Innovation in Finance, Technology & Policy

Moving Climate Innovation into the 21st Century: Emerging Lessons from other Sectors and Options for a New Climate Innovation Initiative

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EXECUTIVE SUMMARY

The UK Government is committed to achieving an ambitious, effective, and equitable global deal that would limit global temperature rise to 2°C and to helping countries adapt to the inevitable impacts of climate change. Supporting the development and deployment of climate technologies in developing countries is essential to achieving this goal. We need to foster international and local innovation into new, breakthrough technologies and into adapting current technologies to encourage more successful deployment in a broad range of local conditions.

The UK Government commissioned Clean Energy Group (CEG) to research what can be learned from a range of existing international public- and private-sector technology and market development collaborations. The overall purpose of this report is to provide a series of options to structure and implement an international climate technology innovation initiative based on best practices from the agriculture, health, and ICT sectors. The research could also help to inform ongoing international discussions to establish a Technology Mechanism under the UNFCCC, as well as international and bilateral climate programs.

Based on lessons-learned from nine case studies, the paper presents core principles and three options for a climate technology innovation initiative.

A Comprehensive Look at Successful Global Technology Innovation

This report analyses technology innovation models from the agriculture, health and information and telecommunications sectors. Its case studies range from projects like Human Genome Project, to the rise of the mobile phone industry, to why the Global Fund has been so successful and what can be learned from the Consultative Group on International Agricultural Research for climate technology. The authors interviewed more than 40 experts from around the globe who created, partnered with or benefited from these initiatives. It explores how these strategies have evolved, especially in developing countries.

This research aims to identify the lessons and best practices from the agriculture, health and ICT sectors that can be applied to the climate technology sector to create a global climate innovation initiative.

The full report can be found at: http://www.cleanegroup.org/Publications/

THE TECHNOLOGY INNOVATION IMPERATIVE

Climate recovery will require new, much cheaper technologies that serve the needs of the poor. A solid scientific consensus predicts that billions of people, particularly the world's poorest, face threats of flooding, severe storms, drought and shortages of potable water, food insecurity, and increased risks of disease as a result of climate change.[1] Addressing the impacts of climate change and reducing future climate risks will require new technological solutions for adaptation and mitigation. ***Adaptation needs*** span the whole range of sectors from agriculture to infrastructure, water resource management to public health, many of which require cheaper technology solutions. ***Mitigation technologies*** that reduce greenhouse gas emission in developing countries will also be crucial as emerging economies grow rapidly in the coming decades. These include low carbon electricity and transport technologies as well as farming and waste management practices. Specifically, many poor countries aim to scale energy access in the near term. Unfortunately today's technologies are not sufficient to meet these growing energy needs while reducing emissions as required.

The only way to rapidly bring down the costs and scale these necessary climate technologies will be to ***increase innovation all along the technology development value chain***—from lab to product development, to commercialization.

The climate technology innovation needs of developing countries can be summarized into three areas:

- ***Adapt mature technologies*** to local markets;
- Create and scale up ***orphaned technologies*** that do not have clear markets in the developed world; and
- Advance new, ***breakthrough climate technologies***.

From Technology Transfer to Technology Partnerships

The international community has been—at least in international climate discourse—principally committed to meeting the climate technology needs of developing countries through technology transfer from the North to the South. This conception of technology transfer relies heavily on official development assistance to subsidize expensive OECD technologies for developing countries and posits developing countries as passive recipients—or at best imitators.

Developing countries have consistently emphasized ***affordability, national priority setting,*** and ***national ownership*** for meeting their climate technology needs.

Based on the theory and empirical evidence in this report, it is clear that the conventional notion of technology transfer—from North to South—needs to be challenged, if not turned on its head. The conditions for climate technology innovation in the developing world are, surprisingly, in many cases far more conducive to the invention and scaling of disruptive new technologies than in the OECD.

This trend means that developing countries are and will continue to be sources of climate technology innovation. Through collaborative RDD partnerships between Northern and Southern countries and companies, it would be possible to accelerate the process of innovation in developing countries; and also benefit the economies of the developed world in the process.

