustainable management practices.

3. ***Catalysing Ocean Finance: Transforming Markets to Restore and Protect the Global Ocean.*** This example is drawn from a GEF/UNDP joint review, released in 2012, of the International Waters portfolio drawing on six case studies to devise a comprehensive approach to sustain the marine environment – a high level “business model” that would balance commercial activities with environmental constraints.⁹⁸ A key conclusion of this high-level assessment was the importance of science-based planning and barrier removal as a basis for market transformation. The report identifies the need for engagement with four main groups of stakeholders: communities, ocean-impacting industries, policy makers, and financiers – with the potential for “blue economy” outcomes that generate substantial jobs in support of marine ecosystem restoration and protection. While described as market transformation, the objectives are dependent on numerous policy reforms (e.g., removing negative fishing subsidies), developing necessary tools and methodologies (e.g., standards for ship hull fouling), and support for private sector technology R&D.⁹⁹

4. ***Building Capacity, Raising Awareness and Building Distribution Channels: Lighting Africa:*** Some of the most successful projects begin with a recognition that multiple forms of innovation are required. A good example is the IFC/World Bank lighting projects, which started with a pilot project, Lighting Africa, in 2007. Lighting Africa has already enabled 15.8 million people across Africa to meet their basic electricity needs (lighting and mobile phone charging) through off-grid solar products and aims to reach 250 million more people by 2030.¹⁰⁰ (The project seeks to achieve its aims through a broadly framed approach that attempts to identify and address barriers ranging from the availability of good products; the adequacy of distribution channels in rural

⁹⁷ GEF, Taking Tropical Deforestation Out of Commodity Supply Chains, https://www.thegef.org/sites/default/files/publications/GEF_Commodities-R3_0.pdf

⁹⁸ GEF and UNDP, Catalysing Ocean Finance Volume I: Transforming Markets to Restore and Protect the Global Ocean (2012), http://archive.iwlearn.net/globallast.imo.org/globallast.imo.org/wp-content/uploads/2015/01/Catalysing_Ocean_Finance_I.pdf

⁹⁹ Ibid, p. 10 (Figure 2).

¹⁰⁰ www.lightingafrica.org.

areas; consumer awareness and acceptance; financing for sellers (often SMEs) as well as consumers; and product quality assurance to reduce the risk of cheaper, low quality knock-offs that poison the market. Knowledge sharing is also a key part of the strategy with conferences and exhibits increasing in size consistent with the growth of the market¹⁰¹ as well as support for innovative ways to finance purchases by poor households in rural areas.¹⁰²

5. **Insurance Approaches to support Climate Resilience:** Various forms of insurance products represent another form of business model being adapted to promote global environmental objectives. The LDCF includes several examples including the Southeast Europe and Caucasus Catastrophe Risk Insurance Facility designed to insure yields for farmers against risks of droughts and floods more likely due to climate change. The project Scaling up Risk Transfer Mechanisms for Climate Vulnerable Farming Communities in Southern Philippines focuses on expanding access to index-based weather insurance for smallholder farmers.¹⁰³

Outside the GEF, there are many examples of innovative business models worthy of consideration. A concept recently approved by the Brazil “climate lab” and proposed by the Nature Conservancy aims to increase the supply of deforestation-free beef from the Amazon by developing a prototype business that will implement Embrapa’s Good Agriculture Practices with individual ranchers that register to comply with the Brazilian Forest Code.¹⁰⁴ The International Red Cross has developed a novel forecast-based financing system that would automatically trigger disaster response measures in response to warnings of extreme

¹⁰¹ See, e.g., <http://www.terrapinn.com/exhibition/lighting-show-africa/index.stm>

¹⁰² BNEF, 2016. *Off-Grid Solar Market Trends Report 2016*. <https://about.bnef.com/blog/off-grid-solar-market-trends-report-2016/>. Recent blogs by social impact investors have expressed conflicting opinions about the likely impact of Pay-Go business models, particularly for sales in low-density rural areas. G. Neichin, D. Isenberg, and M. Roach, “An Impact Investor Urges Caution on the ‘Energy Access Hype Cycle’,” *Next Billion*, March 27, 2017, <http://nextbillion.net/an-impact-investor-urges-caution-on-the-energy-access-hype-cycle/>, and C. Aidun, D. Muench, and R. Weiss, “Hype in the Energy Access Sector (Finally!),” *Next Billion*, April 6, 2017, <https://nextbillion.net/hype-in-the-energy-access-sector-finally/>. The IFC and FMO, the Dutch development bank, recently announced an investment in a pay-as-you-go system for financing solar energy in east Africa with payments made by mobile money. IFC press release, “IFC and FMO investment in Mobisol helps deliver decentralized solar energy to East Africa,” Dec. 12, 2016,

<http://ifcextapps.ifc.org/ifcext/pressroom/ifcpressroom.nsf/0/13D792D670B9CB768525808700362B80>

¹⁰³ GEF LDCF, FY15 ANNUAL MONITORING REVIEW OF THE LEAST DEVELOPED COUNTRIES FUND AND THE SPECIAL CLIMATE CHANGE FUND (GEF/LDCF.SCCF.20/04, May 12, 2016), par. 39,

https://www.thegef.org/sites/default/files/council-meeting-documents/EN_GEF.LDCF_.SCCF_.20.04_FY15_AMR_LDCF_SCCF.pdf

¹⁰⁴ <http://climatefinancelab.org/press-release/us-brazil-investor-group-picks-three-financial-instruments-can-drive-funds-climate-action/>

weather events, with substantial expected savings in mortalities and economic losses.¹⁰⁵ A US AID project identified several high-value business models that support sustainable landscapes, are profitable, and have potential to catalyze private sector investments based on an evaluation of eight low-emission land management investment strategies in use in Asia.¹⁰⁶ These examples are indicative of the energy and creativity now being applied by diverse actors interested in overcoming some of the seemingly intractable barriers to sustainable environmental businesses in developing countries.

GEF Support for Innovation in “policy”

While innovation in finance and technologies are important to address many climate and development challenges, these efforts often depend on a supportive enabling and policy environment – ideally as a complementary package of initiatives. GEF has supported many innovative approaches to policy over the years. In some cases, policy innovations themselves can be the catalyst for creating the impact in development – a good example is the Uruguay wind energy project, discussed below. Usually, though, it is a combination of policy reforms along with industry, sector and technology measures, when taken together, enable lasting change. Moreover, having flexible financing options to support innovations along each of these areas is crucial for getting the investments made and the policies enacted. The absence of a consistent and supportive policy environment has also been identified as a common reason otherwise well-designed projects fail to achieve their objectives. For the purposes of this paper, we define innovative policy as:

Definition: **Innovation in Policy/”Policy Innovation”** is defined as an approach, regulation, a practice or a legislative policy which incorporates or combines a multifaceted approach to achieve its intended outcomes. In some cases, this may include new regulations or standards which enable others to achieve investment objectives (e.g. climate-smart agriculture, resilient cities), or policies which support pricing mechanisms which enable a level playing field and transparency around costs, value or other metric which is useful for industry, developers and financiers to act.

