GREEN GROWTH INNOVATION IN DEVELOPING COUNTRIES

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Framing the Issue

We are at a promising moment in the development of international policy for green growth and innovation. Despite the ambitious and well-intentioned aspirations of past meetings, over one billion people still do not have access to electricity; water availability and sanitation is improved but not close to universal; and 4 billion people live at the Base of the Pyramid (BOP) on less than $9 per day. Furthermore, the world is not on a pathway to arrest the climate crisis. Climate impacts are already being felt, with the greatest vulnerabilities in the developing world. At the same time, the extended global economic recession has brought fiscal austerity in OECD countries, which has limited public sector's ability to respond.

From this turbulence, however, have surfaced new conceptualizations of development that highlight the role of innovation and new technologies and processes as ways to encourage economic growth while simultaneously transitioning onto a cleaner, more sustainable global economic pathway. The world has renewed impetus, therefore, to build the capacity for green growth innovation into our international and national educational, industrial, governance, and fiscal infrastructures. The need for policy and market innovation for environmentally sustainable development is clear—but the means are complex. The challenges of the 21st century require all countries to move towards cleaner economic trajectories while improving the quality of life of the world's poorest.

Policy Considerations

One critical vehicle for reaching these development, economic, and environmental goals is technological change. Although not sufficient in isolation, technological innovation will continue to advance us toward goals in human health, natural resource sustainability, and social equity. As a result of more widespread economic development in recent decades, global capacity for research and development is evolving broadly across the developed world and emerging economies. Consequently, the diffusion of technological knowledge and devices is shifting away from a unidirectional north-to-south flow to a more networked global innovation ecosystem.

However, we are really only at the initial stages of change, and building on this progress will require action to encourage new ideas and to ensure that those ideas can reach, and

even transform, the market. The challenge of transitioning onto cleaner development pathways is particularly difficult for developing countries, whose need for rapid economic growth often outweighs the importance of sustainable or 'clean' growth. This is one area in which international aid needs to better support developing countries as they design and implement their green growth strategies.

Many policy and intellectual property (IP) tools exist to spur technological innovation, although they vary widely across countries. In addition, dozens of financial products have also been created to diffuse and reduce risk in technology investment. The most effective ones reflect all of the following factors:

- **Relevance to the challenges of green growth at all levels of industry.** The ideal international architecture will be able to support breakthrough technology development at small, medium, and large scales.
- **Capability of stimulating both high-tech and low-tech innovations. Innovations that adapt existing technologies to specific contexts or that enhance their ease of use** could be the key to meeting many LDCs' clean development needs. Policies to stimulate this absorptive capacity would increase the quality of science, technology, and innovation in higher education, retain talent in-country, stimulate technology "discovery" at all levels of innovation (from household through the research laboratories), and to promote economy-wide openness to new technologies.
- **Support for innovation across the technology value chain.** Technology deployment can be encouraged through financial support, logistical support for supply chain development and security, and consumer marketing to improve market penetration. This includes substantial investment in business advisory services to attract international venture capital and to take successful start-ups to full commercial scale.
- **Inclusive financial innovation to de-risk private investment.** Innovative financial products can leverage public investments by de-risking private capital. Examples include first loss funds, sovereign risk insurance, collateralized loans with flexible interest rates depending on project outcomes, etc. There are many funds that are supporting this objective, like the Green Climate Fund of the Climate Investment Funds. The Green Technology Fund, recently approved as part of the United Nations Framework Convention on Climate Change (UNFCCC) negotiations, will likely focus on this as well, possibly through its private sector facility. But most funding has gone to support deployment of proven technologies into developing countries. Little focus has been on providing de-risking support for earlier stages of the research and development demonstration and deployment (RDD&D) continuum.
- **Added value to existing institutions.** It is essential to design a new architecture that compliments existing international initiatives aimed at stimulating clean technology RDD&D. Some such initiatives include the UNFCCC Tech Mechanism, CGIAR, Clean Energy Ministerial, the Green Climate Fund, and Infodev Climate Innovation Centers. It will be important to understand not only the gaps in services provided by these organizations but also which programs have been most successful so they can be replicated in other countries and to other sectors.
- **Attractiveness to investors, policymakers, and developing countries** In this era of fiscal austerity, it will be essential to create an infrastructure with sufficient incentives to leverage public financing from developed countries

From these criteria, three categories of programs offer the most likely value for a renewed international initiative to support green growth innovation: regional science foundations, national business incubators, and dedicated funds to de-risk entrepreneurial investments and stimulate the sharing of intellectual property (IP). These three approaches would, moreover, be more powerful if deployed simultaneously because they address different elements of the innovation ecosystem.

Recommendations for Rio+20

Hundreds of international initiatives exist to promote natural resource sustainability and poverty alleviation in developing countries. However, there remain major gaps in international collaboration. The Rio+20 meeting pro-

vides an almost unparalleled opportunity for expanding the narrative of sustainable development to include the enhancement and restructuring of innovation. The Rio meeting should establish a new international green innovation partnership to hasten the pace and scale of innovation, stimulate international venture capital markets, and broaden international cooperation across public and private partnerships for RDD&D.

Such a partnership could build on the work of existing institutions and be supported by a network of regional science foundations, national business incubators, and investment de-risking funds. This new approach would both build capacity for technology development and adoption, and encourage private sector engagement in developing country research and innovation for green growth.

- **Regional Science Foundations.** Regional science foundations are envisioned as intergovernmental agencies charged with setting regional science priorities, including but not limited to green growth, and deploying funds provided by both member governments and international aid donors to meet these priorities. Such foundations would encourage greater south-south collaboration and applied research into all types of innovation. Funding would cover research grants, scholarships, fellowships, peer-reviewed publications, and cooperative/extension programs with non-profits and firms working in priority areas as determined by the foundation. Such institutions would also support the regular meeting of scholars, practitioners, and funding recipients via research conventions, policy advisory meetings, and other opportunities to share information and network. Possible models include the U.S. National Science Foundation, the European Science Foundation, and the Third World Academy of Sciences, among others. Grant criteria could encourage capacity building and collaboration by requiring researchers to partner with peers at other leading research institutions.

- **National Business Incubators.** To support technology deployment and enterprise development, national business incubators could be established to provide business advisory support, including a full suite of business advisory services and network facilitation to in-country entrepreneurs and start-ups working in all sectors. Such organizations would directly address the need to bridge research and commercialization by entrepreneurs in the private sector. The incubators would be responsible for identifying and conducting outreach to promising entrepreneurs and start-up companies as well as providing a host of business advisory services to them. Services they could provide include but are not limited to: business plan support, networking facilitation, access to international venture capital and supply chains, pitch training, finance training, access to market research, office space, facilitation of technology transfer, and negotiation of IP licenses. Incubators could support and enhance the pipeline quality of existing green technology transfer mechanisms such as the UNFCCC Technology and Clean Development Mechanisms. Possible models include the Infodev Climate Innovation Centers, CIETEC in Brazil, CIEE in India, and university technology transfer offices such as those at the Massachusetts Institute of Technology and Stanford University.

- **Dedicated Funds to De-Risk Investment and Encourage IP Sharing.** Large dedicated funds can encourage private investment in developing country projects or in companies that meet specified social and environmental criteria; in addition they can provide incentives to IP developers to share patent and technology implementation information. A risk capital fund would provide development-oriented financial instruments to investors and project developers for companies interested in deploying innovative technologies. Financial instruments include but are not limited to concessional loans, sovereign guaranteed loans, first loss funds, partial credit or risk guarantees, and equity or quasi-equity investments.