Intellectual Property Rights Problems are Not Deal Breakers

In international climate technology negotiations under the UNFCCC, the issue of protecting intellectual property rights (IPR) has been a major area of controversy between developed and developing countries—and posited as a major obstacle to technology transfer. The over-arching message from experts in the fields of agriculture, health and telecommunications is that "IP is not the most important barrier—in almost every case you can negotiate a solution."

In fact, IPR solutions for joint product development and innovation involve "normal business practices" for companies around the world—including in emerging economies.

EMERGING TRENDS IN INNOVATION THEORY AND PRACTICE

Over the past twenty years, economic theories of technology innovation have evolved significantly with major implications for climate technology innovation. *There is little evidence to support the view that carbon pricing alone will introduce* significant innovation into the climate sector. All the evidence is to the contrary, that more aggressive interventions are required.

Moreover, from theories of disruptive innovation to new corporate practices of reverse innovation, the North-to-South transfer of technology story does not hold up anymore. There are benefits for the developed world in these trends—through them we gain access to the developing world's culture of frugality.

Innovation Economics—real world economics that focuses on institutions. Innovation economics is a relatively new entrant into the field of innovation theory. It tends to focus on institutions and their capacity to be productive and efficient, so they can drive growth and innovation. Innovation economics argues for a more engaged government role to expressly adopt innovation policies that focus on institutions and the linkages between them. Innovation economics calls for direct public interventions in partnership with the private sector to encourage cost reductions, information sharing, technology transfer and institutional reform, all the elements needed to move climate technology into the commercial marketplace. This is distinctive from neoclassical economic theory, which states that by just setting the price right, through cap and trade for example, will incentivize all the innovation needed to solve climate change.

Innovation Systems. Innovation systems, also called "value chain" analysis or "transition management," is a process that describes a series of sequential activities, where at each step in the process the product passing through this chain of activities gains some value. In this approach, a climate innovation initiative would look at the deficiencies in the value chain of a particular climate technology —from production, to manufacturing, to distribution, to financing—to understand where improvements and public interventions are required to bring about needed innovations to reduce costs and get products to full market deployment.

Innovation requires independence

As a general point about the institutional framework for disruptive innovation, to be most effective, independence is critical.

Disruptive Innovation. Distributed innovation theory demonstrates that new technologies are generally introduced into niche markets where a particular customer's needs are satisfied, often at lower levels of performance and cost. At some point, the products move up the value chain, adding more performance and other characteristics through scale and learning. In a recent paper, Harvard Business School Professor Christensen and co-authors apply the theory of disruptive innovation to clean energy.[2] They argue that the first major customers for clean energy should be "*nonconsumers*"—customers in the developing world not now served by the grid.

Reverse Innovation. Reverse innovation means designing, creating, and manufacturing a product in the developing world with demands for lower-cost products as well as products with different performance and other characteristics. Global companies like General Electric (GE) now use this "bottom of the pyramid" market strategy to create products that are later exported to the developed world.

The process of reverse innovation up-ends the conventional theory of North to South transfer of technology. *The Economist* highlighted this reverse innovation trend—sometimes called "frugal innovation"—in a summary of new innovation trends for the future.

> *The emerging world will undoubtedly make a growing contribution to breakthrough innovations… People who used to think of the emerging world as a source of cheap labour must now recognise that it can be a source of disruptive innovation as well.*
>
> —*The Economist,* "The World Turned Upside Down." April 15, 2010.

Open and Distributed Innovation. Open and distributed innovation is essentially a way to tap the "global brain." It refers to the process of linking numerous people with disparate expertise working in different institutions and countries, to accelerate the deployment of a specific technology. At the firm level, "open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology."[3]

Sun Microsystems co-founder, Bill Joy, put the need for open innovation perhaps the most succinctly when he framed it this way—"No matter who you are, most of the smartest people work for someone else."

Case Studies

The eight case studies presented in this report support the innovation theories described above with empirical evidence. They are based on in-depth literature reviews as well as interviews with over forty experts who work within or closely with the studied organizations. These experts have provided practical lessons on pitfalls and best practices for how to structure a new international climate technology innovation initiative and how to implement a strategy to best accelerate technology innovation and commercialization.