Some examples of GEF support for innovation in policy from the GEF portfolio include:

1. **Support for Policies to Promote Renewable Energy:** Policy reform has been a major driver in the recent growth of renewable energy in many developing countries¹⁰⁷, and the GEF has made some

¹⁰⁵ E. Coughlan de Perez et al, Forecast-based financing: an approach for catalyzing humanitarian action based on extreme weather and climate forecasts, April 23, 2015, Nat. Hazards Earth Syst. Sci., 15, 895–904, (2015) www.nat-hazards-earth-syst-sci.net/15/895/2015/

¹⁰⁶ US AID and Dahlberg, **SUSTAINABLE LANDSCAPES**. Assessment of business models for sustainable landscapes in Asia (2017), http://pdf.usaid.gov/pdf_docs/PA00MK9D.pdf

¹⁰⁷ As clean energy consultants Energy Innovation state, “policy is the *only* method to drastically reduce carbon emissions.” <http://energyinnovation.org/>

notable contributions to this trend. One of the more notable success stories is Uruguay, which was entirely dependent on a single resource, hydropower, and in low rainfall, years forced to import oil – a threat to the economy in periods of high oil prices.¹⁰⁸ With the help of a \$1 million GEF grant managed by UNDP, in 2007 Uruguay initiated a national wind energy program focused on policy reform and technical capacity building.¹⁰⁹ Key elements of the program were a competitive bidding system for large-scale RE development and a feed-in tariff for smaller-scale systems.¹¹⁰ Incentives were also included to reward early actors. Starting with virtually no wind power at all, the country became a global leader and repeatedly exceeded its targets; the country now aims to generate 38 percent of its electricity from wind by the end of 2017. Evaluations for other renewable energy projects including IFC and World Bank projects supporting solar business development similarly emphasize the importance of measures to create a supportive legal and policy environment.¹¹¹ In contrast, numerous examples demonstrate the likelihood of failure when projects conflict with the policy environment, particularly subsidies for fossil fuels that undermine incentives for clean energy.¹¹²

2. **Natural Resource Management Policies:** While energy policy reforms are the most often referenced examples in the GEF portfolio, there are also good examples from the other focal areas. GEF forestry projects often cite the need for strong natural resource management policies

¹⁰⁸ The risk of high oil import costs in low rainfall years was separately addressed by a World Bank supported insurance product, introduced in 2013, developed in cooperation with Swiss Re – potentially a business model for adaptation to climate change applicable to other parts of the developing world. World Bank press release, “The World Bank Partners with Uruguay to Execute Largest Public Weather and Oil Price Insurance Transaction,” Dec 19, 2013, <http://www.worldbank.org/en/news/press-release/2013/12/19/world-bank-uruguay-public-weather-oil-price-insurance-transaction>

¹⁰⁹ J. Thwaites, “How Uruguay Became a Wind Power Powerhouse,” WRI Blog, March 7, 2016, <http://www.wri.org/blog/2016/03/how-uruguay-became-wind-power-powerhouse>; summary based on M. Westphal and J. Thwaites, *Transformational Climate Finance: An Exploration of Low Carbon Energy*, (WRI Working Paper, 2016), <http://www.wri.org/publication/transformational-climate-finance>

¹¹⁰ A feed-in tariff, or FIT, is a fixed price guaranteed for production of specified sources of power supplied to the power grid, most often used to promote wind and solar energy technologies. A critical feature of such policies is that the price be guaranteed for a time period sufficient for investors to recover costs and generate a return, which in turn enables financing.

¹¹¹ IFC, *Selling Solar: Lessons from More than a Decade of IFC’s Experiences* (2007), p. 18, <http://www.ifc.org/wps/wcm/connect/b5c8428048855621b964fb6a6515bb18/SellingSolar.pdf?MOD=AJPERES>. “A supportive legal environment is essential and should include as many of the following elements as possible: no import duties or tariffs on shs components; incentives for solar pv energy or absence of competing subsidized electricity; publicly disclosed long-term government electrification plans; and a legal basis for enforcing loan collection.”

¹¹² Westphal and Thwaites, “Transformational Climate Finance: An Exploration of Low-Carbon Energy” March 2016 (WRI working paper), <http://www.wri.org/publication/transformational-climate-finance>. The paper reviews examples from Tunisia (fossil fuel subsidies undermine market for solar water heaters); South Africa (uncertain policies hindered RE investment); and Indonesia (geothermal development slowed by absence of leadership and fossil fuel subsidies).

– and enforcement – as essential for project success. The Brazil Forest Service project, for one, emphasized restructuring of national forest management systems to support more effective policy formulation as the basis for mainstreaming sustainable forest management practices into national development policy.¹¹³ Another example is an MSP which supports policy reforms to improve the effectiveness of fisheries management in Africa. The project included several initiatives through the Africa Union and coastal nations to develop and promote “a common understanding of the fisheries reforms necessary to meet the World Summit on Sustainable Development (WSSD) and the 2014 Policy Framework targets.”¹¹⁴

3. ***Policies to Support Climate-Smart Urban Planning:*** Policy reforms need not always take the form of laws and regulations. Some of the most impactful GEF projects have supported development of strategies and planning, particularly at the urban level, while others have promoted voluntary, cooperative approaches based on guidelines and “good practice.” A good example of the former are projects supporting bus rapid transit (BRT) systems, which aim to improve the efficiency and ridership of public buses through dedicated lanes, rapid boarding, and traffic management.¹¹⁵ The GEF approach to transportation projects initially focused on technology solutions like fuel cell buses, electric 3-wheelers, and alternative fuels but starting with GEF-3 shifted to favor support for planning, capacity building, and raising public awareness – all particularly important in promoting adoption of a relatively new approach to urban transportation.¹¹⁶ Building on early collaboration between the World Bank, Brazil, and Mexico City, GEF approved BRT projects in multiple countries in South America, China, Indonesia, South Asia, and Central Asia.¹¹⁷
4. ***Environmental Standards and Best Practices:*** There are also some success stories in the GEF portfolio based on support for non-regulatory collaboratives to define good practice, e.g., for the production and distribution of agricultural commodities, which have historically sometimes been associated with loss of biodiversity and damage to natural resources. Examples include the Green Cocoa project in the Earth Fund set aside¹¹⁸ and the Biodiversity Agricultural Commodities

¹¹³ GEF, *A New Climate for Forests*, p. 11, https://www.thegef.org/sites/default/files/publications/forestry_3.pdf

¹¹⁴ GEF, “Regional Partnership for African Fisheries Policy Reform,” FY2016;

<https://www.thegef.org/project/regional-partnership-african-fisheries-policy-reform-rafip>

¹¹⁵ For an overview of BRT systems, see generally <http://www.climatetechwiki.org/technology/brt>

¹¹⁶ While there are non-trivial infrastructure costs associated with BRT systems, the recommendations of a 2002 STAP workshop and a 2003 urban transport strategy adopted by the World Bank identified support for the planning process as the most likely and effective role for the GEF. S. Karakezi, L. Majoro, and T. Johnson, “Climate Change and Urban Transport: Priorities for the World Bank” (2003), pp. 23-24

(<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.458.2822&rep=rep1&type=pdf>)

¹¹⁷ GEF, “Investing in Sustainable Urban Transport: the GEF Experience” (2009),

<http://www.gtkp.com/assets/uploads/20091123-165835-6293-Investing-Urban-Transportation.pdf>. By one count, the GEF has funded 33 projects with some support for BRT. ClimateTech Wiki, citing Huizenga, C. and Bakker, S., 2009. Applicability of post-2012 mechanisms for the transport sector. Interim Synthesis Consultants Report, Asian Development Bank.

