

# A New Role for UNFCCC:

## The Matchmaker of Global Climate Governance

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## I. Acknowledgments

This report has benefited from the insights and contributions of many colleagues and experts. We are deeply indebted to all who have participated in its development. We wish to express our gratitude to colleagues at Bertelsmann Stiftung and Fundación Democracia y Desarrollo for making this project possible.

We would also like to express our special appreciation to experts who shared their insights and experiences on projects which we listed as case studies. These include colleagues at the German Ministry of the Environment, the World Business Council for Sustainable Development, the Lawrence Berkeley National Laboratory, the German Development Cooperation, representatives at the InvestChile program, the Inter-American Development Bank, the Ministry of Economy, Trade and Industry in Japan, the Energy Foundation and the Alliance to Save Energy, among others.

Special thanks also go to our former research fellows at the Bertelsmann Foundation, Ms. Sha Zhu and Mr. James Tobyne for their dedicated research which enriched the policy recommendations.



## II. Executive Summary



The United Nations Framework Convention on Climate Change (UNFCCC) should expand its global role in combating climate change. This new role should primarily focus on acting as a matchmaker among regions, governments, nongovernmental organizations, businesses and the public. In particular, UNFCCC should foster partnerships in information dissemination and capacity building, creating a sustainable path for clean energy in developing countries and clean energy technology innovation. This report will address each of these proposed partnerships and illustrate them with eight specific case studies. While the case studies were undertaken largely on a bilateral basis, duplicating these cases studies worldwide requires a mediating, coordination body like the UNFCCC secretariat to facilitate the matchmaking process. To ensure that the proposed partnerships do indeed occur and result in concrete results, the report concludes with proposals to enable accountability.

### III. Background

Thanks to years of scientific assessment and analysis along with policy advocacy, the severity of climate change is now acknowledged worldwide. It is widely agreed that global average surface temperatures have increased by 0.8°C since the Industrial Revolution as a result of anthropogenic greenhouse gas (GHG) emissions. The impact of temperature increases and changes in the climate are enormous. Among these are that

- glaciers are melting faster, contributing to more flooding around the world;
- there are more extreme weather events – including heavy rains and extensive droughts, the latter exacerbating desertification in many areas – provoking enormous damage in agriculture;
- heat-related disease has increased and infectious diseases confined to the tropics now threaten to expand into more temperate areas;
- there have been substantial losses to biodiversity, posing questions about the stability of future ecosystems and
- global climate change is killing over 300,000 people, seriously affecting 325 million and causing economic losses of US\$ 125 billion annually.

Given current global trends, GHG emissions are very likely to reach to 800-900 parts per million (ppm) CO<sub>2</sub>-equivalent by 2100 should no substantial changes be made, particularly in the way energy is used. This is expected to result in an increase in the average global temperature of as much as 6.5°C or more. Should a temperature change of this magnitude occur, there are concerns that the climate may reach a tipping point with substantial changes to the globe that may be difficult to reverse. The melting glaciers will put enormous strain on future water supplies; worldwide deaths from malnutrition and heat stress will increase; frequent droughts will lead to severe declines in global food production and 200 million people may become permanently displaced due to rising sea levels, heavier floods and more intense droughts by mid-century. Biodiversity will face a major disaster. Moreover, the human race will be unable to ignore the subsequent national security and global stability implications of climate-induced catastrophes. Climate-induced mass migration and competition for critical resources (e.g. water) as well as adjusted shipping routes could further exacerbate regional conflicts

Global climate change disproportionately impacts the poor. Many low-income countries are already located in regions with greater annual temperature extremes and rainfall variability. The people in these regions, who already suffer from inadequate health and social services, depend heavily on weather-sensitive agriculture for their livelihood.

Scientific findings indicate that the only effective strategy to combat climate change is to constrain global temperature to no more than 2°C above the global temperature at the beginning of the industrial age, which corresponds to an atmospheric concentration of approximately 450 ppm (compared with 390 ppm presently). With annual CO<sub>2</sub> emissions growing at 1.7 percent, this level would be reached in less than 30 years; keeping to this target over the long term instead requires a reduction in annual emissions growth of 3.5 percent. Such a target is difficult to attain partially



because of the large amount of historical global CO<sub>2</sub> emissions that are already in the atmosphere. The Intergovernmental Panel on Climate Change has concluded that 50% of existing CO<sub>2</sub> emissions will be removed from the atmosphere in about 30 years, another 30% in a few centuries and the remaining 20% may stay for many thousands of years. Studies suggest that annual investments of US\$ 100 billion or 1% of worldwide GDP are necessary for the global effort to mitigate and adapt atmospheric concentration of GHG at or below 450 ppm of CO<sub>2</sub>. The urgency for addressing this issue is rising because, “unless total global emissions start to decrease between 2015 and 2020, it will be almost impossible to achieve compliance with the 2°C guard rail.”

Almost two decades ago, in an effort to tackle the climate challenge globally, most countries joined the international treaty known as the United Nations Framework Convention on Climate Change (UNFCCC). The Secretariat of UNFCCC (also known by the same name) was set up to support all institutions involved in the climate change process and to explore a global response to climate problems.

While the original UNFCCC established no binding emissions reduction targets, the 1997 Kyoto Protocol did. It has been ratified by more than 190 countries. This protocol set five-year binding GHG reduction targets (5% below 1990 emissions levels) for 37 industrialized countries and the European Union (EU) community. It also established three mechanisms: emissions trade, the clean development mechanism and joint implementation. The European Union, in particular, has been a remarkable leader in implementing and testing several of Kyoto’s mechanisms, including emissions trading among its members.

Despite these successes, there remains a significant global achievement gap in reducing the impact of climate change. The United States, the largest CO<sub>2</sub> emitter in the twentieth century, is not a party to the treaty and has no binding obligations for reduction. Emerging economies, which have rapidly become the new source of GHG emissions, also do not face binding reduction targets. Lastly, it is significant to note that many industrialized treaty signatories may miss their 2012 targets. The most significant of these include Japan and Canada.

The Copenhagen conference of the parties (COP) to the UNFCCC in 2010 was widely considered to be the last chance to agree to a binding global agreement on emissions reduction. Interest groups tirelessly worked to shape national policies long before the heads of state entered the conference. The intense negotiation, however, deeply disappointed many who were hopeful of a true binding agreement. Instead, the Copenhagen Accord became the lowest common denominator upon which everyone was able to agree. The Accord recognized the 2°C benchmark for global emissions reduction, and the need to mobilize US\$ 100 billion annually for financing emission reduction activities. But it fell far short of agreeing either on specific targets for individual countries or on how the funding would be raised. Instead, the parties to this conference agreed to submit 2020 mitigation target plans to the UNFCCC.