Consultative Group on International Agricultural Research

The Consultative Group on International Agricultural Research (CGIAR) has inspired much interest within the international climate discussions as a model for a global climate innovation initiative. A number of organizations, including the Indian government, the World Bank, and the World Economic Forum, have proposed structuring a network of low carbon and clean energy innovation centers in the model of the CGIAR—to create a Consultative Group on International Energy Research.[4] Thus it is an important case study for deeper research—and clarification on its effectiveness, its impacts, how it functions, and how it has evolved over its forty-year history.

The conclusion of many of the people we interviewed who have been involved in the CGIAR is that the overarching structure of the organization is not the best model to follow. One reviewer very familiar with CGIAR went so far as to say, "CGIAR is the example *not* to emulate…" However, these same reviewers highlighted the critical importance of the research coming out of particular CG centers, the global benefits of which, over its forty year span, have exceeded its total cost many times over.

> *"You don't need a carbon copy of the CGIAR — but you do need to learn the profound lessons from its evolution over the past 4 decades"*
>
> - DFID Senior Agricultural Research Adviser

Moreover, the recent CGIAR review and reform process offers a number of important lessons learned for any new global initiative. That is, while the entire organization may be a poor choice to duplicate, some of CGIAR's programs, in particular the successful Challenge Programs, offer operational models that may be extremely effective for climate. Their most compelling element would be an emphasis on collaboration across countries, centers, private and public organizations—a kind of distributed innovation model.

Global Fund to Fight Aids, Tuberculosis, and Malaria

The Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund) is an international public-private nonprofit organization created in 2002. Its programs are widely lauded as exceptionally effective and unique in their emphasis on results and partnerships.

> *"The Global Fund has done an excellent job. It is the institution of choice for health finance. It's having a serious effect in countries—for some countries it represents 90% of health budget—it's having a massive effect."*
>
> - Carlton Evans, Global Funds and DFIs Department, UK DFID.

Because it does not perform technology innovation itself, the Global Fund may not at first appear to be an obvious case study for global technology collaboration. However, the Fund is an important case study primarily for its unique governance structure, focus on results, and support for innovative programs and financing schemes. Because of perceived failings in existing organizations, the Global Fund's supporters created a new, independent organization and developed a governance structure and procedures unlike any existing international development institution.

In order to create inclusive governance by its constituencies, the Fund is comprised of voting representatives from donors, recipient governments, developing and developed country NGOs, communities affected by the three diseases, and the private sector. The diversity of its Board and its ability to develop creative fundraising has generated a significant amount of popular global appeal for the organization.

Mobile Telephone Take-Off in the Developing World

The uptake of mobile phones around the world represents the "fastest technology adoption in human history," with handset sales volumes reaching over one billion during 2007. By 2008, one in three Africans had access to mobile telephony and today mobile phones are spreading faster across Africa than anywhere else in the world; there are more phones and related services sold every day in Africa than in all of North America.

The rapid diffusion of mobile phones across the developing world has also radically changed perceptions about doing "good business" in emerging markets. Designing products to meet customer needs, crafting innovative business models from the ground up to achieve effective distribution, and aligning prices with what the poor are willing to pay, are some of the lessons the mobile phone story has to offer.

There has been a huge amount of innovation based on mobile phones coming out of the developing world—like mobile banking; this locally incubated innovation is a main reason why mobile phones have taken off. Contrary to convention, transferring technologies from the West to "the rest" is unlikely to suffice to achieve sustainable market uptake. Technologies that can meet local needs and that create opportunity for enhanced income generation have a greater chance at widespread penetration.

Agricultural Value Chains in Sub-Saharan Africa

The share of the world's agricultural exports from Sub-Saharan Africa (SSA) is roughly 2 percent, declining from 10 percent around four decades ago (FAO 2006). Technological innovation that leads to better post-harvest handling and management practices and improved infrastructure has a high potential of helping SSA achieve these needed productivity gains.

The nonprofit organization Meridian Institute manages the *Innovations for Agricultural Value Chains in Africa* project, funded by the Bill and Melinda Gates Foundation. It was developed to bring together leading scientists (purposely from outside of the agriculture sector) with small producers in the maize, cassava, and dairy value chains in Africa in order to identify innovative "out-of-the box" post-harvest

management and processing technologies—a kind of open innovation process. The multi-disciplinary project team identified key bottlenecks and inefficiencies in the dairy, maize, and cassava value chains that became the focus of their innovation concepts.