¹¹⁸ <https://www.thegef.org/content/earth-fund>

Program.¹¹⁹ In these projects companies interested in the adoption of good environmental practices work with civil society organizations, academic experts, and representatives of affected populations to agree on best practice.¹²⁰ There is also an increasing role for non-legally based policies within the financial sector, which often relies on “good practice” in the absence of clear policy guidance (as in many emerging markets) and as a source of transparency when dealing with new concerns like climate risks. Some examples were discussed in chapter two.

Other examples of support for innovative policies for global environmental benefits exist and often are part of public policy design. For example, many public agencies create and develop innovative policies to help address environmental concerns, such as restrictions on vehicle use. Another interesting example is regulation of public pensions to encourage investment in projects with environmental and social benefits, as was the case with the recent adoption of a law requiring South African pension funds to include investments with ESG criteria¹²¹. These policy reforms included changes to the existing South African Pension Fund Act and the launch of the Code for Responsible Investing in South Africa (CRISA) appear to be promising models for replication elsewhere. Other areas for innovative policies that can support environmental action include the insurance industry, disclosure standards, and emissions standards. Non-regulatory approaches to conservation in the context of different commodities are also being considered outside GEF projects, no doubt in part influenced by previous GEF projects and models.¹²²

Cross-Cutting Issues Associated with Innovation

This chapter summarizes some conclusions and recommendations that follow from each of the areas of innovation discussed above: financial products, policy, technology, and business models. In each section, we have provided examples of recommendations on how GEF may support innovation in those areas as it moves into its next replenishment. These are not exhaustive, and many approaches complement and/or

¹¹⁹ http://www.ifc.org/wps/wcm/connect/RegProjects_Ext_Content/IFC_External_Corporate_Site/BACP/

¹²⁰ Biodiversity Agricultural Commodities Program; [FIX FOOTNOTE]; GEF Press Release, “GEF is Greening the Cocoa Industry in Ecuador,” April 1, 2011; <https://www.thegef.org/news/gef-greening-cocoa-industry-ecuador>

¹²¹ The creation and adoption of this policy innovation was supported by an IFC Advisory Services program. See http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/learning+and+adapting/knowledge+products/project+examples/sba-project-south-africa-pension-fund for more information.

¹²² See, e.g., Global Roundtable for Sustainable Beef as an influence on McDonalds as described in Forbes, “How McDonald’s Leveraged a Key Partnership to Verify Sustainable Beef,” Aug. 31, 2016, <http://www.forbes.com/sites/cargill/2016/08/31/mcdonalds-partnership-sustainable-beef/#246a5d925672>. See also Greenpeace, Pulp and paper giant APRIL announces forest conservation policy, June 3, 2015, <http://www.greenpeace.org/international/en/press/releases/2015/forest-conservation-policy-APRIL-Indonesia/>. A problem with such voluntary commitments is that they are not always enforced and in this case the agreement has already fallen apart. J. Hance, WWF and Greenpeace break with Indonesia's pulp and paper giant, The Guardian, Dec. 15, 2016, <https://www.theguardian.com/sustainable-business/2016/dec/16/wwf-greenpeace-april-indonesia-peat-forest-canal-pulp-paper-industry>

overlap with others. As the preceding discussion has emphasized, some conclusions are generally applicable and cross-cutting, including:

1. ***Innovation can rarely be accomplished by a narrow focus on any one of the four areas (technology, business model, policy or financial innovation)*** as achieving lasting impact almost always requires a willingness to consider innovation as a function of several (or all) of these areas – particularly if the action is highly transformative or disruptive.
2. ***Innovative elements may be found in many GEF projects and could be more systematically identified and recognized.*** A good example is the “hackathon” to promote software applications of weather data organized by the UNDP CIRDA program. While not a major result or budget item, GEF could encourage such efforts without major effort.
3. ***Significant, lasting impact usually requires time, persistence, and some adaptation/learning from failure.*** Rapid success of an innovative approach, while of course welcome, is as likely to indicate that perceived barriers were not very serious (and GEF support not essential) as to reflect some fundamental change.¹²³
4. ***Innovation is a dynamic process and not a one-time event.*** Technologies rapidly evolve and require updating or change (e.g., incandescent bulbs were replaced by CFLs, which in turn are being replaced by LEDs) and what works today may have to be rethought in future projects.
5. ***In the development context, innovative solutions to global environmental problems are often location specific.*** Practical, on-the-ground, solutions vary by region and often even within a country, although sharing experience (e.g., by bringing leaders from coastal cities dealing with rising sea levels together) is often beneficial.
6. ***Partnerships will continue to be a critical component of GEF success, particularly with regard to innovation.*** As the universe of public and private funders with some commitment to supporting global environmental projects has grown dramatically – and continues to increase -- outreach to a wider range of partners, particularly from the private sector, may be key. The GEF may want to consider funding based on leverage through partnerships with a range of financial institutions, as an addition to funding projects and programs. Patience may be required as impacts may take multiple projects over time, particularly with early stage technologies and business models which will often involve some element of “learning by doing.” A strategic approach with multiple partners and a long-term perspective may be necessary, if not always consistent with GEF project

¹²³ When relatively small amounts of financial support result in large amounts of private investment, internal project evaluations tend to question whether concessional support was needed at all. See, e.g., WBG IEG, *Assessing the Impact of IFC’s China Utility-Based Energy Efficiency Finance Program*, (2010), <https://www.ifc.org/wps/wcm/connect/9406978049b1ddeb9cc3dea8c6a8312a/CHUEEWebBook.pdf?MOD=AJPERES>. On the other hand, attribution of results is usually inexact and financial experts argue from experience that modest investments in awareness raising and technical assistance may be a small part of the total project but nevertheless make a significant contribution to making deals happen. IFC, “Leverage in IFC’s Climate-Related Investments” (2013) (S. Patel and R. Music, authors), p. 27 (<http://www.ifc.org/wps/wcm/connect/f69ea30041ca447993599700caa2aa08/Leverage+in+IFC%27s+Climate-Related+Investments.pdf?MOD=AJPERES>).

cycles and evaluative criteria. For example, investments in early stage new technologies may be difficult to reconcile with requirements for country-drivenness, as the benefits may not accrue to the host country.¹²⁴ The conflict between the resource allocation system and efforts to engage the private sector was also noted in a report for OPS5.¹²⁵