Many countries have already submitted their target plans. Their commitments range from binding to voluntary. Among the commitments made have been pledges to cut total GHG emissions, pledges to reduce carbon intensity, differing base years from which emissions reductions commitments are made (ranging from 1990 to 2005) and commitments to reduce deforestation. Current estimates based on the individual national targets received to date suggest that GHG emissions will rise to a level that will likely cause a 3.5°C increase in global temperature rather than the target 2°C. Given the different stages of development and political systems, reaching a globally binding agreement among nation states has proven extremely difficult and time consuming.

Many people consider Copenhagen to be a major disappointment because no binding global deal was reached despite the presence of many heads of states. Countries have resorted to finger-pointing, while NGOs are dissatisfied that they were excluded from the negotiations. The UNFCCC's credibility was called into question.

The UNFCCC rehabilitated its image somewhat at the December 2010 Cancun COP. In particular, it succeeded at emphasizing transparency of procedure and focused on achieving tangible results on smaller scale issues like the REDD program that emphasizes reducing deforestation and forest degradation, conservation, sustainable management of forests and enhancement of forest carbon stocks (REDD+).

One very important legacy of Cancun is that it established the benchmark for international consensus for climate change as three-quarters of the participating countries. It set the precedent that international agreement on climate does not have to be based on absolute, one hundred percent support from countries. This new definition of consensus makes it easier to define concrete steps forward, thus creating much more optimism leading up to the South Africa COP at the end of 2011.

Other significant achievements at Cancun included agreements to establish a Green Climate Fund, a Technology Executive Committee (TEC) and a Climate Technology Center and Network (CTCN). The Green Climate Fund was established as a financial mechanism to fund adaptation and mitigation projects, policies and programs in developing countries. The TEC aims to get national experts to provide guidance on international technological opportunities on climate mitigation and adaptation. The CTCN is set to be the cross-sector, cross-national operational arm for capacity building, where technological innovation activities are facilitated.

Cancun does not in any way guarantee future success, but rather still lacks clear plans for how to move forward. The proposed Green Climate Fund awaits resources from donors. The REDD+ program needs to further clarify provisions on details such as safeguards. And the TEC and CTCN need to sort out their institutional relationships as well as issues regarding intellectual property. Moreover, agreement in Cancun failed again to reach any legally binding targets. Cancun further raised uncertainty around the Kyoto Protocol because Japan and Russia expressed hesitation to further emissions reduction targets.



Even though climate change has been widely accepted so far as a key global governance issue, there is still no real international framework or plan to achieve the goal. From the Kyoto Protocol to the Cancun Agreement, combined international efforts are far from sufficient.

- Promised targets have been limited in size.
- Little financing has been offered.
- Few long-term policy incentives have been agreed to be implemented.
- Few mechanisms have been established to pursue technology breakthroughs.
- The lack of agreement on Measurement, Reporting and Verification (MRV) of emissions reduction continues to hinder commitment and pledges of resources, particularly from developed nations.

Despite limited progress through the UNFCCC process to date, over the past decade, actors outside of the United Nations framework (including state and non-state actors) have become increasingly concerned and have taken it upon themselves to act through their own mechanisms to respond to the threat posed by global warming, seeking to implement climate mitigation and adaption strategies at different scales and different levels. Examples of this include the German government's climate change website, the World Business Council for Sustainable Development, the Lawrence Berkeley National Laboratory's analysis workshops, and Mexico's ILUMEX project.

These initiatives have made an important impact on the international governance regime's response to climate change because they offer a new means to achieve international goals. While still fragmented, they stand as an example of how to approach global climate governance in different ways.



## IV. Introduction

The limited progress to date demonstrates that we must fundamentally alter our way of pursuing the global climate deal and our economic advancement. There is an urgent need to take a practical approach toward climate governance initiatives and try to facilitate changes on a daily basis throughout the world. Given the stakes and the limited time to achieve goals, the need for an inclusive and multilateral process of climate change mitigation has to be taken further than the painful global grand bargaining seen thus far. That negotiation ultimately seeks to redefine by 2020 which countries are Annex I countries and hence committed to binding GHG emissions targets and which are non-Annex I countries and hence not bound to such commitments. This is not to say that the redefinition is not important, but it must be accompanied by concrete steps in the meantime.

Specifically, this process has to be accompanied by practical arrangements throughout the globe, often achieved through bilateral partnerships, that achieve tangible short-term impacts. Instead of putting all of the eggs in a solitary basket to reach a universal agreement, this document proposes that the UNFCCC (herein we mean the UNFCCC Secretariat which is charged with the operation of the UNFCCC convention and which works together with the Intergovernmental Panel on Climate Change) undertake a simultaneous second role to facilitate concrete partnerships that will achieve GHG reductions in the short term. *Through this role as a facilitator, the UNFCCC can provide additional effectiveness by mobilizing actors that can tackle the climate change problem from various angles.*

This study identifies a set of new roles for the UNFCCC, which seek to unlock the potential of the growing networks of actors in global climate governance. These roles should be filled in a timely fashion to achieve tangible results. One important element of this report is to illustrate the types of activities that could be unleashed with examples of previously successful arrangements that have brought practical improvements. The UNFCCC should look to these examples and utilize its uniquely global capacity to expand these successful experiences through a “MATCHMAKING” process among these emerging players. Important principles to consider in implementing this process include:

- minimizing the establishment of new bureaucratic structures,
- strengthening already existing activities and institutions within the UNFCCC and
- boosting the effectiveness of existing financial resources.

These processes target three important areas of need, as identified by the UNFCCC:

1. Information dissemination and capacity building
2. Implementing a new, low-carbon development path in developing countries
3. Developing critical new greenhouse-gas abatement technologies



The study highlights ten initiatives in the three aforementioned areas. For these initiatives, eight case studies were identified to illustrate how to advance progress in these areas. These cases are not the only successes achieved, nor are they necessarily more successful than others. They were selected based on the compatibility of the involved parties with the UNFCCC system and their ability to be expanded with UNFCCC assistance. They were also selected because they showcase successes in countries with the greatest need and potential and because they reflect potential cooperation between developed and developing countries. Finally, these cases were chosen based on the availability of sufficient documentation.

Section 1 focuses on the need for information dissemination and building stronger capacity at three different levels of engagement: public consumers, business leaders and policy makers. Section 2 emphasizes the promotion of climate-friendly development strategies within existing frameworks, particularly in developing countries. Section 3 concentrates on the technology development angle, looking for possible ways of utilizing existing climate-friendly technologies in developing countries as well as facilitating further innovations. Finally, the report ends with a discussion of proposed accountability measures so participating countries can have confidence that the activities are actually being implemented and implemented well.

The descriptions of individual recommendations for the UNFCCC are based on adopting the principles enunciated above, and draw on the successful experiences indicated in the boxes that highlight the case studies. These activities should be incorporated into existing activities within the UNFCCC, which should act as a “matchmaker” among potential international partners so that the impact of these activities are expanded or multiplied.