Open innovation involves a radical shift in corporate thinking—a movement from a closed internal R&D strategy to an external network of innovators.

The team then developed nearly 200 technology ideas, five of which are currently being developed into commercial products. Meridian Institute has since proposed a "Post-Harvest Commercialization Initiative," which would support the commercialization of these and other post-harvest technologies that could improve smallholder farmer food security and income in SSA.

Perhaps the most significant lesson for the acceleration of climate innovation from the experiences of agricultural innovation is the need to provide targeted support to each stage of the innovation continuum and to find ways to bridge the gaps between the different innovation stages.

Public Intellectual Property Resource for Agriculture

The nonprofit Public Intellectual Property Resource for Agriculture (PIPRA) is an independent organization affiliated with the University of California at Berkeley. It was founded with support from The Rockefeller Foundation in 2003 to address intellectual property rights (IPR) obstacles in the development and distribution of poverty-reducing agricultural biotechnologies for poor countries. The fragmented ownership of the intellectual property rights (IPR) in the development of those technologies limited the deployment of new crops for humanitarian purposes.

PIPRA was the first and only entity with a dedicated mission to help developing countries overcome IPR problems to access new technologies. The dedicated nature of an independent organization focused on IPR remains its most critical feature, apart from the progress it has made in the programs it has implemented. Recently PIPRA has formed a global partnership in the climate and other technology spaces to work on IPR problems. This new initiative, established in 2010, is called "Global Access in Action." The partners to this initiative include World Economic Forum, WIPO (World Intellectual Property Organization), and Global Access for Technology for Development (GATD), among others. Launch of the GAA is anticipated at the WEF in late 2011.

Some of the key insights coming out of PIPRA case study include:

- IPR is a solvable problem.
- Project specific IPR solutions may be more effective than global, public patent focused approaches.
- A dedicated IPR organization, with access to technical and legal expertise, may be able to most effectively solve climate technology IPR challenges.

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Eli Lilly and Open Innovation

Since the 1990s, the pharmaceutical industry has faced rapidly declining returns on their RD&D investment dollars. Success rates for highly capital-intensive research is on the order of 10 percent. In response, Eli Lilly, the global pharmaceutical company, created three open innovation platforms to improve its R&D productivity and efficiency.

In 2001, Eli Lilly launched InnoCentive, now a private company, as an internet-based platform that connects its clients (seekers) to a global network of registered "solvers." InnoCentive specializes in

solving scientific problems for pharmaceutical, biotechnology, consumer goods, and specialty chemicals companies. In 2003, Eli Lilly, in partnership with Proctor and Gamble, a consumer goods company, launched YourEncore, which connects companies with retired scientists and engineers to leverage their expertise. In 2009, Lilly launched PD2 (Phenotypic Drug Discovery Initiative), a fully-integrated pharmaceutical network where it shares disease-state assays across an open, collaborative, global team of experts.

These open innovation strategies have played an important role in drug discovery for the company—by expanding the traditional breadth of its in-house corporate R&D and allowing it to access external resources and global talent. While these tools are not a substitute for the traditional, internal models of R&D in the pharmaceutical industry, the open innovation approach has proved to be a successful additional tool for solving particular R&D problems. It has improved a solution rate of difficult technical problems from about 10 percent to about 30-50 percent, a threefold increase in success rate.

Open innovation involves a radical shift in corporate thinking—a movement from a closed internal R&D strategy to an external network of innovators. This new trend in drug development and open innovation are leading the way in corporate support for open innovation.

Product Development Partnerships

Product Development Partnerships (PDPs) emerged in the 1990's as a collaborative public-private RD&D model to develop new vaccines and medicines for neglected diseases. Because of perceived low-profit opportunities and high risks, private companies were unwilling to invest in developing new products for diseases mainly found in poor countries—without some public support.

Today, there are almost 20 PDPs working on neglected diseases from tuberculosis to HIV vaccines to malaria drugs. PDPs have had varying levels of success in the development and marketing of new health technologies—though most are credited with numerous indirect benefits—and most are still at a relatively early stage given that drugs can take decades to develop. Key lessons that come from these experiences include imperatives for funders to be aware of the long timeframes and high risks involved in innovation—and thus take a portfolio approach, to take into account the very different incentive structures of small versus large businesses for participation when developing strategies, and to address the full product development chain as early as possible.