Key Insights from Chapter 3

- A deeper exploration of opportunities for GEF innovation requires a closer look at some of the different ways in which new solutions are introduced in responding to specific problems in specific locations. For this purpose, innovation can be defined in many forms; we choose to look at technology, business models, and policy for relevance to the GEF, although often closely linked with *institutional* and *social* interventions.
- The GEF portfolio includes many examples of projects with innovative elements; a review of this experience is helpful in establishing the degree to which innovation has long been a fundamental element of GEF strategy, if not always addressed explicitly. The examples also help identify some of the constraints and challenges associated with being innovative, which often implies greater risk and complexity, the need for greater patience, and more ambiguity in results.
- Support for innovative technologies has a long history within the GEF. In this context, innovation is often the adaptation of a technology to a new environment or application, as opposed to something new in the sense that it has yet to be commercially proven – although the latter has sometimes been the case as well. Immersion in a sector, such as lighting or production of specific commodities, has proven to be key over time as technologies can be dynamic and rapidly changing over time. Many new opportunities have arisen for innovative technologies with the rapid improvement in performance and decline in price for ICT, high-

¹²⁴ This may be changing with national priorities in China; cf Global Lab spin-off in India and prototype in Brazil; another approach is to support similar projects in multiple countries as a coordinated strategy (lighting; modernization of weather and climate information).

¹²⁵ “17. The GEF’s ability to engage the private sector diminished during GEF-4 as a result of the then-introduced resource allocation framework (the RAF). GEF-5 engagement has increased slightly but still lags both in the number and dollar volumes of previous phases. The portfolio analysis reveals that investment in private sector projects appears to have peaked in GEF-3 with declining investment amounts in GEF-4 and GEF-5. The number of projects engaging the private sector peaked in GEF-4, as many projects prepared during GEF-3 became effective during GEF-4. Project numbers decline in GEF-5; although it should be noted that the private sector setaside for GEF-5 has been completely drawn down. 18. Lessons learned from the “Earth Fund” platform, a set-aside designed at the beginning of GEF-4 for engagement with the private sector, revealed that expectations to attract large tranches of private funding to merge with GEF funds did not materialize and were not realistic. As a result the Public-Private Partnership program was re-designed in 2011 for GEF-5 and a project-by-project CEO endorsement requirement was re-introduced. This effectively ended IFC’s involvement, the Agency with the longest history of private sector experience, in new engagements with GEF support for GEF-5.” OPS5 Technical Document #13, *Review of GEF Engagement with the Private Sector (2013)*, <https://www.gefio.org/sites/default/files/ieo/ieo-documents/ops5-td13-gef-engagement-private-sector.pdf>

speed computing, PV power, remote sensing, etc. There is also an increasing awareness that international cooperation and national policies can support greater innovation in developing countries. GEF has done some exploration of these opportunities (e.g. for ICT) but arguably not systematically.

- While much of the focus of technological innovation has been with respect to clean energy, there are also significant emerging opportunities in the other focal areas, e.g., for ICT and remote sensing to help pastoral herders and tracking devices to aid wildlife conservation efforts. GEF may have a greater comparative advantage in these applications because of its multi-focal structure.
- Innovative business models have proven to be among the greatest barriers to addressing problems that affect the poorest and most vulnerable populations. Many seemingly successful technologies such as clean cookstoves have struggled to overcome this challenge, but new business models such as Pay-Go financing appear to offer promise.
- Innovative policies can be among the most transformative and lowest cost measures in GEF projects; a wind energy program in Uruguay is a good example, insofar as policy incentives are considered largely responsible for a dynamic industry previously non-existent in the country.
- Market transformation and scaling up of good but small projects most often requires some combination of multiple forms of innovation. The availability of finance alone is rarely sufficient to achieve market transformation without these other elements.
- Partnerships and outreach will be critical for increasing the role of innovation within the GEF. STAP can support this through its identification of opportunities, experts, and potential partners.

Ch. 4: Conclusions: How Might GEF Promote Innovation?

The expanding world of innovative finance offers new opportunities but also new challenges for the GEF. The potential for increasing the impact of the GEF is significant and worthy of much greater exploration. In every area, the expansion of public and private sources of funding, the increased number of implementing entities (including those in emerging markets), and a larger number of networks offers new opportunities for outreach and partnership. At the same time, this also creates a greater need to avoid duplication of effort and to learn from past failures and those of others.¹²⁶ GEF as an institution and as a funding source can provide a wealth of knowledge and can support innovation along several lines, including innovation in technology, business model(s), policy and, of course, finance¹²⁷.

¹²⁶ “Learning from Failure” is a category for World Bank blogs (<http://blogs.worldbank.org/category/tags/learning-failure>). Contributions appear to be primarily from evaluators and policy analysts as opposed to operational staff. In recent years “Fail Festivals” have emerged as an innovative attempt to legitimize and promote the importance but challenge of learning from development failures: “*Fail Festival – a celebration of failure as a mark of leadership, innovation, and risk-taking in pushing the boundaries of what is possible in scaling ideas from pilots to global programs.*” <http://failfestival.org/events/fail-festival-dc-2015/>

¹²⁷ While the potential for GEF to support innovation is high, it also continues to have room to improve operationally and procedurally to be well positioned to support innovation.

Furthermore, while all types of innovation can be transformative, it can be argued that technological innovation (when applied to the most pressing global environmental concerns) has the potential to have significant positive impact. The evolution of technology is also rapid, and the pace of innovation has been dramatically accelerating over the last decade. The opportunities (and perhaps also the challenges) for STAP and GEF to support new technologies in this context is likely to be a function of (i) ensuring support for innovative applications of new technologies can be developed, transferred or shared with developing countries to address global and local environmental concerns, and (ii) doing so within a timely manner (given the pace of change).

How GEF Might Support Innovation in Financial Products

As mentioned previously, financing innovation is not the same as innovative finance. Innovative finance encompasses a broad range of financial instruments and assets, including securities and derivatives, results-based financing, and voluntary or compulsory contributions, and often implies the introduction of new products, the extension of existing products to new markets, and the presence of new types of investors. However, innovative finance is also about more than creating new financial instruments or products. It is about using financial instruments to remove barriers, successfully share or transfer risks, and crowd in new sources of capital.

In many respects, GEF's work with non-grant instruments has been supporting innovative financial products for some time insofar as such funding has been used in concessional ways to assume and absorb risks and crowd-in other sources of capital. GEF's uses of non-grant instruments have been successful in catalyzing greater private sector investment in specific projects using blended finance approaches deploying instruments such as debt, equity, or risk instruments instead of grants.