## V. Strategies for Partnerships

### Section 1: Information Dissemination and Capacity Building

The glue that enables climate change mitigation programs to work is capacity building and access to information. Public awareness of climate change and how to respond to it are crucial aspects to the effectiveness of new programs. Furthermore, the private sector must acquire information on developing countries' technology needs and the conditions under which it must operate to introduce the appropriate technologies. And unless program designers and implementers are properly trained, the programs are likely to fail.

#### 1. Public Education

The first step in this process is educating the public, both in developed and developing countries. In a world filled with misinformation and absence of information, national mitigation programs, no matter how well intentioned, are bound to fail without a serious effort to educate the public, and thereby win their buy-in for how to respond to climate change. The first critical piece of information needed is an explanation of what climate change is and how it is produced. This includes understanding the impacts of climate change if no mitigation is undertaken. Once climate change and its impacts are understood, individuals then need to understand how they may adapt to climate change as well as how they may contribute to mitigating climate change through personal economic decisions and changes in lifestyle.

The Internet is undoubtedly the most efficient and cost-effective means of diffusing the information just described. Particularly for many in developing countries, the Internet often affords easier access to information than more traditional media. The following case study presents how the German government, in conjunction with the private sector, is using the Internet to build consumer awareness about climate change.



### Case Study 1: Information dissemination to the public – Example of Germany's Climate Change Websites

The climate change websites of the German Ministry of the Environment (BMU) exemplify the critical role government can play in explaining to the public what climate change is, what impacts it will have and what individuals can do personally to reduce their individual carbon footprints. Begun in 1996, the BMU website group provides basic facts about climate change; the sources of greenhouse gas emissions that cause climate change; the impacts of climate change, including on public health; the national and European Union laws and regulations that have been implemented in response to climate change concerns and the consumer products that may be purchased to reduce the greenhouse gas emissions of individual households and businesses.

Despite the regular coverage of climate change in the media, the public both in developed and developing countries does not have a clear understanding of why climate change is occurring, where greenhouse gas emissions come from, what the impacts of climate change will be and what individual consumers can do to reduce their own emissions of greenhouse gases. The BMU websites sought to address this lack of information directly through a well-organized central hub supplemented by relevant links. Among these links is a list of the energy efficiency levels of different home appliances being sold in Germany (shown below) so that consumers can make informed decisions when they purchase appliances about which will offer the lowest levels of greenhouse gas emissions. Another link, to the German Energy Agency (DENA), provides tips to save energy in daily life, including how to heat and cool efficiently, how to drive a car to minimize energy use, and how to build a house that uses little energy. **As of 2009, the website recorded 60,989,068 (Germany's population is around 82 million) hits; no analysis has been undertaken on the impact of the site in changing purchase decision or altering personal behaviors.**

Vergleichen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bezeichnung	Liebherr KTP 1750 Premium	Liebherr KTPesf 1750 Premium	Bosch KIR20A60	Neff K6614X7	Siemens KI20RA60
Bild					kein Bild verfügbar
Preis (UVP in €)					1240
Stromkosten in 1 Jahr(en) (€)	17,64	17,64	18,69	18,69	18,90
Gerätetyp	Kühlschrank	Kühlschrank	Kühlschrank	Kühlschrank	Kühlschrank
Formfaktor	Freistehend	Freistehend	Eingebaut	Eingebaut	Eingebaut
Stromverbrauch pro Jahr (kWh)	64	64	69	69	90
Energie-Effizienzklasse	Klasse A++	Klasse A++	Klasse A++	Klasse A++	Klasse A++

German website graphic that compares energy efficiency levels of different brands of refrigerators. The columns list five different models, with the dark orange row indicating the estimated cost of electricity consumption per year (in Euros) and the second to the last row indicating estimated annual energy consumption (in kilowatt-hours). All models shown are accorded the best energy efficiency rating, Class A++, as indicated in the last row.

The UNFCCC could facilitate and support this process. Either through its secretariat or a working group, it could first facilitate an exchange of information among its signatory countries on existing climate change information programs for the public. It could then seek individual country commitments for developing climate change information Internet programs, which would include a timeline for when they would become operational. Moreover, for those countries that conclude they need technical assistance in designing such programs, the UNFCCC could help facilitate match-making between those countries with the need for technical assistance and those that have both the technical expertise and the experience in designing such programs.

## 2. Informing the Business Sector

Informing the public alone, however, does not meet all information needs. Since a critical need is enabling developing countries to pursue climate mitigation strategies in much the same way many OECD countries already are, information is needed about the technologies that can reduce greenhouse gas emissions. Many of these technologies are presently marketed primarily in industrialized countries; hence, an important first step is to appraise businesses in the OECD of the market needs and opportunities in developing countries. The same type of information is needed by businesses in developing countries, many of whom may not know of the applicability of mitigation technologies to their markets. And mitigation technologies that function well in OECD markets may need some adaptation to be able to operate in developing country conditions. For example, high efficiency compact fluorescent lamps may not be able to withstand the electrical voltage fluctuations characteristic of many developing countries without some adaptation in their design.

Hence, there is an important need to inform businesses in industrialized countries—which have greater access to mitigation technologies—about the market opportunities for these technologies in developing countries. Similarly, businesses in developing countries need to learn of new business opportunities facing them by adapting and selling these technologies from industrialized countries.

Case #2 illustrates one mechanism to do this, highlighting the activities of the World Business Council for Sustainable Development (WBCSD), which regularly informs its members of the opportunities to invest in climate mitigation technologies in developing countries; moreover, WBCSD also offers an example, through the wind project of one of its members in China, of how companies may adapt their products to meet local conditions in developing countries.





## Case Study 2: Capacity building among the private sector

### Example of World Business Council for Sustainable Development

**The World Business Council for Sustainable Development (WBCSD) is an example of a private sector institution that is assisting businesses to pursue green product introduction, including sustainable energy products, in developing countries.** Among its activities, WBCSD has successfully shared information on the business opportunities for sustainable energy investments and projects in developing countries with its more than 200 members.

Generally, developing countries lag far behind developed countries in their access to green energy products and strategies. WBCSD for the past decade has sought to bridge this gulf. Among the strategies the organization has undertaken to foster activity by its members have been CEO-level forums, spring meetings aimed at company vice presidents, working group meetings covering topics such as tools for political decision making regarding climate change, and “Learning by Sharing” sessions in which companies exchange information on their specific experiences. An example of an activity catalyzed by WBCSD is that of its member company, Vestas, which has adopted an ambitious strategy to introduce state-of-the-art technologies to unconventional wind markets in northern China using local manufacturing and product adaptation of wind turbines to meet indigenous needs. **Vestas is now the largest foreign player in China’s burgeoning wind energy market.**

Information sharing about mitigation technology opportunities and needs in developing countries should not be confined solely to unique international business associations such as the WBCSD. Individual governments, both developed and developing, could also work with key trade associations in their respective countries, informing them of the market conditions in developing countries. Such trade associations could span the spectrum from heavy industry (e.g., steel and cement) to consumer products (e.g., refrigerators and air conditioners) to the vehicle industry. Organizations such as the WBCSD, which enjoy international membership covering a range of business sectors, could play another important role as well: organizing private-sector action within a specific sector (such as cement or steel) that extends across countries.

