

# TECHNOLOGY TRANSFER IN A NEW GLOBAL CLIMATE AGREEMENT

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## Executive Summary

A successful climate change agreement must help accelerate the “transfer” of climate-friendly technologies from developed to developing countries. This must include direct assistance from developed countries, including substantial and predictable public finance. But the challenge must be understood more fundamentally as one of building strong, sustainable markets for low-carbon solutions. This requires a suite of complementary efforts on multiple fronts, including clear commitments by the major developing countries to the types of national measures needed to create genuine technology demand. Other key elements in a new global climate agreement should include:

strong developed country emission targets to drive the global carbon market and, thereby, low-carbon technology deployment in developing countries; and a new technology body to monitor, assess and advise on technology-related issues. Other elements of a global strategy are better addressed outside the U.N. climate framework. These include: cooperation on research, development and demonstration, which is best pursued through bilateral and plurilateral initiatives; and efforts to reduce trade barriers and resolve intellectual property issues, which are best addressed through the established forums of the World Trade Organization. An agreement in Copenhagen can establish this broad division of labor and spur stronger efforts on all of these fronts.

## Introduction

A new global climate change agreement will not be tenable or effective unless it includes measures to “transfer” technology from developed countries, where most of the relevant know-how resides, to developing countries, where most future greenhouse gas emissions will occur. This central and enduring issue is among the most complex and polarizing in the climate negotiations. It invokes deep-seated tensions between North and South, and bears directly on government treasuries, diverse commercial interests, and ultimately, on countries’ competitive positioning in the emerging low-carbon economy.

A new technology transfer strategy must, to begin with, deliver on developed countries’ obligations to help developing countries forge low-carbon pathways, in part by providing new public finance. But for technology to transfer and take hold, the challenge must be understood more fundamentally as one of building strong, sustainable markets for low-carbon solutions. This requires not only direct assistance, but a suite of complementary efforts on multiple fronts, both domestic and international. Among these are clear commitments by the major developing countries to carry out the types of national measures needed to create genuine technology demand. (While technology transfer is needed in the area of climate adaptation as well, the focus here is mitigation—reducing emissions.)

## Negotiating Context

The issue of technology transfer has been contentious since the start of the global climate negotiations. In the 1992 United Nations Framework Convention on Climate Change (UNFCCC), developed countries agreed generally to “take all practicable steps to

promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how” to developing countries, and to “support the development and enhancement of [their] endogenous capacities and technologies” (Article 4.5). The delivery thus far has fallen well short of the need.

The Bali Action Plan, which frames the current round of negotiations, designates technology development and transfer as one of four pillars of a new climate agreement (along with mitigation, adaptation and finance). It calls specifically for “effective mechanisms and enhanced means for the removal of obstacles to, and provision of financial and other incentives for, scaling up of the development and transfer of technology to developing country Parties...”

Within the negotiations, developed and developing countries remain far apart. The G77 and China, the principal developing country bloc, has put forward a comprehensive proposal under which developed countries would finance efforts along the full technology chain, from basic research to the construction of high-tech factories in developing countries. Developed country governments have yet to lay out a coherent alternative. They are under increasing pressure from domestic industries fearful of any loss of intellectual property rights, and are having difficulty building political support for significant financial outlays, particularly to would-be competitors.

These issues play out against two important backdrops. The first and most obvious is the global economic crisis, which makes significant financial commitments all the more challenging. The second is the drive by the major emerging economies to rebalance global power-sharing arrangements dating back

to Bretton Woods. How governance issues are resolved in the climate context may help set the pattern for a broader realignment of roles and responsibilities among the world's major economic powers.

## Technology Needs and Dynamics

One area where all appear to agree is the scale and urgency of the technology challenge. The low-carbon transition needed to avert climate disaster requires massive deployment of alternative technologies, both existing and new, across virtually all major economic sectors.

According to the International Energy Agency (IEA), cutting global GHG emissions in half by 2050—the minimum needed to limit warming to 2 degrees Celsius over pre-industrial levels—will require additional energy-related investments on the order of \$45 trillion. The needs are largest in the areas of efficiency, renewables, and carbon capture and storage. Sixty percent of the total investment is needed in developing countries, where the rapid expansion of energy infrastructure threatens to lock in high-carbon technologies for decades to come.

Another area of broad agreement is that most of the investment needed must come from private flows (including through the carbon market, discussed below). In energy, as in other areas, the provision of technology—from early innovation to final deployment—is largely facilitated by private capital. An analysis by the UNFCCC Secretariat of investment flows found that only 14 percent of global investment in climate mitigation and adaptation in 2000 came from public resources. Less than 1 percent took the form of official development assistance. Even with a dramatic increase, public resources could generate only a fraction of future investment needs.