The Human Genome Project

The Human Genome Project (HGP) was established in 1990 in the United States by two federal agencies—to be joined by many others around the globe—to identify and map the 20,000-25,000 genes of the human genome and to determine the sequence of the three billion chemical base pairs in human DNA. In 2003, the complete draft of the human genome was released, two years ahead of schedule.

The HGP was a unique model. Its commitment from the outset was to create a new scientific standard—not only would it reference an entire human genome—but this sequence would be publically available on an open source platform as soon as the information was developed, often the same day. This public database was intended to be used by the biotech and pharmaceutical industry to launch new research and commercial endeavors in the field of genomics. In fact, it is the private sector that has used the bulk of the HGP data to develop and bring new medicines to market. Also, depositing the data into an open source commons underscored the value of sharing data in a "pre-competitive commons"—where there was value in collaboration rather than commercial competition. The creation of a "pre-commercial commons" for genomic data spawned a new open source business model in commercial biotechnology and inspired subsequent private sector commons (SNP Consortium).

Importantly, HGP was not set up as a new formal organization, but rather from its outset, it was established as a consortium of existing national and international research centers, global experts from a

variety of disciplines, and private companies. It was a loosely-affiliated network coordinated through the NIH, DOE, and HUGO—and the largest international science collaboration ever created. HGP successfully engaged multiple entities from many countries, including developing and emerging countries, in an ambitious public project, leveraging public funding worldwide.

SEMATECH Semiconductor Alliance

SEMATECH is a global collaboration of government and semiconductor manufacturers working together in the "pre-competitive" space to help the industry grow and advance. This industry consortium was started initially to strengthen the U.S. semiconductor industry in the mid-1980s, when the U.S. perceived competitive threats from Japan. Within a few years, the entity was so successful that it ended public support for its operations and became fully funded by its industry members. At the same time, its membership expanded to include non-U.S. manufacturers.

The unique feature of SEMATECH is its ability to bring together companies in a fiercely competitive market and figure out ways to have them work together for their common benefit.

> *Through the SEMATECH alliance, industry participants have learned that pre-competitive collaboration is essential in the quest for technology solutions, best practices, cost effective manufacturing, and optimal use of scarce public and private research dollars.*
>
> - SEMATECH 2009 Annual Report

The critical feature of this collaboration is that it focuses chiefly on "pre-competitive" spaces—manufacturing and other product development processes—that benefit all partners, but do not at the same time infringe on their comparative advantage within the industry. It does this by bringing together all players along the semiconductor supply chain, far beyond the initial founding group of manufacturers.

Principles for Low-Carbon and Adaptation Technology Innovation

The following core principles have emerged from the innovation theories and case studies described in this report:

- ***Start by clearly defining the technology barriers and needs with end users to ensure success.***

  Example: World Economic Forum's Global Access in Action initiative found: "Too often in the past, technology transfer for development has failed because it was supply-driven—without real attention to the technological needs of the poor. Companies, research institutes, and universities need to know specifically what the problems/barriers, how technologies will be used, and what the adoption issues are if they are going to successfully apply their knowledge and technology."

- ***Tap the global brain and bank to link global knowledge and finance with local expertise and experience.***

  Example: The successful CGIAR Generation Challenge Program linked experts from over 230 research labs, private companies, national agricultural extension programs, and CG centers, while the key to the successful mobile phones uptake across the developing world was the linking of native entrepreneurs (in almost all cases trained in the West) with international finance. Evolving open and distribution innovation tools (virtual networks, prize competitions,

data sharing systems) and practices (multi-disciplinary teams, cross-sectoral learning) can create international networks and tap global expertise.

- ***Look to developing countries as innovators in their own right through "reverse innovation" where developing countries are not just recipients or imitators of developed country technology activities.***

  Example: Mobile phone innovations, like mobile banking, demonstrate that future technological innovation is likely to come from developing countries. Similarly, the Global Fund relies on program innovations to evolve from the country organizations it supports.

