Energy Security Initiative
at BROOKINGS

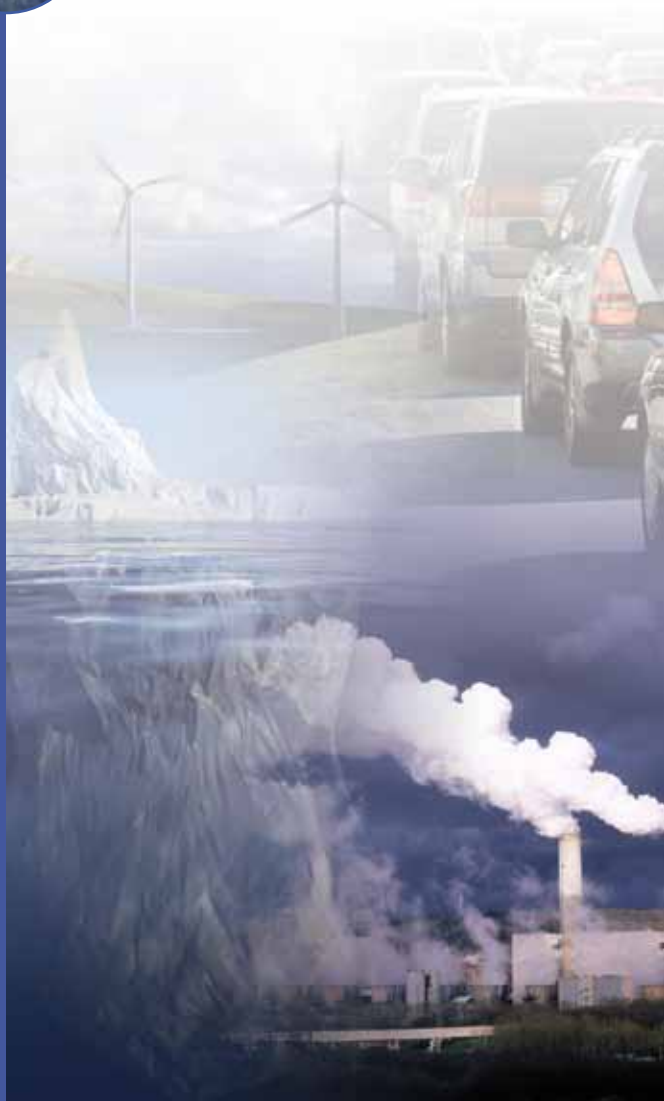




TRANSFERRING ENVIRONMENTALLY SOUND TECHNOLOGIES IN AN INTELLECTUAL PROPERTY-FRIENDLY FRAMEWORK

Dr. Charles Ebinger
Govinda Avasarala

NOVEMBER 2009
Policy Brief 09-08



Energy Security Initiative
at BROOKINGS

TRANSFERRING ENVIRONMENTALLY SOUND TECHNOLOGIES IN AN INTELLECTUAL PROPERTY-FRIENDLY FRAMEWORK

Dr. Charles Ebinger
Govinda Avasarala

NOVEMBER 2009
Policy Brief 09-08

About The Brookings Energy Security Initiative

The Energy Security Initiative (ESI) is a cross-program effort by the Brookings Institution designed to foster multidisciplinary research and dialogue on all aspects of energy security today. ESI recognizes that public and private choices related to energy production and use will shape the global economic, environmental and strategic landscape in profound ways and that achieving a more secure future will therefore require a determined effort to understand the likely consequences of these choices and their implications for sound policymaking. The ESI Policy Brief Series is intended to showcase serious and focused scholarship on topical issues in one or more of these broad research areas, with an emphasis on targeted policy recommendations.

Contact for the Energy Security Initiative:

Lea Rosenbohm
Project Manager
(202) 797-6248
lrosenbohm@brookings.edu

TRANSFERRING ENVIRONMENTALLY SOUND TECHNOLOGIES IN AN INTELLECTUAL PROPERTY-FRIENDLY FRAMEWORK

Dr. Charles K. Ebinger

Dr. Charles K. Ebinger is the Director of the Energy Security Initiative at the Brookings Institution. He has 30 years of experience addressing the security, economic, environmental, and political interrelationships surrounding domestic and international energy issues.

Govinda V. Avasarala

Govinda V. Avasarala is an Energy Security Initiative Intern at the Brookings Institution. His research background has focused on the politics and economics of South-South Trade and Investment and South Asian Energy Security.

The authors wish to acknowledge the generous support of the GE Foundation for this report. They also acknowledge with sincere gratitude the contributions of individuals inside and outside the U.S. government who agreed to be interviewed for this report and who provided extremely helpful comments on earlier drafts of the manuscript.

Table of Contents

Executive Summary

In December 2009, the 15th Conference of Parties (COP 15), under the guidelines of the United Nations Framework Convention on Climate Change (UNFCCC) and in accordance with the Bali Action Plan (BAP) agreed at COP 13 in Bali, Indonesia, will attempt to reach agreement on new international climate change and emissions policies and regulations. The conference in Copenhagen, which convenes top negotiators from 192 nations, will address the significant environmental policy changes urgently needed to mitigate the effects of global warming and climate change.

Given the emissions forecasts of both the industrialized and developing economies, and the disproportionate vulnerability of the world's poorest nations to climate change-related calamities, there is little debate about the necessity of significant environmental policy changes to mitigate climate change; however, both the proposed benchmarks and regulatory frameworks are often disputed as each nation attempts to minimize national concessions.

Meeting any agreed environmental regulations standards will require the use of a plethora of climate change technologies, to which most developing nations do not have access. The scarcity of a distributed network of such technologies brings forth the debate of intellectual property rights (IPR). IPR refers to the protection of rights for the owners of ideas and innovation, research and development, manufacturing processes, and technology, as well as the required economic payment for the use of a previously patented item.

Though IPR is hotly debated, most research finds that it is not the biggest issue facing technology transfer. IPR's infamy is likely caused by the sensitive nature of an issue saturated in nationalism. In fact, while the majority of previous research fails to arrive at a conclusion over whether patent protection stimulates or hampers technology transfer, recent research trends and opinions have found little evidence of IP encumbering such transfers.

In international institutional forums, technology transfer has evolved from one of many ingredients for climate change mitigation to now being considered a pillar for successful abatement. Alas, this Policy Brief finds that the remarkable size of such institutions (such as the UNFCCC) begets an unwieldy negotiation process yielding few tangible results, exemplified by the Kyoto Protocol. Other leading institutions—UNEP, the World Bank Group, the WTO, and the GEF—share the UNFCCC's inefficiencies. The authors contend that not only does the inclusiveness of such multilateral environmental agreements impede concrete resolutions, it also reveals institutional

impudence by including scores of poverty-stricken nations with little culpability for global warming trends, and who face various other challenges (disease and malnutrition, for example). More efforts should be made for imparting climate change adaptation strategies and technologies and developing basic electricity access, assuring the poorest nations are best situated for sustained and sustainable economic development in the short and long-term. In addition to a cumbersome negotiating process that may engineer little more than political pique, none of the previously mentioned institutions (excluding the WTO) has any enforceable IP legislation in place.