The more critical role for government is to create the conditions under which private capital—both domestic and foreign—will favor low-carbon alternatives. Governments must, in other words, use the powers at their disposal to create markets for climate-friendly technologies. In part, this means providing “enabling environments”—the transparent legal and institutional frameworks needed to attract private investment of any sort. But even more, it requires effective policies—whether price signals, standards or other measures—creating sustained demand for these alternative technologies. The close nexus between policy driver and technology uptake is starkly illustrated by the erratic history of U.S. tax incentives for wind power. Investment in new wind generating capacity rose and evaporated from year to year as Congress alternately provided and withdrew a production tax credit, and has risen steadily now that the incentive is being maintained.

Globally, scores of technologies that can lower emissions today remain on the shelf for lack of policy drivers. Indeed, the IEA estimates that 70 percent of the reductions needed to halve global emissions by 2050 can be achieved with existing technologies. The implication for technology transfer is that any “push” achieved through stronger external support will be effective only if complemented by the “pull” of stable policy frameworks that sustain demand on the receiving end.

Governments also must help build markets by clearing away barriers. Those cited most often in the context of technology transfer are tariff and non-tariff barriers, and intellectual property (IP) constraints. In the first category, the Office of the U.S. Trade Representative reports that among the 25 top greenhouse gas-emitting developing countries, most apply import duties

as high as 35 percent on technologies that can help curb emissions. USTR also points to non-tariff barriers such as investment restrictions and weak legal infrastructures. An analysis by the World Bank concludes that removing tariff and non-tariff barriers in 18 major developing countries would increase the flow of efficiency, wind, and solar technologies by 64, 23, and 14 percent, respectively.

Among many in the developing world, however, intellectual property rights are seen as a greater barrier to technology transfer. This has led to proposals for the use of “compulsory licensing”—forcing companies to license their technologies—as was done to dramatically lower the cost of HIV drugs in Africa. Technology companies argue vociferously in response that intellectual property is a critical innovation driver, not a barrier, and that their rights must be fully protected. (In the recent debate over climate legislation in the U.S. House of Representatives, technology companies pushed for provisions to suspend mitigation and adaptation assistance to countries deemed to be violating IPR protections.)

In the case of HIV drugs, intellectual property represents an especially high proportion of a product’s overall cost, and a single patent held by a single company may have no substitute. With clean energy technologies, neither is typically the case, and there are clear examples of developing country success in acquiring IP and know-how through normal commercial channels. Joanna Lewis of Georgetown University documents how two companies, Goldwind and Suzlon, used standard licensing arrangements to acquire the basic technology they needed to become the largest wind turbine producers in China and India, respectively, and among the largest in the world. (Lewis notes that a “supportive national policy environment”

was critical in both cases.) Looking at wind, solar and biofuels, John Barton of Stanford Law School similarly finds that IP is not a significant obstacle to technology access for domestic production and use. “In all three of the sectors,” Barton concludes, “developing nation firms have succeeded in entering industry leadership.”

Technology transfer is neither linear nor straightforward. It reflects a far-flung web of interrelated processes mediated through both markets and governments. Nor does technology flow exclusively from North to South. Indeed, over time, South-South flows may prove even more critical. The question before governments is how best to deploy their limited powers and resources to ensure developing countries access to—and, ultimately, the ability to self-generate—the suites of technologies needed to sharply curtail GHG emissions. The answer entails a mix of efforts on multiple fronts to ease barriers, boost public finance, and establish demand-driving policy frameworks that steer private capital toward the right technology choices.

## Elements of a Global Strategy

Measures to promote technology transfer are an essential element of a new global climate agreement, whether in Copenhagen or beyond. But it is neither feasible nor sensible to address the full range of issues under the climate Convention. Politically and institutionally, other venues are far better suited for addressing key aspects of technology transfer and development. A new UNFCCC agreement could expressly acknowledge this division of labor and provide a means of monitoring, if not coordinating, efforts across multiple venues. As core elements, a global strategy should aim to:

- Focus efforts under the Framework Convention on rapidly transferring existing technologies by: establishing strong mitigation commitments to drive in-country demand and the carbon market; building developing country capacities; and committing substantial, predictable public finance.
- Strengthen cooperation on research, development and demonstration largely outside the Convention, through bilateral, plurilateral, and public-private efforts.
- Address tariff and non-tariff barriers in, and defer intellectual property issues to, established forums under the World Trade Organization.