- ***Focus on market or product development—beyond information sharing and policy.***

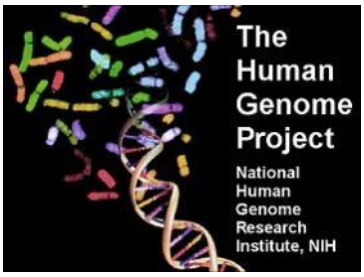
  Example: The Agricultural Value Chains project focused on developing new products to solve specific challenges in Sub-Saharan Africa—five of the technology concepts are being pursued and one is already being commercialized. The Lighting Africa program has spurred significant poverty alleviation impacts by focusing on product development—off-grid solar lighting—rather than high level policy changes.

- ***Systems or value chain approaches are critical to steward new technologies to market.***

  Example: Innovation Economics emphasizes that successful technology deployment must address all barriers along the technology value chain. The African agricultural innovations case study notes a number of technology projects were unsuccessful because they were introduced to solve a particular problem at one step in the value chain—without considering the full product life-cycle process (i.e., the mechanized cassava peeler).

- ***Build public support including high-level political support.***

  Example: One of the keys to the Human Genome Project's success was the high level support it received from U.S. President Clinton and U.K. Prime Minister Tony Blair. At the same time, HGP was able to articulate the benefits of the project to a broad audience to build congressional support for funding. The Global Fund has also been extremely successful at (and attributes some of its success to) building broad public support for its programs through public events and local support groups.



- ***Involve the private sector early and often.***

  Example: The public sector will never have enough money to fund capital-intensive climate technology development alone. All of the case studies have shown that the most effective innovation programs work closely with the private sector to leverage expertise, skills, and funding. In the case of mobile phones' success in Africa, local small businesses and entrepreneurs, linked with multinational telecommunications companies were crucial. The Global Fund includes private-sector participants on its board. The success of the SEMATECH consortium, the GSMA mobile phones industry association, and the SNP Biotech Industry Consortium that came out of the HGP demonstrates that a successful international consortium of private companies can be devised to accelerate new technologies. Working closely with the private sector on IP issues will be essential for any climate technology initiative. As PIPRA learned, it is not worth trying to work

around the private sector on IP; instead, work with them to find solutions faster and more effectively.

- ***Establish partnerships between public, civil society and the private sector.***
  Example: As noted above, involving the private sector is crucial to successful market creation and commercial technology deployment—getting the policy environment right is equally important. Thus a successful climate technology innovation initiative should be structured as some form of public private partnership that includes civil society participation. All of the Global Funds programs require participation from all three sectors. GrameenPhone was created out of a joint venture of a multinational for-profit and an indigenous nonprofit, supported with development aid from Norway and George Soros. SEMATECH was established as private company consortium catalyzed by the U.S. federal government. Exactly how the partnership is structured is likely to depend on the technology and market in question, but this should be a central focus in designing a new initiative.

- ***Treat IP as a solvable problem—and support solutions through a dedicated IPR function.***
  Example: In most case studies, IPR is increasingly seen as a series of specific legal problems, all solvable within "normal" business practice, rather than intractable political and policy problems that stymie new technology innovation. IPR issues should have dedicated institutional support that is demand driven. This could be incorporated within the organization, or a climate innovation initiative could partner with and support the emerging efforts of the World Intellectual Property Organization's *Global Access in Action,* as described in the PIPRA case study.

- ***Independent organizations are critical for incubating innovation.***
  Example: The Global Fund was specifically established as an independent entity, outside of existing organizations such as the World Bank and the UN. Similarly, the CGIAR's Challenge Programs and new Research Programs are expressly established as independent of existing CG center hierarchies.

- ***Operationally lean innovation organizations most often operate with small staff with core expertise—tapping outside, topic-specific expertise as needed.***
  Example: The CGIAR's new Climate Change Agriculture and Food Security program is dedicated to staying small with a core staff of 7 people working with researchers in existing institutions around the world—managing its US$70 million annual budget.

- ***A heavily networked entity is one way for an organization to stay lean, by relying on the capacity of existing organizations to the greatest extent possible.***
  Example: The Human Genome Project, the GSMA mobile phones industry association and the CGIAR's Challenge Programs are all examples of successful organizations whose success depended on being highly networked and leveraging expertise in diverse existing organizations.