Recommendation #1: Increase the Use of both Grants and Non-Grant Instruments, particularly to support Innovative Technologies, Business Models and Policies

GEF's funding can play a critical role in catalyzing innovation, and in providing "innovative finance". However, to date, GEF's experimentation in non-grant instruments has been relatively minor (about 1% of overall GEF approvals by volume), although the value of these types of instruments has the potential to be incredibly important in catalyzing innovative technologies and business models, particularly with the private sector. GEF may wish to consider:

1. ***Increasing the availability of GEF Funding through non-grant instruments.*** Whether through dedicated windows, sector specific allocations or other mechanisms, GEF should consider increasing the availability of non-grant instrument funding to support innovation across all sectors, technologies and businesses. GEF's partner Agencies should continue to deploy GEF funding through non-grant instruments, and should continue to use GEF funding in blended finance approaches particularly to catalyze private investment, to share risks and to remove barriers that prevent scaling of innovative approaches to address climate change.
2. ***Increasing the availability of grant-based GEF funding to support capacity building***

activities that can help entrepreneurs and businesses promoting innovative technologies and business models. Of equal importance is the continued use of grant-based instruments to help build capacity among private sector, including those who are promoting innovative technologies and business models. Grant based resources support capacity building, technical assistance and other efforts that can increase the probability of long-term sustainability in commercial activities.

Recommendation #2: Promote and Encourage Innovation by Funding Competitions and Other Crowd-sourcing mechanisms to develop solutions to climate challenges.

As mentioned previously, prizes and competitions have become increasingly common ways to attract more diverse actors in developing innovative solutions to commercial and public needs. Many of these efforts allow for innovative ideas to be developed. GEF may wish to consider:

1. **Inviting partnerships with organizations sponsoring competitions and other crowd-sourcing mechanisms to address GEF objectives.** The universe of competitions and prizes designed to attract innovative ideas for public goods has increased dramatically in recent years, e.g., the Global Innovation Lab for Climate Finance (now with at least three (3) separate competitions seeking practical solutions to climate challenges) and Global Health Innovative Technology Fund. GEF could identify which of these initiatives could be engaged as a GEF partner providing know-how in the administration of such competitions and potentially cost-sharing prizes. GEF is also well placed to invite one of those organizations to run GEF-specific competitions as/when GEF is seeking solutions to significant climate challenges.
2. **Providing resources for demonstrations, pilots, or scaling up prize winning concepts that require further financial support.** Some competitions such as the Global Innovation Lab provide an endorsement and support for developing requests for funding but no assurance of the financing project developers require. In others, some funding may be awarded but only for a modest initial pilot. This has resulted in some entrepreneurs forgoing the time and effort to participate in the competition, in part because the process is more than six months long. GEF funding could play a key role in catalyzing the concepts that win these competitions, and providing seed funding or financing for concepts to scale-up, greatly enhancing the value of such awarded. Furthermore, sponsoring these competitions could give GEF visibility into a larger number of potentially innovative concepts addressing climate change.

How GEF Might Finance Innovation in “technologies”

The GEF approach to supporting new technologies has evolved considerably from large, and very early support for products based on expected improvements in cost and performance to more modest projects focused more on demonstration and market development – sometimes closely associated with a focus on business models. The need for large investments in “breakthrough” technologies still exists as reflected

in the initiative Breakthrough Energy Ventures and multi-billion dollar investment within the OECD in carbon capture and storage, battery storage, and other means of reducing GHG emissions. The GEF role, however, seems more consistent with technology transfer and helping project developers overcome the widely acknowledged “valley of death” – the gap between support required to develop an early stage commercial product and the growth stage achieved when a product has achieved sufficient market penetration that public support is no longer necessary. There are also technologies of most relevance and benefit for low-income markets that will not be developed without donor support, and which may address global environmental needs.

Recommendation #1: Demonstration projects/projects to help cross the “valley of death.”

While not new, GEF funds can continue to play a key role in financing technologies that need both (i) to be demonstrated in the field, and (ii) to be scaled from early stage to sufficient scale to be investible by mainstream investors. The expansion of support for solar lamps and lighting technologies has been a prime example and is also notable for attracting support from multiple donors. Over time, and because of early GEF support, many new players have been attracted to the field of solar lamps and lighting with a willingness to address difficult markets. Another example has been investment in safe drinking water technology.

The potential to support innovative technologies is significant, and GEF should remain open to accepting ideas and proposals for supporting both (i) the demonstration and (ii) the scale up (or both) wherever such technologies prove promising. ***We would emphasize, however, that the role of GEF funding would be highly valuable as (i) seed financing, (ii) early stage capital and (iii) capital for expansion into new markets. In some cases, these efforts may require grant-based support and in others some form of concessional non-grant instrument that provides sufficient patient capital for these technologies to be demonstrated and scaled.***

Recommendation #2: Supporting the transfer of technologies from developed to developing/emerging markets

As a complement to Recommendation #1 in this section, supporting the transfer of technologies from developed to developing markets continues to be an important area. While the examples below are not exhaustive, they represent suggestions where GEF support can help catalyze technology transfer from developed to developing/emerging markets. In some cases, these may require grant-based support, and in others, some form of concessional non-grant instrument that provides sufficient risk sharing or patient capital may be useful. Examples of efforts that support this objective include:

1. ***Support for transfer of battery and storage technologies that can be modular and scalable, and which can be combined with efforts to increase energy access.*** A good example of a technology application well-suited to emerging markets, including low-income countries, is the adaptation of battery technologies to replace diesel gensets. Enormous investment in battery technologies is being driven by car companies and utilities, while some investment is also being directed to systems scaled for the relatively large power needs of homes and businesses in developed

countries. Very little is being directed at the design and price requirements that will meet developing country needs, particularly if linked to solar systems.¹²⁸

2. **Support for weather data collection and information dissemination.** Technology for weather forecasting is advancing rapidly in the developing world, but even basic daily and seasonal forecasts are often not available in poor developing countries. Systems for early warning of storms, lightning, and extreme weather events are also weak or non-existent. Engaging private weather companies as partners may also create opportunities for shared revenue, but institutional barriers and lack of appropriate staff skills continue to impede potential progress.
3. **Support for technologies that allow access to safe drinking water.** The Acumen Fund and other social impact investors have demonstrated that commercially based distribution of safe drinking water is possible. However, existing efforts remain modest and there is a great need to scale up and validate successful business models.

Recommendation #3: Support the Development of Analytical Tools that Enable Markets for New Products and Services with Global Environmental Benefits

As a complement to policy efforts that support climate-risk analytics and tools, the GEF can play a critical role in the development of these applications. In the past, GEF funding helped to address the need for resource mapping for both solar and wind technologies. This support included grants to help map solar irradiation data, wind resource availability, and test drilling to understand the extent of geothermal resources prior to investment. This data and information was critical for the economic evaluation of the project, and essential for investors, and would not have been possible without GEF support.

¹²⁸ The situation is somewhat comparable to that that occurred with the development of solar lamps. Initially it was expected that the largest global lighting companies would be key to developing and distributing these products. Over time, however, it has proven to be smaller and indigenous companies with more localized market knowledge who have proven key to the growth of these markets.

Another issue related to the growth in use of renewable energy technologies is the need to integrate a growing share of intermittent energy sources while continuing to provide power on-demand.¹²⁹ As the market penetration of renewable energy systems increases and potentially becomes the dominant source of power – a short-term possibility in a growing number of regions – this issue receiving increasing attention. However, the technical answers may be location specific, and options for developed countries may not all be appropriate in developing countries.