### UNFCCC: Rapid Deployment

The highest priority under the Convention should be to promote the rapid transfer and deployment of existing climate-friendly technologies. Strong mitigation commitments by the major economies are essential to drive demand for these technologies. First, commitments by the major emerging economies are needed to ensure sound policy frameworks creating indigenous demand. Second, strong developed country targets are needed to drive the global carbon market and, thereby, create further demand for emission reduction and technology deployment in developing countries. The other essential element is developed country support for capacity building and to help finance technology deployment.

### *Developing Country Commitments*

Integrating developing country efforts into a global framework requires a more flexible approach to commitments than under the Kyoto Protocol. While all developed countries should be expected to have

Kyoto-type emission targets under a new agreement, the emerging economies are not prepared for economy-wide emission caps. Most, however, are undertaking or considering a range of policies or actions—such as efficiency standards, renewable energy targets, or forestry goals—that moderate greenhouse gas emissions. The challenge is to strengthen these efforts and bring them into the international framework.

Under the Bali Action Plan, developing countries are to undertake “nationally appropriate mitigation actions...supported and enabled by technology, financing and capacity building.” Both the mitigation actions, or NAMAs, and the support for them are to be “measurable, reportable and verifiable.” Determining how NAMAs will be structured and how they will be supported are perhaps the central issues in the negotiations. Many developed countries are unlikely to assume binding emission targets of their own unless the NAMAs, at least in the case of the major emerging economies, are also regarded as commitments. While the Bali Action Plan does not call for developing country commitments, it does not exclude them either, as did the Berlin Mandate framing the Kyoto negotiations. The likelihood of developing country commitments, in turn, hinges heavily on commitments of financial and other support from developed countries.

A number of Parties have proposed that NAMAs be put forward within, or supplemented by, low-carbon development strategies outlining longer-term pathways. One important role for such a strategy would be to provide a comprehensive assessment of a country’s mitigation potentials and of the technologies needed to achieve them.

### ***Developed Country Commitments and the Carbon Market***

Perhaps the most important vehicle for mobilizing private capital for technology transfer is the carbon market. Under Kyoto's Clean Development Mechanism (CDM), developed countries investing in emission-reducing projects in developing countries can credit those reductions toward their emission targets. This provides lower-cost reductions for developed countries while financing clean development in developing countries.

Although technology transfer is not a specific mandate of the CDM, the UNFCCC Secretariat has tracked its role in enabling the "use of equipment or knowledge not previously available" in a host country. The most recent analysis found that of the 3,300 projects in the CDM pipeline as of mid-2008 (an estimated investment of nearly \$100 billion), 39 percent entailed some form of technology transfer. Japan, Germany, the United States, France and Great Britain were the predominant technology originators, and China, India, Brazil, Mexico and Malaysia the leading recipients.

In the UNFCCC negotiations, Parties are debating going beyond the CDM's project-based approach to allow "sectoral" or "policy-based" crediting. These broader approaches could facilitate greater reductions, investment and technology transfer. However, future demand for developing country reductions—and, hence, the potential for the carbon market to drive technology transfer—is largely contingent on the strength of developed country emission targets.

### ***Public Finance***

A pivotal issue within the negotiations is the nature and extent of new multilateral finance. (Under any

outcome, much of the future public finance is likely to flow bilaterally; a related question is how these flows are regarded under a new climate agreement.) Technology could be one of the "windows" within a comprehensive new climate fund, or the focus of a separate fund. In either case, critical issues include: the level of finance; how the funds are generated; how they are allocated and disbursed; the best institution(s) to manage a new fund (or funds); how the fund is governed; and how to ensure accountability.

To best promote rapid transfer of existing technologies, a new fund should have two overriding objectives: building developing country capacity and directly subsidizing deployment. On the capacity-building side, many developing countries need help in identifying their best mitigation options, developing and implementing effective policy frameworks, and assessing their present and future technology needs. All are critical complements to direct deployment support.

In selecting projects for deployment funding, the primary criterion should be cost-effectiveness—delivering the greatest emission reduction per dollar invested. Deployment support can be delivered through concessional loans, grants or other instruments depending on the project and the host country. What is critical is that a fund be structured to maximally leverage private investment. This can be done at the project level by, for instance, bundling direct assistance with carbon finance and conventional market finance.