- ***Multiple funding sources are critical—public funding should be "seed funding" that leverages additional private sector and other funding.***
  Example: Public funding should be sought from a wide range of governments as well as private foundations and public donations. This has been a key to the success of the Global Fund, which receives funding from almost fifty countries. The Global Fund also receives significant funding from the Gates Foundation, individuals, and creative public-private fundraising programs.

Illustrative Options For A Climate Technology Innovation Initiative

Based on the analysis of the case studies described above and the forty interviews conducted with experts, we have identified three possible options for a climate technology innovation initiative. It is important to acknowledge that this paper is only designed to provide the intellectual foundation for a much more rigorous, second-phase scoping and design process. Thus the three options described below are notional without the necessary detail to fully support them at this time. The findings of this report (and the resulting options) were explored further at an international workshop on 24th March 2011, with a wide range of interested stakeholders from developed and developing countries including governments, UN agencies, private sector, and academic institutions. This will help further develop options and prepare for the next phase of scoping and design.

Option 1: Country Specific—Projects Only, No Coordination

This option would consist of a few country-based project initiatives that would not be supported or managed by any global coordinating organization or function. These would be distinct projects that would initiate this effort, with determinations made later about the need for any other supporting entity.

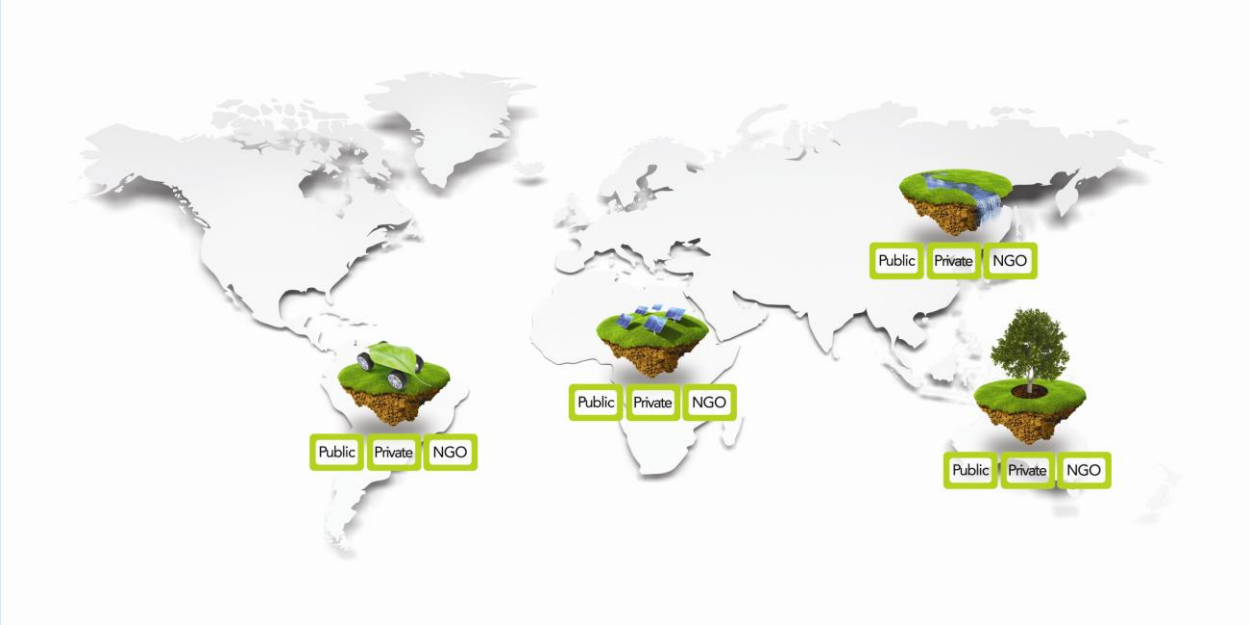
Key design elements:

- Importantly, this option would consist only of implementing projects, without any backup coordinating entity or organization.
- Projects would focus, like Lighting Africa, on climate product development in developing countries in the areas of mitigation and adaptation.

The projects would use an "innovation systems" or "value chain" approach to identify local institutional barriers to change, and propose solutions to overcome them.