A different analytical challenge exists in making climate risk information available across all sectors, and efforts are needed to develop analytical tools, products, and services to address climate risks. As mentioned previously, there are currently no widely accepted methods identifying and quantifying climate risks in these ways, and without such tools, efforts by policy makers, financial actors, companies, and consumers to manage and mitigate these risks are highly challenging. The absence of tools and metrics to adequately identify and quantify climate risks – coastal flooding, the likelihood of crop losses, insurance products, etc. – is a challenge to products that address these risks. Such tools will require a combination of climate data, weather data, time horizons and

Urgent Need for Climate Risk Assessment Tools

In addition to supporting the development and deployment of climate-risk assessment tools for countries, projects and financial stakeholders, GEF could benefit from further effort to implement climate risk assessment tools that can be applied to its projects, and can help mainstream these approaches into GEF's portfolio. This challenge was recognized in the June 2016 Report of the STAP Chair to the GEF Council, in which she notes: "Mainstreaming climate resilience across GEF operations has been requested by Council in 2010, yet has not been fully integrated." (STAP Chair report to Council, June 2016) While there is a large amount of climate information available to the global community, it is often not used appropriately in the assessment of climate risks, including by various types of risks and hazards, as well as various timeframes. Challenges include (i) climate data usability, (ii) trust of end-users in the data, and (iii) a perceived lack of technical and financial capacity to conduct adequate climate risk analyses. STAP has partnered with the World Bank Climate Change Group to explore climate data visualization tools, as well look at technical guidelines for the use and interpretation of climate information. Supporting the development of these types of approaches and tools for a variety of users, including countries and policy makers, private developers and sector-wide approaches and financial actors would have a significant impact and could catalyze and accelerate the mainstreaming of climate risk.

¹²⁹ While options for addressing this issue have been discussed for some time in anticipation of high-level RE penetration, e.g., a 2011 IPCC report, the actual need to implement such measures is very recent and no answer has yet proven to be economically and technically adequate. One current example is the increasing reliance on concentrating solar power in Chile, with one (expensive) approach the use of molten salts to allow continuous operation. N. Miroff, A Solar Saudi Arabia, Washington Post, March 31, 2017, http://www.washingtonpost.com/sf/world/2017/03/31/while-trump-promotes-coal-other-countries-are-turning-to-cheap-sun-power/?utm_term=.bc5ec23e8955. A former STAP member, Dr. Robert Williams of Princeton University, also made a presentation on a possible technical solution to this emerging problem at a recent symposium: Toward Reduced Costs CO2 Capture and Storage for Power on Grids with High Levels of Intermittent Renewable Electricity, April 3, 2017.

investment and asset values. The application of these tools must also be simple enough to be implemented widely, quickly, and at a reasonable cost.

The potential to support the creation and deployment climate risk analytical tools that can assess and quantify climate risk (over many time horizons) is significant. In some cases, supporting the creation, development, and dissemination of these tools may require grant-based support, and in others, some form of concessional non-grant instrument that provides sufficient risk sharing or patient capital may be useful to crowd in other sources of capital.

How GEF Might Finance Innovative “business models”

Business model innovation is the development of new, unique concepts supporting an organization's financial viability, including its mission, and the processes for bringing those concepts to fruition. Business models are often the central issue for products/services targeted to low-income populations such as solar lamps and clean cookstoves as up-front costs are a major obstacle, even when products pay for themselves relatively quickly and offer other benefits. The growth of sales of small solar products has been largely driven by pay-as-you-go financing, which allows low-income consumers to pay consistent with their availability of funds. Making technologies that work well is often far less difficult than finding a business model that has broad appeal, as the cook stove example illustrates.

Business mode innovation may be difficult to assess *ex-ante*, but GEF should be focused on supporting entrepreneurs who develop new innovative – and financially sustainable – approaches to delivering climate-smart products and services, such as Pay-Go approaches to distributing energy and water.

STAP could review recent experience with innovative business models in different fields, particularly those that involve selling to poor households in rural areas, to identify promising opportunities and lessons learned. The many examples discussed in the preceding pages, including Pay-Go consumer financing and index insurance for small farmers, are indicative of a rapidly evolving body of experience with some initially promising results.

Marketing sustainability has become an essential element of many recent approaches to conservation, including commodity roundtables and certification programs but face common issues with respect to quality and consumer acceptance. STAP could explore the evolving state of these programs and lessons learned for the design of GEF projects incorporating such strategies.

Perhaps the most significant impact the GEF can make in promoting innovative business models is to embrace and be willing to support sustained engagement where such innovation has the potential to have a transformational impact. STAP could help clarify experience and learning with respect to when and how such support can be most effectively provided. In some cases, these efforts may require grant-based support and in others some form of concessional non-grant instrument that provides sufficient patient capital for these business models to be demonstrated and scaled, and to crowd in private capital.

Recommendations for GEF Support of More Innovative Business Models

1. **Providing seed financing and early stage capital.** GEF funding could play a significant role in supporting businesses/business models that may not yet have commercial returns, but where the potential is significant, and where some financial returns may exist alongside high social benefits and climate-smart impacts. If the social returns are high enough, public support may be justified on a continuing basis as the most efficient means of providing a public good. Some examples of these types of business models may be (i) the establishment of new index insurance products for small farmers, and (ii) modernizing weather and climate information services.
2. **Providing funding to help entrepreneurs with innovative business models build capacity and grow their businesses.** The biggest challenge for successful small businesses in emerging markets, particularly but not limited to the energy sector, is the capital required for growth.¹³⁰ As the GEF focuses increasingly on achieving the scale required for transforming markets, addressing this need will be critical.
3. **Providing capital for aggregation vehicles,** such as investment funds like Acumen. These types of financing vehicles often fill a gap in the local financial ecosystem for funding for early stage entrepreneurs, and GEF funding can play a key role in supporting these types of vehicles focused specifically on GEF objectives.

How GEF Might Finance Innovative “policy”

GEF projects that support policies conducive to investment have been among the most impactful, particularly when coupled with measures that address barriers related to finance, technology, and business models. The policy environment, of course, includes legal and regulatory approaches in specific sectors, such as renewable energy policies that allow wind developers to obtain long-term financing or forest conservation laws that effectively protect biodiversity.

However, increasingly “policies” also take the form of informal standards, the development of commonly applied metrics (even if not required by regulation), or the agreement and adoptions of best practices for specific efforts. Such agreements can be as effective as regulations if widely adopted and implemented, and compliance can be monitored. One such example is the Equator Principles, a risk management framework adopted by financial institutions to guide their environmental and social governance approaches in the projects they finance. While applying the Equator Principles is not required by

¹³⁰ “While there is some hype about investing in the handful of established companies, our biggest concern is that *not enough* capital is flowing into the sector to give it the opportunity to prove itself. One must remember that the energy access sector is “asset heavy” – companies finance customer purchases of otherwise unaffordable solar home systems. . . We estimate that \$200 million raised in 2016 will prime the pump to reach just over 1 million households and businesses in 2017 (with an average investment of \$150 per household). But that’s a penetration of less than 1 percent of the potential market in sub-Saharan Africa. Keep this in perspective: it took several billion dollars per year for a decade to enable the mobile phone industry to reach 75 percent of sub-Saharan Africa. As such, \$200 million is not investor hype – it’s closer to capital starvation.” C. Audin, D. Muench, and R. Weiss, “Hype in the Energy Access Sector (Finally!),” Next Billion (Blog), April 6, 2017, <https://nextbillion.net/hype-in-the-energy-access-sector-finally/>

government policies or regulations in many places, they have been endorsed by 89 financial institutions around the world, and cover more than 70% of all project financing debt in emerging markets. Equator Principle banks provide a baseline standard and metric for their ESG screening and risk management.