Given the shortcomings of existing institutions, the authors propose two solutions: in the event of a standoff at Copenhagen, the creation of the E-10, a summit of ten leading emitting nations to collectively reduce their environmental footprint. Drawing on past successes of the 'G' forums (G-8, G-20, etc.) including fast and effective responses to two financial crises and agreement on the Africa Action Plan, the E-10 would exploit the benefits of fewer, more capable parties. The group members—the United States, European Union, China, India, Japan, Russia, Canada, South Africa, Australia, and Brazil—account for more than three-quarters of total global emissions.

In the event of an agreement in Copenhagen, the authors propose a collaborative effort between the UNFCCC and private sector firms through the usage of Technology Needs Assessments (TNAs) and a segmented/parallel pricing mechanism. TNAs are country-specific technology requirements based upon geographic and demographic constraints. Developed in conjunction with UNEP, TNAs prevent 'blanket solutions' whereby nations receive unsuitable technologies. Segmented/parallel pricing involves selling technology to wealthy nations at market prices and to developing nations on a marginal cost scale.

After Part I's synopsis of the setting for Copenhagen and the issues at stake, Part II and Part III of this Policy Brief will elucidate the history of intellectual property and its impact on technology transfer and detail the development of technology transfer as a theme to effective climate change abatement strategies, in order to demonstrate the tribulations facing dialogue this December and beyond. Finally, Part IV will detail the weaknesses of current multilateral institutions in formulating an intellectual property (IP)-friendly agreement on technology transfer and Part V will expound the authors' solution with or without agreement in Copenhagen.

PART I

Background to IP and Technology Transfer

Anthropogenic climate change is undeniable

Climate change will have varying and disproportionate effects across the globe. Developing countries are more vulnerable to the negative impacts of climate change given their greater dependence on the natural environment, demographic size, and lack of access to appropriate adaptation technologies. Low-lying and small island countries such as the Maldives and Bangladesh, for example, will be affected disproportionately by changes in sea level than more developed countries. Short-term phenomena and longer-term trends like rising sea levels, less predictable and more severe weather patterns, and climate-induced displacement and migration require strategies that effectively address both short-term and long-term time horizons.

COP 15[1] Will Address Combating Climate Change

While there is a consensus among global experts in the Intergovernmental Panel on Climate Change (IPCC) that human activities play a major role in climate change, the extent of the economic impacts of climate change, as well as the implementation costs of various mitigation mechanisms are still subjects of intense international debate. How the costs of climate change abatement and adaptation will be shared and how companies that provide critical technology in this process can be assured of intellectual patent protection are issues that will be at the forefront of the Copenhagen negotiations in December 2009.

The COP 15's fundamental objective is to generate a consensus on an agreement for post-Kyoto Protocol greenhouse gas emissions reductions to be implemented in 2012, when the Kyoto Protocol expires. The agreement will also detail mechanisms that must be implemented to help developing nations acquire information, technology, and education from industrialized nations, thus ensuring contentious debates. Entering negotiations with inconclusive and divisive information and demanding comprehensive, binding agreements regardless of cost will prove damaging to a successful outcome. Owing to the complexities of the issues involved and the diversity of

[1] COP 15 is the 15th Meeting of the Conference of Parties under the United Nations Framework Convention on Climate Change (UNFCCC) in Copenhagen, Denmark this December. The Conference of Parties framework was developed under the establishment of the UNFCCC at the Rio Convention in 1992 to create and implement a framework for mitigating the effects of climate change.

negotiating parties, it is the thesis of this policy brief that a measured, cost-efficient approach to these issues will prove far more realistic and effective than some of the more extreme proposals, such as closing down all fossil fuel CO_2 emitting plants as rapidly as possible.

Copenhagen and Technology Transfer

Just as there is no dispute of anthropogenic acceleration of climate change, there is little doubt that technology transfer is vital for curbing emissions and developing successful adaptation strategies. Unless a "magic-bullet solution" is found, successful mitigation of climate change hinges upon the usage of an assortment of technologies.[2] Solar, wind, and biofuel usage is increasing dramatically; however, it still accounts for only a fraction of energy consumption. Unproven (hydrogen fuel cells) or commercially unviable (carbon capture and sequestration) technologies are still being researched and financed as potential assets to an ever-growing portfolio of 'green' technologies. Furthermore, while next generation nuclear technologies offer one path to partial decarbonization of the electric power sector, cost and environmental concerns as well as public opposition continue to impede the industry from meeting its potential as one of the major non-CO_2 clean energy technologies.

In Copenhagen, one of the main points of contention between developed and developing nations will be the extent of developing world responsibility for combating climate change and how they will garner access to costly environmentally sound technologies (ESTs). Technology transfer has long been a theme at environmental summits, dating back to the 1972 Stockholm Convention, the first international environmental conference. Section 3 below will detail the growing importance of technology transfer to climate change negotiations.

In this Policy Brief, the definition of technology transfer employed is that of the Intergovernmental Panel on Climate Change (IPCC): "The broad set of processes covering the flows of knowledge, experience, and equipment amongst different stakeholders such as governments, private sector entities, financial institutions, NGOs, and research/educational institutions."[2]

Who Will Pay for Climate Change Efforts?

Much fanfare has been made of the disputes between developed and developing nations, leading to December's summit. Developing nations (most notably, India) refuse to pay for the economic costs of climate change mitigation and adaptation, arguing that global warming is a phenomenon imposed by rich-world industrialization and that per-capita emissions in developing nations are nowhere near levels in developed nations. Thus, developing nations demand that the industrialized world must cover the costs of climate change mitigation and adaptation, particularly regarding the transfer of ESTs.

Conversely, developed parties such as the United States, European Union, and Japan contend that although they do share much responsibility, emissions in the emerging economies, namely China, India, and Brazil, are increasing at startling rates and therefore should be included in any emissions caps. The impasse represents a historic cleft between developed and developing world viewpoints regarding culpability for environmental degradation.

---

[2] Christian Egenhofer and Markus Ahman, *Beyond Bali: strategic issues for the post-2012 climate change regime* (Brussels: Center for European Policy Studies, 2008), p.118.

[3] IPCC, 2000. Methodological and Technological Issues in Technology Transfer. Cambridge University Press, Cambridge.

Disputed Economic Costs of Climate Change

Also causing much disagreement are the potential economic costs of climate change. Although the human contribution to climate change is undeniable and the vast majority of analysts recommend the implementation of climate change mitigation strategies, research and literature reports divergent estimates, resulting in a daunting array of opinions.