The UNFCCC, again through its secretariat or the Climate Technology Center and Network proposed in Cancun, could play an important facilitative role in this process. First, it could seek commitments by individual signatory countries to work with national trade associations to disseminate information about the market needs and opportunities in developing countries and a time frame by which those commitments would be realized. In addition, for those countries that may need some assistance in this process, it could again facilitate matchmaking between those countries with the need and those with the expertise. Finally, it could work with critical industries in both developed and developing countries to facilitate sector-wide matchmaking, ultimately bringing about “sectoral agreement on technology changes.”

### 3. Informing and Training Policy Makers

Yet a third critical information need is informing and training policy makers about the design of climate mitigation strategies. If developing countries are to pursue climate mitigation strategies in much the same way many OECD countries already are, training is needed on how to design effective programs. Unless policy makers have the capacity to understand where greenhouse gas emissions are coming from, how technically the growth of these emissions can be reduced, and how to design the policies and programs needed to reduce this growth, they will be heavily constrained in being able to implement climate-friendly programs successfully.

Case #3 highlights a training program that was operated by the Lawrence Berkeley National Laboratory in the United States in the late 1990s to build capacity among developing country policy-makers worldwide.

#### Case Study 3: Capacity building among policy makers – Example of Lawrence Berkeley National Laboratory Workshop

**The 1994 and 1995 Greenhouse Gas Mitigation Assessment Workshops at Lawrence Berkeley National Laboratory (LBNL) stand as an example of a collaborative capacity-building program for developing country analysts and policy makers sponsored by the U.S. government.** These workshops successfully trained over 70 scientists and policy makers from 35 countries (including China, Egypt, Philippines, Ethiopia, Thailand, Russia, Nigeria, Kazakhstan, Oman, Poland, Indonesia, Zimbabwe, the Czech Republic, Venezuela, Gambia, Bulgaria and Uruguay).

At the time of the workshops, most developing country analysts and policy makers lacked the technical capacity to identify their emissions levels and to develop strategies to reduce those emissions. Jointly with five other national labs, LBNL was commissioned by the U.S. Environmental Protection Agency to develop these skills in targeted workshops. The LBNL workshops focused on three issues: energy-based emissions, non-energy-based emissions and top-down macro-economic analysis. Workshop participants received instruction in specialized computer models and methods and upon completion, participants submitted greenhouse gas mitigation working plans for their individual countries that could serve as foundations for national mitigation roadmaps. Many of the LBNL trainees later went on to prominent positions within their own governments, including Zhou Dadi from China, who became the director general of the Energy Research Institute of the National Development and Reform Commission, and Odón de Buen from Mexico, who served as general director of Mexico's National Energy Saving Commission from 1995 to 2003. **The workshops successfully catalyzed the development of mitigation action plans by several countries, which were submitted to the UNFCCC. These included Russia, Botswana, Malawi, Mozambique and Thailand.**



Building upon this example, bilateral and multilateral donors, many of whom have developed strong capacity-building programs with specific developing countries, could expand those programs to include training in climate mitigation analysis and program development. With the UNFCCC facilitating the process, a methodical matchmaking procedure could be pursued.

First, those developing countries with capacity-building needs for climate mitigation program developers and analysts could be identified. Then each identified developing country could be matched with at least one developed country or multilateral donor with expertise in capacity building. The intent would be to pursue matches with countries or donors with which the particular developing country already has enjoyed an extensive and trustworthy relationship in capacity building. In so doing, a comprehensive roadmap could be constructed for building the needed capacity in all developing countries.

## Section 2: Building a New Path in Developing Countries

Information sharing and capacity building across the public and private sectors is a critical step to ensure that a climate mitigation path is pursued in developed and developing countries alike. However, additional steps enabling new low-carbon development paths should be pursued in developing countries. A strong partnership is needed between individual developing countries that are interested in pursuing a climate-friendly development path and experts who have considerable knowledge and knowhow. The UNFCCC has the potential to be a strong facilitator in bridging expertise and resources on a larger scale. Specific actions to achieve this are discussed in the following set of recommendations.

### 1. Partnerships To Implement Climate-Friendly Paths in Developing Countries

Many developing countries enjoy the benefits of long-term relationships with bilateral and multilateral donor agencies that have extended over decades and have enabled them to meet a range of development challenges. These relationships could be expanded to address a new development challenge: the design of climate-friendly development paths.

Case #4 highlights one such relationship between a donor, in this case Germany, and a developing country, India, that has evolved to include cooperation in designing low-carbon energy development paths. In particular, the two countries have worked together to introduce renewable energy in India, especially for rural residents without access to electricity at present.

#### Case Study 4: Designing a climate-friendly path in developing countries – Example of India and Germany's Cooperation in Energy

The cooperative energy program between the German Development Cooperation (GTZ) and the Indian Ministry of Power illustrates how a donor country can work with a developing partner to implement sustainable energy strategies, in this case, in renewable energy. The energy cooperation takes place on many fronts, building upon four pillar projects: the Indo-German Energy Program (IGEN), the Renewable Energy Supply for Rural Areas (RESRA), the Indo-German Energy Forum (IGEF) and the Trigeneration Tamil Nadu House, Delhi (TRIGEN). These include: transferring and promoting the development of advanced renewable technologies, training energy managers and energy auditors, operating a website to cultivate future energy managers, providing assistance in labeling household appliances, assisting in the development of standards for energy intensive industries, facilitating public-private partnerships and launching forums to promote technical and financial cooperation in renewable energy adoption and collaborative research and development.

In order to meet its economic growth, environmental improvement and poverty alleviation goals, India needs to make significant progress both in substantially increasing the level of energy services per capita for its population and in reducing its dependence on polluting fossil fuels. One of the pillar projects in the German-Indian cooperation, RESRA, was designed with the recognition that about 500 million people in rural India still lack access to electricity. The project was specifically established to develop commercially viable business and governance models for decentralized energy supply in rural areas from renewable sources. An example of what has emerged from that cooperation is the residential venture Rabi Rashmi Housing Complex in West Bengal, which provides electricity from photovoltaics (PVs), with batteries serving as back-ups. **Other projects provide electricity from solar thermal systems that simultaneously generate electricity and heat water in an economically viable manner.**

The cooperation between Germany and India could serve as a model for designing a comprehensive network in which each interested developing country is matched with at least one donor agency with whom it has enjoyed a productive relationship, with the goal of assisting that country in designing and implementing a low-carbon development path. The UNFCCC could play an important facilitative role in establishing such a network, either through its secretariat or a working group of signatory countries. Specifically, it could oversee the actual process of matching every interested developing country with at least one appropriately qualified donor agency, and monitor whether the commitments made by each donor are adhered to in a timely and substantive manner.