The opportunity for GEF to support innovation in policy is significant, in particular with respect to the creation of best practices, standards, metrics and reporting. Some specific recommendations for potential GEF support of innovative policies:

Recommendation #1: Greening the Financial System.

Perhaps one of the most important – and newly emerging – areas in the policy space is around financial regulations and policies that can help “green” the financial system to foster accelerating investment in climate-smart activities and the global common. Over the last five years, a number of important bodies of research have begun to explore how financial policy – including banking regulations, pension regulations, insurance regulations, and macro-prudential approaches - can catalyze climate-smart investment. The GEF agencies are effectively placed to develop and promote project and programs that support efforts to “green” the financial system. With few exceptions, efforts here would require grant-based support, as policy level interventions are often undertaken by the public or non-profits sector. Examples of efforts that support this objective include:

1. ***Supporting open-access, standardized systems/platforms for companies and financial institutions to report on environmental, climate and sustainability performance*** (e.g. GRI, CDP, SASB-like approaches);
2. ***Promoting enhanced alignment of financial regulation with environment and climate change across a country’s regulated financial industry*** (e.g. insurance, banking, investors), including supporting the development of disclosure regulations;
3. ***Supporting the development of country road maps for greening finance flows***, including those that help integrate measures and metrics of climate risk into financial flows. These road maps are important for domestic planning, and can easily be integrated into international commitments (e.g. NDCs);
4. ***Supporting the creation and piloting establishment of national green finance institutions with the purpose of accelerating climate smart (both mitigation and resilience/adaptation) investment.***

Recommendation #2: Supporting Policies that Allow for Transparency, Disclosure, Dissemination of Climate Risk(s)

While very complementary to recommendations to support “greening” the financial system, this recommendation focuses specifically on the need to develop a set of tools, analytics and data platforms for understanding and assessing climate risks – particularly for communication relevant to the financial community. The need for these tools was highlighted during recent efforts by the Task Force on Climate-related Financial Disclosures, which had an impressive membership from the financial community, and engaged in widespread external consultation. What is evident is that while disclosure is necessary for a

number of reasons, the ability to assess and quantify these types of risks along a variety of impacts (e.g. heat, sea-level rise, drought, wind, etc.), in a variety of contexts and locations (e.g. the climate risks of parts of sub-Saharan Africa are not similar to those of northern India), and across a number of time horizons (e.g. long term asset life, financial investment life, annual or quarterly), was highly complex.

While risk screening tools are selectively used by the MDBs – although not by all or consistently -- there is no consensus on appropriate methods for identifying and quantifying climate risks in project assessment, and without such tools, efforts by policy makers, financial actors, companies, and consumers to manage and mitigate these risks are highly challenging.¹³¹ ***Some efforts are emerging, mostly in developed economies, and there will be a need to ensure similar efforts are developed for emerging markets and GEF-recipient countries.*** This process for developing these tools will require a multi-faceted effort by many actors including support for government institutions in disseminating climate related information, and efforts for business, investors, and other financiers to assess, quantify and disclose climate-related risks in all its forms -- transition, physical and liability.¹³² With few exceptions, efforts here would require grant-based support, as these type of interventions would often be undertaken in coordination between the public, private and non-profits sector. Examples of efforts that support this objective include:

1. ***Supporting the creation and convening of international, country and regionally-specific working groups to develop and pilot climate risk tools and analytical approaches.*** Working groups should be both sectoral (e.g. infrastructure, agriculture, or water sector) or multi-sectoral, and may coordinate with other standards-setting bodies (e.g. ISO or others).

Recommendation #3: Expanding support for high-impact, sector-specific regulations.

The effectiveness of GEF support for renewable energy policies adapted to differing national needs and circumstances has been among its greatest achievements. This has included climate-smart energy policies including feed-in tariffs and auctions adapted from developed country experience. While a major political challenge to leadership by other players, efforts to reform fossil fuel subsidies (and in some countries to implement carbon pricing) continues to be worthy of support. There is room for further creativity outside the energy sector, including in agriculture, water, biodiversity, and across the financial sector. While the examples below are not exhaustive, they represent suggestions of innovative areas where GEF support can help catalyze innovative policy approaches. In some cases, these may require grant-based support,

¹³¹ One of the authors (Miller) was involved with the first IFC pilot studies on climate risk which sought to illustrate the value of climate risk screening. See, e.g., IFC, Climate Risk Case Study – Khimti 1 Hydropower Scheme, Himal Power Limited, Nepal (2011), https://www.ifc.org/wps/wcm/connect/af11c8804a830dd88614ff551f5e606b/ClimateRisk_Hydro_Nepal_Full.pdf?MOD=AJPERES. The results of these studies were published as early as 2011 but the IFC has yet to implement a climate screening policy.

¹³² A. Miller and S. Swann, "Climate Change and the Financial Sector: a Time of Risk and Opportunity," Georgetown Environmental Law Review, Vol 29, No. 1, pp. 69-110 (2017), <https://gelr.org/in-print/>

and in others, some form of concessional non-grant instrument that provides sufficient risk sharing may be useful. Examples of efforts that support this objective include:

1. **Supporting and capitalizing climate risk insurance pilots** (e.g., the Southeastern Europe and Caucasus Catastrophe Risk Insurance Facility, pilot insurance facility for small farmers in Ethiopia), especially in many low-income countries where the insurance policy framework and the market is still at a very early stage. GEF support to enable this type of product can both (i) provide insurance-like risk mitigation, and (ii) can help transform nascent markets such that insurance itself begins to be more regularly accessed and adopted, helping increase financial resilience when extreme events occur.
2. **Support for policies and regulations that require mobile phone companies to provide climate and weather information.** The rapid growth of mobile phone service in many developing countries has also created possibilities for mobile phone companies to be critical partners in the delivery of information to promote good farming practices and emergency warnings of extreme weather events. Such services can sometimes be required as a condition for licenses required to operate.
3. **Support for the creation and enforcement of building codes that integrate climate resilience.** Building codes and land use planning are critical to enhancing resilience and adaptation. Regulations, and importantly the enforcement of those regulations, can help to transition existing and future buildings, home and communities to a more climate-resilient environment.

Annex A further illustrates some of the potential opportunities for STAP to explore innovative strategies for new technologies, business models, and policies in collaboration with a wide range of experts in emerging fields.¹³³

¹³³ The approach suggested builds on the 2013 *Vision Statement for the GEF*, which lists multiple potential ways to promote innovation in the GEF under the headings increasing access to knowledge and promoting new ways to do business (p. 43).