The 2007 Stern Review on the Economics of Climate Change, written by Lord Nicholas Stern for the use of the British government, is arguably one of the most cited reports on the economic risks of climate change. In fact, Great Britain's then-Prime Minister Tony Blair boldly lauded the Stern Review as "the most important report on the future ever published by this government."[4] However, the research is vehemently disputed by numerous economists, including Richard Tol, the lead writer for the Intergovernmental Panel on Climate Change, who claims Stern vastly overstated the economic risks of global warming.[5] Stern's research concludes that without a response to climate change, global warming would cost nearly 5 percent of global GDP per year. Tol argues that Stern's empirical analysis was fraught with elementary economic mistakes and receives support from Robert Mendelson, a celebrated economist from Yale University who argues that not only did Stern overestimate the cost of global warming but he also underestimates the costs of implementing an emissions reduction strategy.[6]

Certainly, Stern's work is not without its supporters: many Nobel Prize-winning economists have expressed their backing for Lord Stern's findings including, Joseph Stiglitz, Robert Solow, and Amartya Sen;[7] however, despite economic luminaries on both sides, the lack of consensus on the economic risks of climate change has produced a striking range in cost estimates. Economists Warwick McKibbin and Peter Wilcoxen highlighted the momentous uncertainty best:

> "The most comprehensive study to date is [the] IPCC [2001], which surveyed the literature and reached several conclusions that are most notable for their uncertainty. The…impact of a small increase in global temperatures could be 'plus or minus a few percent of world GDP.' To put that in context, the IPCC's estimate of world [GDP] in 2050 is $USD 59 to 187 trillion, so if a 'a few percent' might mean 3 percent, the global damages from climate could be plus or minus $5.6 trillion, or about the entire GDP of the United States in 1990."[8]

Similarly, international institutions have produced an array of estimates for both mitigation and adaptation strategies. For instance, regarding mitigation, the Conference of Parties (COP), developed under the United Nations Framework Convention on Climate Change (UNFCCC), estimates costs for mitigation at between $200-$210 billion/year while the International Energy Agency (IEA) predicts costs between $400 and $1,100 billion/year; the OECD's Environmental Outlook to 2030 estimates costs between $350 and $3,000 billion/year; and the IPCC's most recent assessment in November of 2007 ranges between a 5.5

---

[4] Simon Cox and Richard Vardon. "Running the Rule over Stern's Numbers." BBC News. <http://news.bbc.co.uk/2/hi/science/nature/6295021.stm>.

5 Ibid.

6 Ibid.

7 HM Treasury, *Responses to the Stern Review by Leading Economists.* <http://webarchive.nationalarchives.gov.uk/+/http://www.hm-treasury.gov.uk/d/20061028_Quotes-7.pdf>.

8 Warwick J. McKibbin and Peter J. Wilcoxen, *Climate Change Policy after Kyoto: Blueprint for a Realistic Approach* (Washington D.C.: Brookings Institution Press, 2002), p.42.

percent loss to a 1 percent gain in global GDP[9] (equaling between a $3.3 trillion loss to a $600 billion gain per year, by the World Bank's 2007 estimates).[10]

Estimated costs of adaptation range similarly, albeit on a smaller scale: the UNFCCC estimates adaptation costs between $28-67 billion in 2030, while the UNDP predicts a cost of $86 billion by 2016.[11] Such uncertainty and staggering discrepancies in estimates without further research inhibits the capacity of policy makers to make effective decisions, resulting in policies that are inadequate or, more likely, highly expensive and wasteful.

Disproportionate Risks to Developing Nations

Not lost in the debate over effective climate change mitigation are the disproportionate risks facing the poorest nations, particularly in Africa, parts of Latin America and the Caribbean, portions of Southeast Asia, and the Pacific island nations. Threats include the melting of ice caps and glaciers, leading to rising water levels and increased floods, more violent hurricanes, typhoons, and tsunamis, and increasing inconsistencies in natural weather patterns causing irregular rainfall variation, droughts, fires, and heat waves.

Africa will experience significant impacts from climate change. Indeed, its size, population and poverty may make it the "ground zero in a warming world."[12] In Africa, agricultural yields may decline by as much as 50 percent by 2020. One quarter of Africa's population is under high-water stress and this number is projected to grow to between 75 and 250 million people by 2020. Low-lying coastal areas are in direct risk of flooding from rising sea levels.[13] Similarly, in poverty-ravaged Bangladesh, cyclone Sidr in 2007 forced millions of people into food and water insecurity and malnutrition, not accounting for the thousands who perished during the super-storm.[14] The plight of sparsely populated low-lying Pacific and Caribbean nations is rarely heard; however, the island nations are critically vulnerable to rising sea-levels, storm surges, flooding and tsunamis. The danger is such that leaders from Pacific nations are already arranging migration agreements with developed neighbors Australia and New Zealand.[15]

The inconspicuous injustice of global warming is that most nations critically at risk from climate change effects have contributed very little in harmful emissions. In fact, most efforts in such nations focus on rudimentary development and not industrialization; therefore, climate change mitigation for nations like Nicaragua, Togo, and Samoa will have little global impact, and any endeavors should concentrate on adaptation strategies while maintaining development efforts and poverty-reduction endeavors. Alas, until recently, international climate change policies seldom

---

[9] The World Bank Group. "Development and Climate Change: A Strategic Framework for the World Bank Group." 2008. <http://siteresources.worldbank.org/EXTCC/Resources/FullFrameworkDocument1212008Book.pdf>.

[10] World Bank, "World Bank Development Indicators," July 1, 2009.

[11] The World Bank Group. "Development and Climate Change: A Strategic Framework for the World Bank Group." 2008. <http://siteresources.worldbank.org/EXTCC/Resources/FullFrameworkDocument1212008Book.pdf>.

[12] Abigail Jones, Vinca LaFleur, and Nigel Purvis. "Double Jeopardy: What the Climate Crisis Means for the Poor," in *Climate Change and Global Poverty: A Billion Lives in the Balance?* eds. Lael Brainard, Abigail Jones, and Nigel Purvis (Washington D.C.: Brookings Institution Press, 2009), p.13.

[13] Ibid.

[14] Atiq Rahman. "Integrating Climate Change into Development: Multiple Benefits of Mitigation and Adaptation," *Climate Change and Global Poverty: A Billion Lives in the Balance?* eds. Lael Brainard, Abigail Jones, and Nigel Purvis (Washington D.C.: Brookings Institution Press, 2009), p.113.

[15] Stephen de Tarczynski, "Climate Change Refugees Look to Australia, N.Z.," *Inter-Press Service News Agency*, September 1, 2008. <http://ipsnews.net/news.asp?idnews=43743>.

stress adaptation strategies[16] and focus mostly on mitigation.[17] Although embracing adaptation technologies requires the admission that global warming is, in fact, a very real danger (perhaps part of the reason adaptation strategies have not been appropriately elaborated), technology transfer for adaptation measures are feasible and cost-effective; Oxfam International, an organization concerned with alleviating millions from poverty, predicts[18] that immediate-priority adaptation measures will cost between $8 and $33 billion.[19]

By recognizing the danger while simultaneously ignoring adaptation measures, policy makers threaten global security. Jones et al. overtly contend that "a warmer world will be a more violent one" as displacement and climate change related migration "[exacerbate] the hardship and suffering that can breed despair and chaos."[20] Adaptation efforts like reforestation, water management, and coastal management are all inexpensive and feasible strategies that can reduce future social, economic and political turmoil.

Furthermore, the authors assert that although climate change adaptation strategies are imperative to LDC and poor developing countries, forcing climate change mitigation upon them to the detriment of economic development is presumptuous, disadvantageous and counterproductive.

[16] Elliot Diringer. "Toward a New International Climate Change Agreement," *Climate Change and Global Poverty: A Billion Lives in the Balance?* eds. Lael Brainard, Abigail Jones, and Nigel Purvis (Washington D.C.: Brookings Institution Press, 2009), p.73.

[17] The UNFCCC has begun allocating appropriate attention to adaptation needs. UNFCCC, 2009. Ad-hoc Working Group on Long-term Cooperative Action Under the Convention, September 17, 2009. *Ideas and proposals on the elements contained in the paragraph 1 of the Bali Action Plan: Submissions from Parties,* U.N. Doc FCCC/AWGLCA/2009/MISC.6. United Nations, New York.