## 2. Programs to Encourage Climate-Friendly Private-Sector Investment in Developing Countries

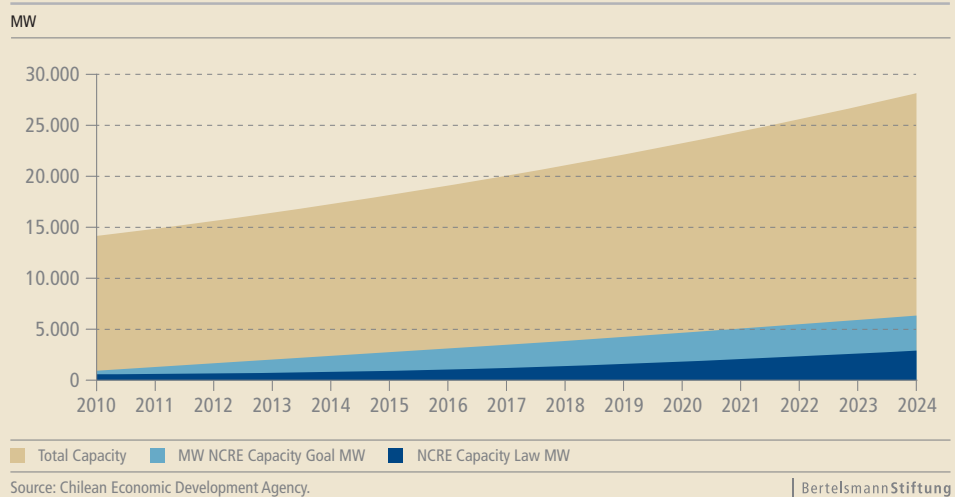
While donor-to-government assistance is important, equally valuable is leadership from individual developing country governments and their private sectors to attract the investment community to a new development path that emphasizes energy efficiency, renewable energy and a low-carbon future.

Case #5 showcases a program launched by Chile to do exactly this, which may serve as a model for other countries. The program, known as InvestChile, is intended to attract technology-intensive foreign direct investment into that country, particularly in renewable energy, one of the many climate-friendly pathways available to developing countries.

### Case Study 5: Bringing climate-friendly industries to developing countries – Example of InvestChile and Renewable Energy

**The renewable energy component of the InvestChile program exemplifies the role a developing country government can have in promoting foreign direct investment in green energy within the country.** Created in 2000, InvestChile is a government-sponsored national program to promote and attract technology-intensive foreign direct investment into Chile. One of the goals of InvestChile is to increase the penetration of renewable energy in its national energy matrix and make Chile a more attractive commercial platform to develop and export non-conventional renewable energy (NCRE) sources. Currently, InvestChile has a total portfolio of 133 NCRE projects at different stages of maturity.

Chile, like many other developing countries, must import its oil and gas, and, while endowed with significant hydropower, it has seen periodic serious droughts that have sharply reduced its power output, an occurrence that is expected to happen more frequently with climate change. While it has other significant renewable resources, including wind, sun, and geothermal, Chile has lacked sufficient indigenous capacity to develop these resources. The renewable energy activity within InvestChile has played an important role in addressing this gap. The program provides a range of services to both domestic and international actors, which include policy guidance, strategic analysis of business opportunities, and a mix of grants, loans and loan guarantees. It also catalyzed the amendment of the country's Electricity Act to create a Renewable Portfolio Standard to set a national goal of 10% electricity generation from NCREs by 2024 (equivalent to about 3410 MW installed capacity). **In total, the National Energy Commission projects the installed capacity of NCRE will reach 101MW by 2010 and will total 2,145 MW when all projects are completed.**

**Figure 1: Installed Projected Power and Participation on NCRE**

Programs such as this could be created throughout the developing world using a similar comprehensive network approach between countries, experts and individual donors. With the UNFCCC playing an important facilitative role, interested developing countries could be matched to experienced countries and donors interested in providing assistance in designing programs to draw in private-sector investment in low-carbon strategies. Once again, the UNFCCC could oversee the process of matching each interested developing country with a donor or donor country and could monitor how well each country or donor fulfills its commitments in a timely and substantive manner. In so doing, the UNFCCC could blaze a path for an exchange between developing countries and private industries seeking to invest in climate-friendly paths appropriate to each country.

### 3. Programs to Adapt Climate-Friendly Technologies to Developing Countries

Even if programs are successfully launched to attract private-sector investment in climate-friendly technologies to developing countries, often these technologies cannot simply be transferred from the markets where they presently dominate to those of less developed countries. Conditions are often different in developing country markets that necessitate changes to the specific technologies in order for them to function well. Frequent voltage fluctuations can cause the lighting technologies to burn out prematurely. Engine designs may not tolerate the types of fuels used, breaking down frequently and requiring more frequent maintenance. Building operations in developed countries that use energy management systems that are controlled remotely from computers and other electronic devices may not translate as effectively in developing countries.





In these cases, as in others, a process of adapting climate-friendly technologies to work in developing country conditions is necessary. Case #6 highlights one technology adaptation program sponsored by the World Bank and known as ILUMEX. In this example, the tool used was procurement. A program to introduce compact fluorescent lamps (CFLs) in poorer residential homes in Mexico faced the challenge of altering the lamps so they could operate well in the fluctuating voltage conditions that characterize Mexico (and many other developing countries as well). The World Bank was able to use the purchasing power associated with the procurement of those lamps to foster a change in the specifications of the lamps so they could withstand voltage fluctuations.

#### Case Study 6: Adaptation of technology – Example of Mexico's ILUMEX Project

**The Mexico High Efficiency Light Project (ILUMEX), implemented by Global Environmental Facility (GEF) and the World Bank between 1995 and 1998, illustrates the role a donor agency can have, in collaboration with a developing country, in prompting the necessary technological adaptation so that green products in the country's market are optimized for the operating conditions of that country.** The focus of this project was on spurring the market entry of high efficiency compact fluorescent light lamps (CFLs) that could operate well in the local electricity grid. Ultimately, ILUMEX helped realize a successful transformation of the Mexican residential lighting market, with CFLs becoming more affordable and available. Sales surged from 50,000 in 1995 to 7 million in 2004 and unit prices dropped from \$15 in 1995 to less than \$3 in 2004. The CFLs were also designed to operate in the fluctuating voltages that characterize the grid in Mexico. The resulting CFLs are applicable to other developing countries with similar voltage fluctuation conditions.