Annex A: Potential Topics for STAP Consideration to Promote Innovative Approaches by the GEF

STAP has in the past explored opportunities for innovation through outreach and engagement with leading practitioners in fields relevant to global environmental projects. One example is the GEF CEO Forum on Innovation Partnership: Application of Information and Communication Technologies, held in Washington, D.C., December 18, 2013 and hosted by IBM at its Institute for Electronic Government. The table below identifies some of the many possible topics that might be similarly addressed with STAP support.

Innovative Opportunity	Environmental Impact Application	STAP Focus	Expertise Required	Potential Partner(s)
<i>Technology Innovation: Identifying Opportunities and Demonstrating New Technologies</i>				
Greening food production	Chemicals, forestry, water, climate	Technologies for improving the efficiency of agricultural production	Multiple fields across the agriculture value chain	See participants in the Business and Sustainable Development Commission report ¹³⁴
Low cost sensors, remote sensing, and high speed data processing	Potential across GEF focal areas including conservation, water resource management, climate adaptation	Emerging uses for ICT to promote global environmental objectives	Experts in technologies; “futurists” with visions of emerging opportunities	Semiconductor Industry Assoc.; Google; IBM
<i>Technology Innovation: Facilitating transfer of technologies to developing countries</i>				
Mobile Phone and internet applications	Potential across GEF focal areas and SDGs	Possible applications to GEF challenges; a look ahead at technology capabilities	Specialists in mobile phone applications for development; industry representatives	GSMA (mobile phone assoc.); Consultative Group to Assist the Poor (CGAP); Human Network

¹³⁴ *Valuing the SDG Prize in Food and Agriculture* (2016),

http://www.ppv.issuelab.org/resource/valuing_the_sdg_prize_in_food_and_agriculture_unlocking_business_opportunities_to_accelerate_sustainable_and_inclusive_growth

				Int'l; Airtel, Orange, Vodafone etc.
<i>Technology & Business Model Innovation: Supporting development of analytical tools to enable markets for new products and services</i>				
Incorporating large scale intermittent RE with the grid¹³⁵	Climate change	Issues arising from increasing RE share of power to dominate grids	Grid managers, utility system planners, RE experts	NREL, regional grids with high RE penetration; Energy Innovations, Inc
Analytical tools and metrics for identifying and disclosing climate risks	Climate risks, resilience	Evaluating climate risks from a financial perspective; common metrics	Climate impact experts, financial experts for affected sectors	TFCD advisors; Climate risk specialists, e.g., Acclimatise, Four Twenty Seven, Coastal Risk Consulting
<i>Business Model(s) Innovation: Supporting Market Transformation</i>				
Designing innovative models for scaling up investment by incorporating lessons learned	Across GEF focal areas	Common issues in scaling up to achieve market transformation including challenge providing small firms with working capital	Case studies (solar lamps); experts on markets for specific products in specific regions	VC firms and social impact investors active in emerging markets; Global Solutions Summit groups ¹³⁶
Innovative business models such as Pay-Go and index insurance for small farmers	Energy access and climate mitigation; climate resilience	Emerging experience and lessons learned selling to the BOP	Selling to the BOP; communication	GOGLA; Global Index Insurance Facility; International Red Cross

¹³⁵ See discussion, p. 45 and fn 129.

¹³⁶ The Global Cleantech Cluster Association (GCCA), the P80 Group Foundation (P80), and the Global Technology Deployment Initiative (GTDI) (<http://www.globalsolutionssummit.com/gss-2016.html>)

Marketing sustainability (biodiversity, supply chain, new technology adoption)	Conservation through commodity value chains to promote sustainability	Technologies for tracking and compliance; consumer response	Marketing; behavioral psychology	Sustainable commodity roundtables
<i>Innovative Policies/Innovation in Policy</i>				
Greening financial systems	Multi-focal	Strategies for promoting greater awareness and response to sustainability considerations in the financial system	Sustainability heads from financial institutions; social impact investors;	Equator Principles; Transparency focused groups, e.g. Carbon Disclosure Project (CDP); Global Reporting Initiative
Transparency and Disclosure of Climate Risks	Climate change, adaptation	Policies for climate risk disclosure and reporting	Sector specific experts; risk management experts; financial reporting experts	TFCD; civil engineering, standard setting bodies; risk ratings companies
High impact, sector specific regulations	Multi-focal, especially climate resilience	Building codes, insurance, pension, utility regulators	Experts from relevant fields, regulators	Standard setting bodies (e.g., ASHRAE, ISO); associations of regulators (e.g., NARUC)

Annex B: GEF-6 Non-Grant Instrument Portfolio

Project	Focal Area	Implementing Entity	Approach	GEF Funding
Equity investment in biodiversity	Biodiversity	IADB with the Union for Ethical Biotrade	Equity investments in Latin American SMEs to implement Nagoya Protocol on Access and Benefit Sharing	\$10 million with expected return of 13 to 15 percent
Junior equity for renewable energy	Climate Change	Development Bank of South Africa (DBSA)	Investments with below market ROR for small and independent power producers to reduce capital costs	\$15 million with expected co-financing of \$190,450,000
Junior equity for agro-forestry	Land degradation (additional expected biodiversity benefits)	Africa Development Bank (AfDB)	Junior equity investor (6% expected return), fund plans 5-6 replicable agroforestry projects that include plantation forestry	\$12 million with expected co-financing of \$50.8 million
Guarantees and Subordinated Debt for Land Restoration	Land degradation with associated enhancements to the carbon stock	Inter-American Development Bank (IADB)	Funds will be used as guarantees and subordinated loans to finance land restoration and natural resource management activities	\$15 million with expected \$120 million in co-financing
Subordinated debt for energy efficient transport	International waters and climate change	European Bank for Reconstruction and Development (EBRD)	Subordinated concessional loans and security for investments to improve freight transport in the black sea region	\$15 million with expected co-financing of \$155.25 million with expected subsequent follow-on investments of \$250 million
Reimbursable grant for renewable energy	Climate change	AfDB	Funding for RE project preparation to be reimbursed as project developers obtain financing; reflows recycled until 7 th year	\$10 million with \$25 million from AfDB and an expected \$920 million from private investors

			with GEF repayment thereafter	
Equity investment in sustainable fisheries	International waters	Conservation International (CI)	Equity fund for small-scale fishing communities in the Philippines and Indonesia for sustainable fishing practices; expected tenors of 5-7 years and ROR of 10-15% over 10- year life	\$6 million with co-financing of \$35.2 million (including grants for TA)
Blue bonds for fisheries management	International waters	World Bank (IBRD)	GEF loan with an IBRD guarantee to lower the cost of “Blue Bonds” to finance measures to transition from open access to managed fisheries	\$5 million loan supports \$15 million bond issuance and expected total co-financing of \$32 million
Debt Aggregation for Energy Efficient Street Lighting	Climate Change	World Bank (IBRD)	GEF MSP supports International Energy Efficiency Facility to help aggregate city projects to convert traditional street lighting to cost reducing LEDs	