[18] The World Bank Group. "Development and Climate Change: A Strategic Framework for the World Bank Group." 2008.

[19] Even if Oxfam's predictions may be underestimating adaptation costs, all cost predictions for adaptation measures are less expensive than mitigation costs. The previous section on cost uncertainties detailed adaptations costs as well as mitigation costs, and in each case adaptation costs are less expensive.

[20] Abigail Jones, Vinca LaFleur, and Nigel Purvis. "Double Jeopardy: What the Climate Crisis Means for the Poor," in *Climate Change and Global Poverty: A Billion Lives in the Balance?* eds. Lael Brainard, Abigail Jones, and Nigel Purvis (Washington D.C.: Brookings Institution Press, 2009), p.25.

PART II

The IPR Issue

Intellectual property rights (IPR) refers to the protection of rights for the owners of ideas and innovation, research and development, manufacturing processes, and technology, and the required economic payment for the use of such items that have been previously patented.

IPR Issues at Copenhagen

IPR has the potential to bring negotiations at December's COP 15 meeting in Copenhagen to a standstill. If private sector firms and groups who have invested millions of dollars in developing patented 'clean' technologies do not have an assurance of financial remuneration, an agreement on global emissions reductions and necessary technology transfer of Environmentally Sound Technologies (ESTs) will be unattainable. While some observers argue that businesses threaten to maintain the status quo and that compulsory licensing or a "use it or lose it" scheme would best effectuate technology transfer, such mechanisms threaten private sector R&D incentives and are consequently not viable strategies.

A Brief History of IPR, TRIPS

A framework for protection of intellectual property was initially established in 1883, when fourteen nations signed the Paris Convention for the Protection of Industrial Property, providing foreign investors with protection of "utility models, industrial designs, trademarks, service marks, trade names, indications of source or appellations of origin, and the repression of unfair competition."[21] In 1886, the Berne Convention ensured that any invention must be patent-protected in another member nation. The two groups merged in 1893 to form the United International Bureau for the Protection of Intellectual Property (BIRPI), which evolved into the World Intellectual Property Organization (WIPO) in 1967. In 1970, WIPO subsequently became part of the United Nations framework as the body that executes the Paris Convention.

The industrialization of developing economies in the 1970s and 1980s put strain on international IP laws, concerning developed nations—developing nations wanted access to patents that were previously considered commercial monopolies under the Paris Convention, while developed nations feared such policies would expropriate private property.[22] During this time, the United States, European nations, and Japan increasingly relied on the General Agreement on Tariffs and Trade

[21] Paris Convention for the Protection of Intellectual Property, 1883. Article 1.2. Paris. <http://www.wipo.int/treaties/en/ip/paris/trtdocs_wo020.html#P72_4121>.
[22] Paul Lewis, "U.S. and the Third World at Odds Over Patents," *New York Times*, October 5, 1982.

(GATT) as the appropriate institution to implement global IP legislation. Contrary to WIPO, GATT had an existing enforcement mechanism and, at the behest of developed nations, sought more stringent patent protections during the 1986 Uruguay Round of negotiations.[23] The culmination of the Uruguay Round in 1994 brought forth an agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS), an international accord on standards and regulations for the protection of intellectual property. The seven-and-a-half year negotiations resulted in the creation of the World Trade Organization and its inauguration in 1995. Encouraged by industrialized nations, ratification of TRIPS was compulsory for WTO membership, thereby ensuring that developing nations agreed to an enforceable intellectual property mechanism.

In 2001, at the fourth Ministerial Conference in Doha, Qatar, developing nations sought to expand the scope of the TRIPS agreement, arguing that industrialized nations practiced an unfairly stringent interpretation of the accord, strictly enforcing patents of pharmaceutical products vital for combating epidemics, like AIDS and malaria, and in doing so, making such drugs too expensive for procurement by LDC nations. Tensions regarding TRIPS and public health escalated, as developing nations facing health emergencies and epidemics struggled with high prices and lack of sufficient access to key pharmaceutical products. Although Article 31 of the original TRIPS Agreement allowed for the compulsory licensing of drugs when faced with a national emergency after having exhausted all possible avenues for obtaining licensing, poor nations wanted both easier access to patented drugs or cheaper generics—against the will of developed nations' pharmaceutical firms—and an increase in the scope of a 'national emergency' to include a range of diseases and epidemics. By contrast, developed nations argued that expanding the definition could potentially lead to the inclusion of non-epidemic diseases. After much rancorous deliberation WTO members reached an agreement in 2003, amending TRIPS to expand compulsory licensing of pharmaceutical products and generics in cases of public health emergencies.

TRIPS and ESTs

As TRIPS does not specify the treatment of climate change or environmentally sound technologies (ESTs), developing nations have sought protection under the TRIPS agreement on public health grounds by invoking Article 31. In this way, poorer nations would gain access to ESTs through compulsory licensing[24] by arguing that climate change represents a national health emergency. There are, however, serious flaws with this argument. First, the patent issues for ESTs are not the same as pharmaceuticals, as ESTs require many different technological inputs: Japan and the EU argue that while there is generally only one patent per pharmaceutical product, climate change mitigation technologies almost always require numerous patents held by many different firms.[25] Also, the climate change abatement technology market is relatively substitutable: generally there is only one drug that can provide a particular medical benefit, compared to the abundant competition for similar clean energy products. For example, a recent market research study found 47 different

[23] Mark A. Franz, "Message to Verity: Don't Let the U.N. Undermine Patents," Heritage Foundation, September 9, 1988.
[24] Compulsory licensing is a technology transfer mechanism whereby governments or international institutions require the holder of a patent to extend licensing to parties who will use it for educational or non-commercial purposes, in exchange for a smaller royalty fee. Compulsory licensing is widely disliked by private sector firms who argue that it prevents them from earning revenue to cover high R&D costs and therefore reduces incentive to invest in potentially crucial technologies.
[25] Copenhagen Economics A/S and The IPR Company ApS, "Are IPR a Barrier to the Transfer of Climate Change Technology?" Copenhagen: 19 January 2009, p.7.

solar panel manufacturers.[26] The divergent characteristics of ESTs compared to pharmaceuticals suggest that ESTs be treated outside the realm of public health within TRIPS. Finally, coupling abatement technologies to public health and other national emergency provisions threatens to allow an unfairly broad interpretation of the agreement as, under TRIPS, "each Member has the right to determine what constitutes a national emergency, or other circumstances of extreme urgency."[27] Thus, WTO members will be granted compulsory licensing in "a very broad set of circumstances."[28]

In TRIPS, there is only one specific mention of the environment, excluding products that provide immediate harm to the environment from patentability.[29] TRIPS has no concrete agenda for technology transfer of ESTs. Instead, it refers to the transfer of technology for public welfare purposes and for economic development of LDC nations. Article 7 declares that IP should promote technology innovation and transfer "to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare."[30] On economic development for LDC nations, TRIPS Article 66.2, requires:

> "Developed country Members [to] provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least-developed country Members in order to enable them to create a sound and viable technological base."[31]

Articles 7 and 66.2 are examples of the broad scope of TRIPS regarding technology transfer and economic development. Given TRIPS' limited reference to specific EST provisions, the following will investigate whether IPR furthers or inhibits technology transfer, to determine the appropriate role of intellectual property in any future climate change agreement.