The ILUMEX project was conceived as peak electricity demand was growing sharply in Mexico. In 1992, electricity demand was growing by more than 5% annually, with an additional 14,000 megawatts of capacity anticipated to be required in 10 years, most of it to be generated by fossil fuels. Energy efficiency was recognized as a cost-effective strategy for reducing the rate of electricity demand growth, and since lighting is a major end use, attention turned to the potential for the introduction of CFLs. Since CFLs at that time were primarily used in developed countries, major barriers for the introduction in Mexico were their high unit costs and the intolerance of the units to the voltage fluctuations of the local grid, which caused significantly shortened life spans than are typically seen in developed countries. With support from the World Bank and the GEF, the electricity company Comisión Federal de Electricidad (CFE) purchased CFLs in bulk (200,000) and then sold them to customers in Guadalajara and Monterrey, the second and third largest cities in Mexico. With the bulk purchase, CFE was able both to specify the characteristics it desired for the CFLs, including a 10,000 hour lifetime and an ability to withstand voltage fluctuations of 10%, and to achieve a lower unit cost. In addition, CFL purchasers were offered credit for up to two years, rendering the lamps affordable to Mexican consumers despite their higher first cost. **Greenhouse gas emission reductions of 2.0 to 3.2 megatonnes (Mt) are estimated to have been achieved in the period 1995-2004, and a further 3.3 to 6.3 Mt in the period 2005-2010.**

The challenge of adapting climate-friendly technologies to ambient conditions in developing countries may seem daunting at first. But the good news is such ambient conditions do not vary substantially across many countries. In the case of ILUMEX, for example, the CFLs that emerged from that project may now operate satisfactorily in many developing countries throughout the developing world.

Hence, a process could be initiated under the aegis of the UNFCCC involving a working group from both developing and developed countries. The first step would be to identify a target set of technologies for adaptation. Criteria for selection of technologies would include that they account for a significant amount of energy use and the adaptation of the specific technology to the ambient conditions of the participating country would render a product that could be used extensively in other developing countries. Both of these criteria applied to the CFLs targeted in the ILUMEX project.

The second step in the process, again potentially involving a working group of developed and developing countries acting under the aegis of the UNFCCC, would be to identify specific developing countries within which the adaptation process could be supported. For example, countries with more advanced science and technology capacity could be candidates to support such a process. Countries with a large domestic manufacturing base that could produce or co-produce the adapted technologies could also be candidates. And countries that export products to others in the region could also be candidates.

Once the target technologies and target countries are agreed upon, then a roadmap could be established by the working group so that each targeted technology is adapted and brought to market in a targeted country. Details would then be worked out with each targeted country, such as how the necessary research is supported, how the changes are embedded in manufacturing, and what policy tools (such as procurement) are used to incentivize demand for the new products, both domestically within the producing country and external to that country. Institutions such as the multilateral development banks, which frequently support technology advancement in their client countries, and the Global Environmental Facility—charged with developing highly leveraged programs to meet climate needs—could play important financing roles in this process.

#### 4. Harmonizing Climate-Friendly Policies Across Regions, Especially for Smaller Countries

Even with the positive steps proposed to date, many countries may well find the act of implementing climate-friendly policies unduly onerous. The benefits of policies they may implement could be countered by opposing policies in a neighboring country, potentially even setting off trade disputes. At the same time, the costs of implementing climate-friendly policies and programs may be daunting. An appliance efficiency program, for example, requires the development of a testing facility to test the appliances, a label to convey to the public what the energy usage of the device



is, and governmental enforcement capacity to ensure compliance. These problems are all the more onerous for small countries. As exemplified by the European Union, working together across borders can diminish the burden for individual countries, particularly the smallest countries, and can also reduce the risks of trade-related frictions resulting from a patchwork quilt of policies.

Case #7 highlights one ongoing effort to reach harmonization among a group of countries, the so-called APEC or Asia-Pacific Economic Cooperation countries. Initial areas of focus for this cooperation have been on policies to harmonize appliance energy efficiency, but discussions are also planned on potential harmonization of building energy codes and common strategies to promote public transportation. As illustrated in the description, the APEC process also benefits from including some industrialized countries with extensive experience in climate-friendly policies, such as the U.S. and Japan, in the process.

#### **Case Study 7: Harmonizing regional climate-friendly policies – Example of APEC and Energy Efficiency**

**The program among the member countries of the Asia-Pacific Economic Cooperation (APEC) to harmonize region-wide energy efficiency policies is an example of a collaborative effort among developed (U.S., Australia, Japan, and New Zealand) and developing countries (Chile, China, Malaysia, Philippines, Vietnam and Thailand) to establish uniform policies that provide a sizable market demand for energy efficiency and avoid distortions caused by differing and potentially conflictive policies among the countries.** With an ambitious goal of reducing energy intensity by at least 25% by 2030, the regional effort has to date moved forward on a process to develop harmonized energy efficiency standards and labeling on household appliances, including air conditioners, fans, fluorescent lamps, televisions, washing machines and dryers, refrigerators and rice cookers.

A challenge facing both developed and developing countries is to create sufficient market demand for energy efficiency to drive forward a new generation of energy-efficient products and buildings. With many countries individually too small to spur demand by themselves for efficient products, regardless of how much the governments of the individual countries may desire to do so, a collaborative effort to institute harmonized policies can create a market sufficiently large to drive such change. With APEC economies accounting for more than half of the world's energy consumption, a region-wide effort to harmonize policies can yield substantial results. In addition to energy efficiency for appliances, future issues APEC members plan to address include building energy efficiency codes and public transportation. **If the proposed appliance standards and labeling are put into place, it has been estimated that by 2020, 1113 terawatt-hours (TWh) of electricity and 327 TWh of fuels will be saved annually by 2020, and by 2030, 3385 TWh of electricity and 928 TWh of fuels.**

The model provided by APEC could be replicated throughout the developing world. Indeed, existing regional trading partnerships have the potential to expand to include harmonizing strategies and policies to promote a climate-friendly future. Examples include the MERCOSUR and the Andean Pact in South America, ASEAN in Southeast Asia and SADCC in Africa. Many of these partnerships already work with specific industrialized countries, often geographic neighbors, and these working relationships could serve as the framework upon which to build a comprehensive program between donor institutions and regional trade alliances on harmonizing climate-friendly policies.

The UNFCCC could provide leadership by reaching out to these regional partnerships, with the goal of developing a comprehensive network of partnerships to pursue climate-friendly paths throughout the developing world. In each case, the UNFCCC could provide the venue for convening the members of these regional partnerships to determine their interest and to help to define initial targets for harmonization for each partnership. In addition, the UNFCCC, through its secretariat or a working group of signatory countries, could facilitate matchmaking between these regional alliances and donor institutions to provide necessary funding and technical expertise. Moreover, the UNFCCC could play an important monitoring role to ensure that the harmonization efforts yield tangible results.

### Section 3: Developing New Climate-Friendly Technologies

Implementing existing climate-friendly technologies in developing countries – with adaptation as needed – is clearly critical to meet the planet’s climate challenges. At the same time, there are a host of climate-friendly technologies that are needed but that have not yet been invented or commercialized. Examples include new generations of very efficient and cost-effective renewable technologies, carbon capture and sequestration (CCS) technologies, and very highly energy-efficient technologies that substantially reduce the demand for fuels that produce greenhouse gases.