Pros: This process would likely be easiest to establish, with simpler institutional problems and smaller amounts of funding.

Cons: This approach may not achieve global scale and scope, and limits learning across projects and technologies.



Option 2: Country Specific Projects with Global Network

This second option would consist of a light, virtual global organization—independent but perhaps linked to some other global body—that would initiate and support a few different technology/market "nodes" in select countries. The theory behind this option is that of a bottom-up, in-country strategy linked to a global, open innovation architecture of experts. A combination of in-country capacity building and a dedicated, international, technology innovation support network are the essential elements of this structure. A few early projects would be started in different countries with specific technologies. The other key distinguishing feature would be a virtual team working in a global network—using various open and distributed innovation tools to tap into the "global brain" to solve implementation problems.

Key design elements:

- A Core Team would provide leadership, identify and vet specific technology concepts, strengthen networks, aggregate and share knowledge.
- Project Teams would implement projects in countries where the technologies will be deployed.
- Virtual Resources would efficiently link project teams with various experts, as needed, in the areas of technology design, finance, market analysis, policy, and IP issues.

Pros: A global organization, managing multiple projects in different locations and technologies, can allow for faster learning and for greater replication and scale.

Cons: This would be more complicated and expensive to execute than Option 1 (though perhaps less expensive than Option 3). In addition, the creation of a virtual network would be a new endeavor that would take some time to structure and put in place.

Option 3: Central Global Organization with Multiple Projects

This third potential option would be a new centralized division or entity within an existing global organization such as the World Bank/IFC—or under the UNFCCC technology "centre"—that would rely on in-house staff to initiate and manage many technology projects in multiple countries.

Key design elements:

- It would rely on an existing organization to support the project development and implementation.
- It would likely rely on existing expertise to vet projects.
- It would possibly be able to raise funds more quickly given likely relationships with donors.

Pros: This option could likely be established most quickly and avoid the challenges of new organizational set up. It would be recognized by existing partners based on past performance. It would also be able to rely on past performance to argue for taking on a new responsibility and new funding.

Cons: This option may be less country-led and may not be able to adequately account for individual country priorities. Moreover it is inconsistent with the emerging consensus that independent organizations tend to be more capable of managing innovation.

NEXT STEPS – A DESIGN PROCESS TO ESTABLISH THE INITIATIVE

Given the many variables and trade-offs involved in consideration of options, we recommend that the next step should be a design process. This could take the form of a "design charette"—a strategic planning exercise where major potential partners, funders, and other organizations are brought together in person for a several-day session to develop a framework for the global technology innovation initiative.

This effort would require new funding. It is important to address this funding question head on in the design process. An in-depth business plan should be developed that could be adopted to "stand up" a pilot as early as the end of 2011. Toward that end, this design process should start as soon as possible. Delaying the start of the design process would likely jeopardize the serious strategic planning needed to develop a collaborative and consensus plan by the end of the year, in time for the 2011 COP in Durban, South Africa.

ENDNOTES

[1] UNFCCC, "Climate Change: Impacts, Vulnerabilities and Adaptation in Developing Countries (2007). http://unfccc.int/resource/docs/publications/impacts.pdf

[2] Talukdar, Shuman, Horn, Michael B., Alton, Rich and Christensen, Clayton M., "Winning and Losing Bets on Green Technologies" (April 28, 2010). Available at SSRN: http://ssrn.com/abstract=1597315

[3] Chesbrough, H.W, *Open Innovation: The new imperative for creating and profiting from technology* (Boston: Harvard Business School Press, 2003) p. xxiv.

[4] Delhi High Level Conference on "Climate Change: Technology Development and Transfer," Chair's summary (October, 2009). p. 7 paragraphs 9 and 10. http://moef.nic.in/ downloads/public-information/Chair%27s%20summary-FINAL.pdf

See also: World Bank, "World Development Report 2010: Development and climate change" (Washington, D.C.: International Bank for Reconstruction and Development/The World Bank, 2009) p. 306. http://go.worldbank.org/FTD88BBDV0

See also: Carlos M.Correa "Fostering the Development and Diffusion of Technologies for Climate Change: Lessons from the CGIAR Model," Programme on IPRs and Sustainable Development (ICTSD: December 2009). http://ictsd.org/i/publications/66697/