Does IPR Advance or Hinder Technology Transfer?

Research on the empirical effects of property rights on technology transfer, particularly to developing nations is murky, with a large incongruity existing between developed and developing nations.

Developed countries, often at the impetus of the private sector, claim that IPR reduces transaction costs for technology transfer by establishing a regulatory framework, whereby R&D costs can be recovered by firms and incentives for future investment is maintained. Also, strong IPR protection is an important catalyst for encouraging innovation in developing countries, and actually helps promote the sharing of technology as consistent and predictable legislative processes protect foreign direct investment and further joint ventures and international collaboration.[32] Industrialized parties' fears of technological imitation may be tempered by recognizing that the few emerging economies (China, India, Brazil, Russia, South Africa, Indonesia, and Mexico) that have the capacity to reverse-engineer and imitate solar,

---

[26] Jennifer A. Haverkamp, Statement to the U.S. House of Representatives Select Committee on Energy Independence and Global Warming, "Climate for Innovation: Technology Transfer and Intellectual Property In Global Climate Solutions," July 29, 2009.
[27] World Trade Organization, *The Uruguay Round Agreements: Agreement on Trade Related Aspects of Intellectual Property Rights.* Article 5.2. Geneva: WTO, Geneva: 1994.
[28] Garten Rothkopf, "Intellectual Property Protection and Green Growth: Analysis and Implications for International Climate Negotiations," Washington D.C.: Global Intellectual Property Center, September 2009.
[29] World Trade Organization, *The Uruguay Round Agreements: Agreement on Trade Related Aspects of Intellectual Property Rights.* Article 27.2. Geneva: WTO, Geneva: 1994.
[30] Ibid., Article 7.
[31] Ibid., Article 66.2.
[32] Copenhagen Economics A/S and The IPR Company ApS, "Are IPR a Barrier to the Transfer of Climate Change Technology?" Copenhagen: 19 January 2009, p.7.

wind, and other clean technologies, are developing relatively large amounts of domestic patents, thus reducing or even eliminating the incentive to import and reverse-engineer foreign products.

The industrialized world's argument for patent protection extends only to the poorest developing nations. TRIPS includes transitional provisions in Article 66.1 for new market-based economies and an amendment in 2005 allows the poorest 32 nations, classified as the least-developed countries (LDC), to be exempt from TRIPS regulations until 2013 (and 2016 for pharmaceutical regulations).[33] The North-South divide and the development of South technologies will be discussed subsequently.

In contrast to the position of developed countries, developing and LDC nations, as well as many NGOs, argue that IPR promotes high costs and unjust protectionism, thus inhibiting access to necessary technologies.[34] Debates at the Conference of Parties over the appropriate stringency of IPR in climate change technologies illustrate the vivid divide between those in favor of a strong IPR regime and those against it: developing nations such as India, China, Brazil, Bolivia, and Ghana all seek mechanisms that avoid "over-protectionism" of patents, while industrialized parties such as the United States and Australia seek an improvement in IP protection and enforcement.[35] The majority of proposals within the UNFCCC and WTO come from developing nations.[36] The disproportionate representation of developing country views has spawned more radical financing suggestions, including the G77+China's suggestion of a 'Global Technology Pool for Climate Change' that "promotes and ensures access to intellectual property protected technologies…on non-exclusive royalty-free terms."[37]

Contrary to the views of poorer nations, a comprehensive review of literature indicates that patent protection has a positive impact on technology transfer and rarely presents a barrier: stronger IPR provisions promote technology transfer and economic growth in industrialized and low-income nations, and have only a marginally negative impact on technology transfer and growth in middle-income nations as middle-income nations have the technological capacity to reverse-engineer and imitate imported ESTs.[38] A recent report by the European Commission, through the University of Copenhagen determined, "dismantling or weakening the intellectual property rights system would not only hinder the access of developing countries to costly technology, it would also hinder the access to low cost technology as IPR protected technology is also to be found among the low abatement cost technologies."[39] The late John Barton[40] and Keith Maskus,[41] both revered

[33] World Trade Organization, "Poorest countries given more time to apply intellectual property rules," WTO Press Releases, November 29, 2005. Geneva.
[34] Patrick Avato and Jonathan Coony. "Accelerating Clean Energy Technology Research, Development, and Deployment: Lessons from Non-energy Sectors," Washington DC: The World Bank, 2008.
[35] UNFCCC, 2009. Conference of Parties, Ad-hoc Working Group on Long-term Cooperative Action Under the Convention, Poznan, 1-10 December, 2008, *Ideas and Proposals on Paragraph 1 of the Bali Action Plan,* Paragraph 129. U.N. Doc FCCC/AWGLCA/2008/16/Rev.1. United Nations, New York.
[36] Jennifer A. Haverkamp, Statement to the U.S. House of Representatives Select Committee on Energy Independence and Global Warming, "Climate for Innovation: Technology Transfer and Intellectual Property In Global Climate Solutions," July 29, 2009.
[37] Sangeetha Shashikant, *Developing countries call for no patents on climate-friendly technologies*, Third World Network, Bonn News Update No.15, June 11, 2009. <http://www.twnside.org.sg/title2/climate/news/Bonn03/TWN.Bonn.update15.doc>.
[38] Rod Falvey, David Greenaway, and Neil Foster, "Intellectual Property Rights and Economic Growth," Internationalisation of Economic Policy, Research Paper No. 2004/12. 2004.
[39] Copenhagen Economics A/S and The IPR Company ApS, "Are IPR a Barrier to the Transfer of Climate Change Technology?" Copenhagen: 19 January 2009, p.39.
[40] John H. Barton, "Views on the Future of the Intellectual Property System," ICTSD Issue Paper 4, ICTSD 2007, Geneva.
[41] Keith E. Maskus, Kamal Saggi, and Thitima Puttitanun, "Patent Rights and International Technology Transfer through Direct Investment and Licensing," in *International Public Goods and Transfer and Technology Under a Globalized Intellectual Property Regime,* ed. Keith E. Maskus and Jerome H. Reichman (Cambridge: Cambridge University Press, 2005). p.266.

IP scholars, concurred with the EC's study, finding that IPR is not a barrier, rather an incentive for technology transfer.

However, Maskus, among many experts, believes that IPR is not the most important issue surrounding technology transfer: infrastructure, absorption capacity (including human capital), and governance must be in place for effective technology transfer and investment.[42] In fact, a UNFCCC survey of developing and poorer nations identified lack of financial resources as the main economic and market barrier to technology transfer, while few nations considered IPR a significant impediment, ranking it behind nine other barriers in terms of importance. Those barriers include high investment costs, incompatible prices, subsidies and tariffs, lack of incentives, consumers' low income, high upfront costs, and lack of access to credit.[43] Moreover, many climate change mitigation and adaptation strategies require no property rights regulations or already exist in the public sphere, such as reforestation or removing energy pricing subsidies that make the development of cleaner or renewable energy sources commercially unviable.

[42] Ibid.

[43] UNFCCC 2006, Subsidiary Body for Scientific and Technological Advice, *Synthesis Report on Technology Needs Identified by Parties not Included in Annex I to the Convention.* U.N. Doc. FCCC/SBSTA/2006/INF.1. United Nations, New York.