With developing countries expected to dominate in the future as global energy consumers, it is critical that these technologies, when invented, are commercialized and implemented as soon as possible in these countries. Moreover, it makes sense that those developing countries that enjoy both strong science and research bases and domestic companies with track records in bringing new technologies to market should increasingly participate in the development of these new technologies. Many of them have substantial domestic markets to which they could readily deploy the new technologies and they are also major exporters to other developing countries, again providing a mechanism for quick deployment.

When looking for cases to demonstrate efforts made toward development of new climate-friendly technologies, we were able to identify some models used to bring technology into large developing market. However, we encountered significant difficulties when trying to identify ways for joint



innovation. This is an area of heated debate, touching upon delicate issues such as intellectual property and the true definition of public domain technology, particularly in a time of increasing profit or potential gains from a market that is becoming more climate conscious. The lack of process in the cooperation of technology development in itself is a calling for more actions, perhaps beginning with smaller scale pilot programs.

### 1. Bringing Technology Development to Market in Developing Countries

A number of developing countries are likely in the future to be partners in joint technology development. But even developing countries with strong research and development bases, when compared with their industrialized country counterparts, still face major barriers to bringing the fruits of their research to market. Immaturities in their economies often hinder new technologies from being commercialized. The success of the climate-friendly joint technology development process hinges, however, on all partners being able to bring technologies forward. Therefore, it's critical to work with developing countries that are having difficulties bringing innovation to market.

Case #8 highlights an innovative program between the Inter-American Development Bank and Brazil, with the goal of stimulating innovative financing for small and medium technology-based start-up companies, including venture capital. Known as INOVAR, the program led to the establishment of 25 venture capital funds and seed capital fund for small entrepreneurs. The beneficiaries of the venture capital and seed capital funds included renewable energy companies.



### Case Study 8: Support green market innovation – Example of Brazil's INOVAR Program and Renewable Energy Innovation

**The Brazilian INOVAR initiative is an example of a collaboration between a developing country and a multilateral development bank to stimulate financing, including venture capital, for small and medium technology-based start-up companies, including in sustainable energy. A focus of the INOVAR program has been to foster renewable energy companies.** Since its inception, INOVAR has established 25 venture funds, created a venture capital (VC) portal to stimulate matchmaking between VC funds and technology companies, established a Technology Investment Facility to undertake due diligence for VC funds and established a Seed Money program to provide early stage financing for small entrepreneurs.

Brazil exemplifies advanced developing countries, which, though they enjoy significant research capacity, have difficulty bringing the fruits of their research to market. INOVAR was established to address this gap. Launched in 2002 under the Brazilian Innovation Agency, FINEP, it was co-funded by Brazilian government institutions and the Inter-American Development Bank. In addition to seeking investment by venture capital funds, it sought investment by pension funds in venture capital funds. There are now 13 pension funds investing in VC, with a total allocation of \$900 million, and a total venture capital pool of almost \$2 billion. By 2008, 6 percent of venture capital in Brazil went to renewable energy companies and this sector is among the fastest growing VC destinations in Brazil. **Components of the INOVAR model have been adapted for other Latin American economies, including Peru and Columbia, and the program has been presented as a model in international conferences in Asia and the U.S. as well as a G-20 meeting on small and medium enterprises.**

In order for developing countries with strong research and development bases to become effective partners in joint technology development, they need to be able to bring their innovations to market. Programs such as INOVAR are an important step in the process.

Under the aegis of the UNFCCC, a collaborative process could be pursued that would matchmake developing countries with a strong research and development bases with donor institutions to assist them in strategies to bring innovations to market. This could potentially be realized under the Technology Executive Committee proposed in the Cancun Agreement.

The first step in the process would be to identify the applicable countries. These could be selected by a working group of developed and developing country representatives. At a minimum these would likely include Brazil, China and India. Once the countries are identified, the next step would be to match them with donors, ideally ones that have a history of supporting science and tech-





nology innovation in those countries. Once the matches are identified, the next step would be to define the specifics of the cooperation; the focus would be on addressing the gaps in the innovation process (all the way through commercialization) these countries face in bringing their innovations to market. The establishment of venture capital funds such as INOVAR is likely to be one of many options that could be implemented, but the appropriate set of options for each country would have to be studied comprehensively within the context of that country's energy innovation process and its problems.

## 2. Pilot Program in Joint Technology Development

Joint technology development is one of the topics on which no agreement has yet been reached within the Conference of Parties (COP) process. Clearly, an array of problems can be conceived of to thwart such development, ranging from intellectual property rights to the sharing of the profits of any resulting innovation. But the costs of inaction are indefensible. To meet the global challenges facing the planet, new climate-friendly technologies need to be developed at an unprecedented rate and they need to be deployed disproportionately in developing countries if significant progress is to be made in capping and reducing global greenhouse gas emissions.

The stalemate on this subject therefore needs to be broken. Perhaps, the best path forward is to try joint technology development on a pilot basis at first. As with the previous recommendations, the UNFCCC could play an important convening and facilitating role in the process. It could convene a working group composed of major leaders in technology innovation among developed countries (at a minimum, the U.S., the European Union and Japan) and emerging leaders in technology innovation among developing countries (at a minimum, China, India and Brazil).

Using a process of cooperation and collaboration similar to the one described throughout this document, the working group could identify a few pilot multi-party partnerships, selecting technology challenges in which initial agreements could be reached among all the participating parties. The specific technology selected would need to be applicable to the markets of the parties in the partnership. For example, carbon capture and sequestration is important for major coal-consuming countries such as the U.S., China, and India. For each pilot, a technology challenge could be identified as well as the participating partner countries, both from the developed and developing world. Funding for each project could potentially come from both participating partner countries as well as interested external partners, such as the multilateral development banks. Participating partners would also need to agree to some minimum requirements to prevent intellectual property theft. Each pilot team could then work collaboratively to define needed research, request proposals on the research from research teams within their countries and oversee that research.

A critical element of the pilots would be documentation of the process, overseen by the UNFCCC, potentially under the Technology Executive Committee. The documentation would record what

worked well and what did not, as well as ideas on how to overcome problems encountered by the pilots. Following such a process, a subsequent round of pilot programs could then be pursued in which the lessons learned from the previous round are factored into the new round of pilots. In such a manner, with each succeeding round of pilots, the global community would be able to determine with greater clarity how joint technology development could be successfully carried out.

### 3. Evaluating the Efficacy of Public Domain Technologies

Another topic where no consensus has yet been reached in the COP discussions is the proposal to designate some new climate-friendly technologies being developed as public domain technologies. The argument has been made that some or all climate-friendly technologies have such an important role in ensuring the health of the planet that they should be in the public domain so that they may readily be accessed by developing countries. Such a designation has been likened to the treatment accorded to HIV drugs at the beginning of this century; in the latter case, there was general agreement that conventional strategies to protect intellectual property and patent rights of these drugs were adversely affecting the global population by effectively removing affordable access to these technologies from the poorest and most dispossessed of the world's citizens, many of whom were most in need of the technologies. Many have similarly argued that traditional patent and intellectual property laws will continue to effectively remove affordable access to these technologies from populations in the poorest countries in the world, many being most in need of these technologies. Similar interventions have been proposed for climate-friendly technologies as had previously been implemented for HIV drugs, including the licensing of the technologies at below-market rates for sale in developing countries.