For expediency, and to avoid duplicating institutional capacities, the new fund should be operated from an existing institution such as the World Bank, and



governed by an independent board under the guidance of the UNFCCC Conference of Parties. For this to work, however, its governance must depart from the traditional donor-recipient model and give developing countries an equal voice. The interim Clean Technology Fund established recently at the Bank, which provides for balanced representation from developed and developing countries, may point toward an alternative model. Here, the technology transfer issue intersects with broader questions of power-sharing at the Bretton Woods and other multilateral institutions. How governance is resolved in the case of climate funding may well shape—but, given the urgency of climate action, must not be contingent on—broader outcomes.

Governments have proposed a number of international mechanisms to generate finance, such as a levy on aviation or an auction of emission allowances. However, many appear to favor a “scale of assessment” approach, in which an agreed formula sets each donor country’s share of the total, and each generates its contribution domestically. This approach has been successful in other areas, including funding under the Montreal Protocol supporting the phase-out of ozone-depleting substances in developing countries. In that case, however, funds are raised through periodic rounds of pledging, not commitments per se. In the case of climate change, the scale of need is much greater and firm commitments are needed to ensure predictable flows.

### ***A New Technology Body***

To support activities under the Convention, and to provide some linkage to efforts elsewhere, a new technology body reporting to the UNFCCC Conference of Parties should be established. Its specific functions could include:

- Periodically assessing, on the global scale, priority areas for technology transfer and development;
- Monitoring and assessing the full range of international technology-related efforts within and outside the Convention, including major plurilateral and bilateral initiatives;
- Assisting developing countries on national technology assessments and strategies;
- Advising the Conference of the Parties on the guidance it should provide to the governing body of the new technology fund; and
- Developing and/or applying standards for the “measurement, reporting and verification” of technology support.

To ensure the necessary balance and expertise, the body should be comprised of government, independent and private sector experts, as in the Montreal Protocol’s Technology and Economics Assessment Panel.

### **RD&D Cooperation**

Stronger collaboration is also needed in the research, development and demonstration of new technologies, but these efforts are more practical outside the Convention through bilateral and plurilateral arrangements. Successful initiatives are likely to involve more limited partnerships among key countries—and with the private sector—which a 180-nation intergovernmental process does not easily accommodate.

The track record on international RD&D cooperation is not strong, and a spate of technology-focused climate initiatives such as the Asia-Pacific Partnership have produced meager results. The United States hopes to use the Major Economies Forum in part as a springboard for new technology initiatives and, like Europe, is actively exploring closer bilateral collaboration with China in areas such as carbon capture and storage. Such partnerships can contribute directly to technology transfer by strengthening innovation capacities in developing countries and through the sharing of the intellectual property that emerges.

An agreement under the UNFCCC can help spur these efforts by committing countries to higher levels of public finance for RD&D. Countries undertaking RD&D initiatives also could choose to include them among their UNFCCC commitments, or could agree at least to report their efforts to the UNFCCC to facilitate monitoring and assessment.

### **WTO: Trade Barriers and Intellectual Property**

Also more sensibly managed outside the Convention are the issues of trade barriers and intellectual property.

Reducing or eliminating tariff and non-tariff barriers to “environmental goods and services” generally is among the many issues languishing in the Doha round of WTO talks. The United States and the European Union have jointly proposed a two-tiered agreement that singles out climate-related goods and services for rapid liberalization. A commitment by Parties in a new UNFCCC agreement to accelerate liberalization of trade in climate-related technologies could spur efforts within the WTO.

The WTO also provides an established forum on intellectual property—the Trade-Related Aspects of Intellectual Property Rights, or TRIPS, agreement. TRIPS sets out the international legal framework governing intellectual property, including the potential use of compulsory licensing. In cases where a party believes intellectual property poses a substantial barrier to technology transfer, the evidence should be considered and the remedy fashioned within this framework. More routinely, the question of IP costs can be implicitly addressed through public finance for technology deployment. A new UNFCCC agreement can most productively address IP by reaffirming and deferring to the TRIPS regime.

### **Objectives for Copenhagen**

A comprehensive new climate agreement under the UNFCCC can best accelerate the transfer of climate-friendly technologies to developing countries by:

- Establishing verifiable commitments for effective policy frameworks in major developing countries;
- Delivering substantial, predictable public finance for capacity-building and for deployment of existing technologies;
- Driving the global carbon market through strong emission reduction targets for developed countries;
- Committing countries to scale up public finance for RD&D efforts outside the Convention;
- Committing countries to accelerate efforts in the WTO to reduce or eliminate tariff and non-tariff barriers;



- Reaffirming TRIPS as the appropriate forum for addressing intellectual property; and
- Establishing a standing body to assess technology needs and to monitor and assess technology-related efforts within and outside the Convention.

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