PART III

Importance of Technology Transfer to Climate Change Mitigation

Technology transfer has long been seen as the integral component of effective climate change mitigation and adaptation strategies. This section follows the evolution of technology transfer's growing importance at international environmental summits dating back to the 1972 Stockholm Convention.

Evolution of the Technology Transfer of ESTs

UN Conference on the Human Environment, Stockholm, 1972

Environmental preservation increasingly became a part of national and international political discourse in the 1960s as the acceleration of industrial development after World War II resulted in visible harm to the environment. To offset these effects, domestic measures were taken, such as the advent of the Environmental Protection Agency in 1970 by the United States.[44] The politicization of the environment culminated with the first major international environmental conference, the 1972 United Nations Conference on the Human Environment (UNCHE) in Stockholm. Delegates from 114 nations were charged with "[the] responsibility to protect and improve the environment for present and future generations."[45]

Developing an environmental framework sparked debates that would set the tone for future multilateral environmental, and subsequently, climate change negotiations, in that there was a distinct divergence between support for economic development and support for environmental protection. Furthermore, a regional schism developed, whereby northern nations' concerns for the environment challenged southern nations' "suspicion" of attempts to undermine industrial development.[46]

There were three major ramifications of the Stockholm convention: (1) the introduction and promotion of the concept of "sustainable development", a hybrid theory ensuring economic development through environmentally sound practices; (2) the establishment of the United Nations Environmental Programme (UNEP), an institution that collaborates and engineers environmental projects, particularly in developing nations; and (3) the conception that technology will prove vital for eco-friendly development. At Stockholm, leaders

[44] Jan-Erik Lane, *Globalization and Politics: Promises and Dangers* (Burlington, VT: Ashgate, 2006), p.33.
[45] UNCHE, 1972. Stockholm, Sweden, June 5-16. *Declaration of the United Nations Conference on the Human Environment*, Principle 1. U.N. Doc. A/Conf.48/14. United Nations, New York.
[46] Paul Kennedy, *The Parliament of Man: the Past, Present, and Future of the United Nations* (New York: Random House, 2007), p.159.

expounded the virtues of "the transfer of resources (capital, technology, and scientific expertise) from richer to poorer countries.[47] Thus, the importance of technology transfer to global cooperation on the environment was recognized from the start.

1985 Vienna Convention and 1987 Montreal Protocol

In 1977, UNEP outlined a "World Plan of Action" to diminish the rate of ozone depletion. UNEP followed the Plan of Action with a discussion in 1982 among 24 nations for an agreement on ozone protection. The forum concluded in 1985 with the signing of the Vienna Convention on the Protection of the Ozone Layer, where a framework was developed to reduce the effects of industrial pollution on the ozone layer. Discussions were limited to a framework and not the establishment of policies because polluting industries, backed by European governments, doubted any threats to the ozone layer.[48]

Although its tangible importance was limited, the Vienna Convention furthered technology transfer efforts by calling for the "development and transfer of technology and knowledge."[49] The Convention specified mechanisms for technology transfer, including the "facilitation of the acquisition of alternative technologies by other Parties, provision of information on alternative technologies and equipment, supply of special manuals or guides to them, the supply of necessary equipment and facilities for research and systematic observations, and appropriate training of scientific and technical personnel."[50]

In an effort to capitalize on the momentum provided by the Vienna ozone protection framework, leaders reconvened in Montreal in 1987 to establish reduction requirements for the production and use of chlorofluorocarbons (CFCs).[51] The consequent Montreal Protocol was signed in September 1987 by the United States, European Community, and 23 other nations (mostly other major CFC emitters). To this day, the Protocol is considered the most successful international environmental agreement.[52]

The Protocol, which was implemented fully in 1989, was amended in 1990 in London to establish the Multilateral Fund (MLF) to help signatory nations adhere to the Protocol's regulations. The MLF is the first financial mechanism to result from an international treaty and from 1991 to 2007 accumulated more than $2.2 billion.[53] At the time of implementation, the MLF was the most comprehensive mechanism for facilitating technology transfer. MLF policies that ensure technology transfer include identifying needs and facilitating technical cooperation, providing additional resources when necessary; monitoring and facilitating bilateral, regional, and multilateral cooperation, and, ensuring that the "best available, environmentally safe substitutes and related technologies are expeditiously transferred... under most favorable circumstances."[54]

Creation of the IPCC

While not directly related to technology transfer, the Intergovernmental Panel on Climate Change

---

[47] Ibid., p.160.
[48] Stephen O. Andersen, et al., *Technology Transfer for the Ozone Layer: Lessons for Climate Change* (London: Earthscan, 2007), p.29.
[49] UNEP, 1985. Vienna, Austria. *Vienna Convention on the Protection of the Ozone Layer.* Article 4.2. <http://www.unep.org/ozone/vc-text.shtml>.
[50] Ibid.
[51] In 1974, scientists Mario Molina and Frank Sherwood Rowland published a report detailing the link between CFC prevalence and usage and ozone layer depletion. Soon after the Molina-Rowland report was published, companies began to abandon CFCs (SC Johnson was famously the first company to do so in 1975) and by 1976 the US, Canada, Norway, and Sweden had imposed bans on CFCs.
[52] Jan-Erik Lane, *Globalization and Politics: Promises and Dangers* (Burlington, VT: Ashgate, 2006), p.12; it is also important to note that Montreal was successful in reaching a tangible and effective agreement because the scope of its agreement was small (relative to the scope of today's negotiations) and alternative technologies were readily available.
[53] MLF, <www.multilateralfund.org>.
[54] UNEP, 2000. *The Montreal Protocol on Substances that Deplete the Ozone Layer*. Article 10, 10a. <http://www.unep.org/ozone/pdf/Montreal-Protocol2000.pdf>.

(IPCC) deserves mention as it is globally recognized as the principal independent authority on climate change. In 1988, at the 40th Session of the World Meteorological Organization (WMO) Executive Council, the IPCC was established as a joint effort between UNEP and WMO to serve as an independent scientific body to oversee and assess research on climate change studies. Although it doesn't perform any seminal research, it is widely considered by governments and experts as a primary source to balanced reporting on climate change (IPCC).

1992 Rio Convention and the Establishment of the UNFCCC

Although several climate change conferences and conventions occurred after the creation of the Montreal Protocol, including a 1988 conference in Toronto, the 1989 Basel Convention, and the 1991 Convention in Espoo, Finland, the watershed for the promotion of technology transfer came in 1992, at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, popularly known as the Rio Earth Summit.

In the years leading up to the Rio Summit, developing nations' concerns became more manifest. Following the Montreal Protocol, the LDCs wanted increased access to financial resources and technology as compensation for sacrificing economic growth for public environmental gain.[55] Although the 1990 London amendment to the Montreal Protocol established the MLF as a vehicle providing aid and technology to developing nations, many developing countries were unfamiliar with climate change issues and concerns and until then, the IPCC and most climate change information and debates centered around the industrialized world; therefore few developing nations were given opportunities to make significant inputs into these deliberations. The North-South rift was amplified following Brazil's and Mexico's vehement expressions of discontent, resulting in the 1990 meeting of the World Meteorological Organization's (WMO) Second World Climate Conference (SWCC) which engaged developing nations at an unprecedented level.[56]

In an effort to coagulate divergent opinions into a comprehensive agreement, the SWCC created the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change (INC/FCCC or INC). The INC's goal of achieving a solution by the Rio Earth Summit in 1992 seemed unfeasible given the initially laborious pace of negotiations. Though negotiations were "contentious",[57] they were necessary, for as the UNCED approached, more states had a chance to voice their views and concerns.[58] The INC met five times between February 1991 and May 1992.