No progress has been made on the public domain technologies question, but it merits further examination. Within the aegis of the UNFCCC, a working group could be established under the guidance of the Technology Executive Committee that consists of developed countries, developing countries with strong internal research capacity and developing countries with very limited capacity to bring new products to market. The group, potentially pooling its capital and human resources, could then undertake a study to determine whether there is a class of new climate-friendly technologies, similar to HIV drugs, which without changes in the manner in which they are developed would end up being beyond the reach of some of the neediest countries. Such an analysis could try to prioritize the technologies most deserving of a public domain status, and simultaneously put forward suggestions about strategies that could be pursued for these public domain technologies to reduce their cost of entry in the poorest countries.



The recommendations put forward are based on the principle that significant progress can and should be made in the aforementioned areas, while minimizing the creation of new bureaucracies. The recommendations embrace the principle that many proposals may be implemented by expanding existing activities and partnerships between developed and developing countries. They are also predicated on the principle that no developing country should be left out.

If a decentralized approach to problem-solving is to work, there is a need for a facilitator and coordinator (the “matchmaker”). The UNFCCC is a logical entity to fulfill such a role. As outlined in the recommendations, for each proposal, the facilitative role should either be assumed by the UNFCCC secretariat directly or by a working group of signatory countries.

The concept of working within existing systems will not work, however, unless these systems are monitored to ensure accountability and non-exclusion of countries. The UNFCCC is also a logical candidate to fulfill this role. Indeed, the UNFCCC could issue an annual update that delineates the state of progress on each proposal set forward in this document as well as each partnership created in response to each proposal. This would ensure transparency and accountability. Moreover, the proposed structure should also be evaluated regularly by an independent party to determine the effectiveness of the centralized process of establishing partnerships, with the UNFCCC functioning as secretariat.

The agenda proposed is an ambitious one that will draw its credibility from a concrete set of results. Hence, in order to ensure success, the specific elements of the partnerships across countries and donor institutions must be defined as well as the specific goals to be achieved with each partnership.

For the information and capacity-building proposals in the first section, for example, a set of metrics needs to be created to define progress in achieving public information dissemination, business information sharing and training of policy makers and analysts that goes beyond “bean counting.” These include:

1. How do we measure whether the public understands climate change better?
2. How do we evaluate whether the information being dispensed about business opportunities in developing countries is actually enabling technologies to enter new markets?
3. How do we measure the adequacy of the training of policy makers and analysts?

The same questions should be posed in the activities posed in the latter two section of this report: building a new development path and developing new climate-friendly technologies.

The responsibility for monitoring the metrics, once agreed upon, logically rests with the UNFCCC. External independent evaluation would also make sense to assess how well the process is going, perhaps as frequently as every two years, at least in the early years of the program when it is still unproven. Not only would an independent evaluation offer a fresh set of eyes to the process, but it would also be able to address how well the UNFCCC is functioning as facilitator, coordinator and monitor of the process. In addition to surveying the effectiveness of the overall process, such an evaluation could also assess how effective the program metrics have been as indicators of success. Moreover, an independent evaluation could also review the speed and delivery of individual programs.





Enormous challenges lie ahead for the global climate regime. Global momentum leading up to the next UNFCCC meeting in South Africa needs to increase to combat climate change. Businesses and consumers need to participate more directly into this process.

States and regional economic organizations, as well as existing multilateral institutions, have some successes in arrangements for climate education, information sharing and market building. These successful experiences pose opportunities for expansion. Greater numbers of consumers could be educated, businesses need to be better informed, markets should be harmonized and resources should be attracted to support climate-friendly industries. Technological innovation should be induced across sectors and national boundaries.

The UNFCCC is in a unique position to more deeply integrate global movement that brings together governments, and those whose decisions and actions make a difference on a daily basis. In addition to the continuing efforts of the COP process within the UNFCCC, which has proved to be lengthy, the UNFCCC should also play an important matchmaking role to facilitate the development of partnerships between developed and developing country governments, consumers and businesses that will yield concrete, short-term results to reduce GHG emissions.

For example, three entities – the UNFCCC secretariat, the proposed Technology Executive Committee and the Climate Technology Center and Network – could potentially play **matchmaking roles** by setting up and guiding a series of working groups. These working groups can focus on linking and matching the appropriate partners who are best suited to cooperate on a climate-friendly development path. By making the partnership arrangements and feeding them with needed expertise, the UNFCCC can bring about a wide array of activities that will contribute directly and immediately to mitigate tomorrow's carbon emissions.

We consider this a needed **second track of global climate governance** acting parallel to the binding emission targets. The window for reducing emissions in time to avoid serious future catastrophe is closing. We must take concrete steps and make difficult decisions now with the systems and tools we have in hand.

## VIII. Acronym List

<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>GHG</b>	Green House Gases
<b>REDD</b>	Reducing Emissions from Deforestation and Forest Degradation
<b>REDD+</b>	(plus)
<b>TEC</b>	Technology Executive Committee
<b>CTCN</b>	Climate Technology Center and Network
<b>GTZ</b>	German Development Company
<b>IGEN</b>	Indo-German Energy Program
<b>RESRA</b>	Renewable Energy Supply for Rural Areas
<b>TRIGEN</b>	Tri-Generation Tamil Nadu House, Delhi
<b>IGEF</b>	Indo-German Energy Forum
<b>PV</b>	Photovoltaic (A measure of solar power, usually referring to solar cell.)
<b>Mt</b>	Megatons of Electricity
<b>CFL</b>	Compact Fluorescent Lamp
<b>ILUMEX</b>	Mexico High Efficiency Light Project
<b>CFE</b>	Comisión Federal de Electricidad, Mexico
<b>GEF</b>	Global Environmental Facility
<b>VC</b>	Venture Capital
<b>INOVAR</b>	Brazilian Renewable Energy Program
<b>FINEP</b>	Brazilian Innovation Agency
<b>BMU</b>	German Ministry of the Environment
<b>DENA</b>	German Energy Agency
<b>WBCSD</b>	World Business Council for Sustainable Development
<b>LBNL</b>	Lawrence Berkeley National Laboratory
<b>NCRE</b>	Non-Conventional Renewable Energy
<b>APEC</b>	Asian-Pacific Economic Cooperation
<b>MERCOSUR</b>	An economic and political agreement between Argentina, Brazil, Paraguay and Uruguay
<b>ASEAN</b>	Association of Southeast Asian Nations
<b>SADCC</b>	Southern African Development Coordination Conference
<b>CCS</b>	Carbon Capture and Sequestration





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**Printing**

Matthiesen-Druck, Bielefeld



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