The 15-month long negotiations process concluded in June 1992 in Rio, marking the 20th anniversary of the Stockholm Convention. While the INC entered the Rio Earth Summit with set commitments, reaching an inclusive agreement—ensuring that all nations signed the accord—proved more difficult. The proposal, called Agenda 21, "crystallized" the conspicuous North-South dichotomy.[59] Certainly, the obduracy of the United States in opposing quantifiable emissions caps and reductions commitments played a fundamental role in encumbering a consensus; however, technology transfer

[55] Daniel Bodansky, "Prologue to the Climate Change Convention," in *Negotiating Climate Change: the inside story of the Rio Convention*, ed. Irving M. Mintzer and J. Amber Leonard (Cambridge: Cambridge University Press, 1994), p.59.
[56] Ibid., p.60.
[57] William K. Stevens, "At Meeting on Global Warming, U.S. Stands Alone," *New York Times*, September 10, 1991.
[58] Daniel Bodansky, "Prologue to the Climate Change Convention," in *Negotiating Climate Change: the inside story of the Rio Convention*, ed. Irving M. Mintzer and J. Amber Leonard (Cambridge: Cambridge University Press, 1994), p.61.
[59] J.R. McNeil, *Something New Under the Sun* (New York: W.W. Norton and Company, 2000), p.354.

posed a greater point of contention than expected —developing nations wanted financial and technological aid to protect themselves from risks posed by climate change.[60] An accord was reached eventually, and the UNCED, through Agenda 21, established the United Nations Framework Convention on Climate Change (UNFCCC).[61]

Unlike previous convention agreements which simply mentioned technology transfer as one of numerous components required to tackle climate change, significant attention was paid to technology transfer in the texts of Agenda 21 and the UNFCCC framework proposal. Agenda 21 declares, "the availability of scientific and technological information and access to and transfer of environmentally sound technology are essential requirements for sustainable development."[62] Furthermore, the agreement emphasized "[ensuring] access, in particular of developing countries, to scientific and technological information" and promoting "endogenous capacity-building."[63]

The UNFCCC document went even further, explicitly making technology transfer an Annex II party's responsibility (Annex II parties are Annex I OECD members responsible for providing financial resources to non-Annex I parties):[64]

> "The developed country Parties and other developed Parties included in Annex II shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention. In this process, the developed country Parties shall support the development and enhancement of endogenous capacities and technologies of developing country Parties."[65]

Furthermore, developed nations are accountable for providing sufficient financial resources to cover "full incremental costs" of program implementation.[66] Small island nations and other parties disproportionately threatened by climate change garnered surprising clout in Rio as developed Parties were charged with allocating resources especially for nations "particularly vulnerable" to the effects of climate change."[67] Finally, the most important provision of the UNFCCC's 1992 draft was its method of implementation: it declared the Conference of Parties responsible for developing a financial mechanism for funding technology transfer projects. The Global Environment Facility (GEF),[68] established in 1991 under the auspices of the World Bank, was restructured during the Earth Summit and became a separate institution, assigned as the financial mechanism of the UNFCCC.[69]

---

[60] Paul Lewis, "U.S. at the Earth Summit: Isolated and Challenged," *New York Times*, June 10, 1992.
[61] Under the Agenda 21 agreement, the Convention on Biological Diversity (CBD) and the United Nations Convention to Combat Desertification (UNCCD) were also established. For the sake of this Policy Brief, we will focus on the UNFCCC, as it is paramount to the transfer of technology for combating climate change.
[62] UNCED, 1992. Rio de Janeiro, Brazil, June 3-14. *Agenda 21,* Section 4, Chapter 34.7. United Nations, New York.
[63] Ibid., Chapter 34.14a, d.
[64] Annex II parties do not include economies in transition (EITs): Czech Republic, Hungary, Mexico, Poland, Slovak Republic, South Korea, and Turkey.
[65] UNFCCC, 1992. *United Nations Framework Convention on Climate Change*, Article 4.5. U.N. Doc. FCCC/INFORMAL/84. United Nations, New York.
[66] Ibid., Article 4.3.
[67] Ibid., Article 4.2.
[68] GEF, <www.gefweb.org>.
[69] The GEF also became the financial mechanism for the CBD.

Alas, technology transfer efforts to date have not been sufficient for effective climate change mitigation. The Rio Convention's inability to achieve concrete policies severely hampered efforts to reduce emissions, and the subsequent decade saw a rise in greenhouse gas emissions.[70] However, the delegation of the Conference of Parties (COP) as the mechanism for environmental negotiations (as opposed to arbitrary conventions and summits under varying organizations) was the Rio Convention's greatest legacy.[71]

Conference of Parties

Since 1995 the Conference of Parties has met annually to negotiate terms of a climate change agreement. The most famous conference, the 1997 COP-3 in Kyoto resulted in the Kyoto Protocol, the first agreement that set binding emissions targets for 37 industrialized nations and the European Community. The Protocol was consummated in 1997 and entered into force in 2005, with 184 nations having ratified it to date.[72]

The Kyoto Protocol's founding at COP-3 set the agenda for future COP negotiations. The agenda at subsequent summits centered on developing technology transfer and financing mechanisms to enable global 'green' participation. COP-4 in Buenos Aires developed the Buenos Aires Plan of Action (BAPA), which implemented UNFCCC Articles 4.8 and 4.9,[73] thus further facilitating technology transfer to nations most at risk from climate change, including small island nations, countries with low-lying coast areas, and countries liable to drought and desertification.[74]

Although it accomplished its goal of furthering the dialogue started in Kyoto, BAPA was evocatively ambitious and its provisions became "taxing"[75] to constructive dialogue at future summits.[76] The 2001 Marrakech Accords, agreed upon at COP-7, brought BAPA to a close and established the Expert Group of Technology Transfer (EGTT) as an expert group to "analyze and identify ways to facilitate the transfer of technology."[77] The GEF and the SCCF (Special Climate Change Fund) were established as the financing mechanisms for the EGTT framework.[78] The EGTT has since overseen the development of a technology transfer clearinghouse (TT:CLEAR) in 2001 and has collaborated with the GEF on nation-specific Technology Needs Assessments (TNAs) "that identify and determine the mitigation and adaptation technology priorities particularly of developing countries."[79] TNAs will be discussed in Part 4 of this Policy Brief.

At the 2007 COP-13 in Bali, the Bali Action Plan (BAP) was adopted, focusing on four 'pillars': mitigation, adaptation, financing, and technology transfer. The BAP sought to establish a framework for a post-2012 (after the expiration of the Kyoto

---

[70] Warwick J. McKibbin and Peter J. Wilcoxen, *Climate Change Policy after Kyoto: Blueprint for a Realistic Approach* (Washington D.C.: Brookings Institution Press, 2002), p.42.
[71] Ibid.
[72] UNFCCC, <www.unfccc.int>.
[73] UNFCCC, 1998. Conference of the Parties, *Report of the Conference of the Parties on its Fourth Session, held at Buenos Aires, from 2 to 14 November 1998: Part Two,* Paragraph 1c. U.N. Doc. FCCC/CP/1998/16/Add.1. United Nations, New York.
[74] UNFCCC, 1992. *United Nations Framework Convention on Climate Change*, Article 4.8. U.N. Doc. FCCC/INFORMAL/84. United Nations, New York.
[75] Farhana Yamin and Joanna Depledge, *The International Climate Change Regime: a Guide to Rules, Institutions and Procedures* (Cambridge: Cambridge University Press, 2004), p.26.
[76] The BAPA's ambitious goal was to conclude unfinished business from Kyoto (finalize flexibility mechanisms, discuss the use of carbon sequestration, and design a compliance schedule) while concurrently implementing a technology transfer agreement and adaptation measures.
[77] UNFCCC Expert Group on Technology Transfer, <www.unfccc.int/ttclear>.
[78] TERI, Energy Resource Institute, and Indo-Dutch Programme on Alternatives in Development, *Alternative Development Paths: Scope for mobilizing international resources for funding the power sector in India* (New Delhi: TERI Press, 2006), p.186.
[79] UNFCCC, "Expert Group on Technology Transfer: Five Years of Work," <http://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/egtt_en_070523.pdf>.

Protocol) emissions agreement, which would be finalized in 2009 in Copenhagen.

Emergence of 'South' Technological Innovation

The industrialized world has voiced its displeasure about proposed abuses of intellectual property rights by developing nations for facilitating the transfer of technologies. Industrialized governments represent the majority of private sector initiatives in clean technology innovation. As such they aim at ensuring that not only are private sector interests vocalized and cared for but also that developing nations, particularly India and China, pay for their steep emissions growth rates over the past two decades. From 1990 to 2001, industrialization resulted in a 61 percent increase in carbon emissions for India, and a 111 percent increase in carbon emissions for China.

Emerging nations, such as China and India, have been very vocal since Bali, entrenched in the opinion that as developed nations are the foremost culprits of anthropogenic climate change, any climate change abatement costs must be paid by them. Furthermore, they contend that no developing nation should slow domestic economic growth owing to environmental concerns when industrialized nations never faced such constraints.[80] According to both governments, any emissions curbs and necessary technology must be paid for by the developed nations. Along those lines, Beijing and New Delhi and other governments propose an extension of TRIPS' compulsory licensing flexibilities on public health to climate change, arguing that an improved environment is a public good, much like public health.[81] As stated earlier, developed parties point out that this is a flawed argument, for as one firm holds the patent to one pharmaceutical technology, an EST generally has numerous patents owned by various firms, and there are often several technological options for addressing most issues.[82]

Industrialized nations and private sector firms are quick to illustrate the contradictory positions assumed by China and India. First, there is profuse evidence illustrating the emergence of BRIC (Brazil, Russia, India, and China) as potential leaders in developing clean technologies. From 1994-1998, emerging economies accounted for just 3.75 percent of all patented clean technologies; by 2008, 20.5 percent of all clean technology patents came from emerging markets.[83] China produces most of the world's wind turbines and is a leading producer of PV units. Brazil, Russia, and India have all seen increases in technological capability as well. Second, as a key staff member of General Electric, a global leader in alternative energy development, recently elucidated, much of GE's foreign investment in renewable energies is in BRIC nations, primarily China and India.

China and India are not the only nations developing EST industries. South Africa and Brazil have invested in developing clean technologies domestically. Last year Johannesburg invested approximately $40 million in an Evolution One Fund, a clean technology investment fund. Investors include the International Finance Corporation (IFC) and investment groups from Switzerland

[80] Despite these views both China and India have made efforts to channel their development on a more efficient path, exemplified by China's emission standards on cars and India's ambitious National Solar Mission.

[81] Copenhagen Economics A/S and The IPR Company ApS, "Are IPR a Barrier to the Transfer of Climate Change Technology?" Copenhagen: 19 January 2009, p. 7.

[82] Ibid.

[83] The date is from a presentation by Jukka Uosukainen, the former head of the UNFCCC's Expert Group on Technology Transfer, presented at a WIPO Conference, "Conference on Intellectual Property and Public Policy Issues" in Geneva, Switzerland, July 13-14, 2009. Data can be found at: <http://www.wipo.int/export/sites/www/meetings/en/2009/ip_gc_ge/presentations/uosukainen.pdf>.

and Finland.[84] Though analysts initially believed South Africa was slow to develop a green energy sector, new policies, including feed-in tariffs that guarantee stable returns to renewable energy suppliers, have injected domestic and foreign interest and investment.[85] Similarly, Brazil has seen a surge in investment in clean energy projects, as Brazil-bound foreign investment in renewable energy grew 76 percent in 2008 to $10.8 billion accounting for almost all such investment in Latin America.[86] Brazil is already the world's largest renewable energy market. An abundance of hydropower (that comprises 85 percent of its power capacity) and a long-established ethanol sector (ethanol accounted for 52 percent of fuel consumption by light vehicles) have already laid foundation for a successful green technology sector. There is still room for improvement: Brazil has not capitalized on its potential for wind power generation;[87] however, this is likely to change as President Lula's National Climate Change Plan accelerates the ambition of the government's PROINFA program.[88] As investments in developing nation clean energy sectors continue to rise, any emerging economy efforts to weaken global IP regulations will be self-defeating.

The documented rise of innovation in developing nations has introduced a new technology transfer flow. Initially most technology transfer was referred to as North (industrialized)—South (developing) transfers; however, South-South transfers have been increasing rapidly. South-South trade across all industries has grown hurriedly over the past decade.[89] The burgeoning relationships between Brazil, China, India, and South Africa have spilled into the renewable energy sector.[90]

As some 'South' nations become hubs for exporting ESTs, developing domestic patent regulatory frameworks will be imperative. Trends observed since 2000 show an increasing awareness about IPR in developing countries, which may lead to improved conditions for technology transfer and may help blunt the divisiveness over the IPR issue inside the UNFCCC. Government agencies in developing countries are coordinating with law enforcement and judicial bodies to enforce IPR, including government-led police crackdowns on counterfeiting and other violations of IPR rules and procedures. Some countries such as Malaysia have created special divisions in courts of law to deal specifically with IPR infractions and promulgated new legislation regarding IPR enforcement.[91]

Clearly, building legal and regulatory frameworks to sustain technology transfer and protect IPR is a challenging and multifaceted process. Enforcing IPR via law enforcement seems to be the main conduit of choice, perhaps symptomatic of an immature existing institutional framework for handling these issues. Evidently, well functioning courts can be effective mechanisms for redress of infractions of IPR laws, rules and regulations and are especially appropriate for large and systematic

---

[84] Evolution One Fund, <www.inspiredevolution.co.za>.

[85] UNEP, SEFI, and New Energy Finance, "Global Trends in Sustainable Energy Investment 2009: Analysis of Trends and Issues in the Financing of Renewable Energy and Energy Efficiency," 2009, p.55. <http://sefi.unep.org/fileadmin/media/sefi/docs/publications/UNEP_SEFI_Global_Trends_Report_2009_f.pdf>.

[86] Ibid., p.52

[87] Ibid.

[88] PROINFA is a program implemented by the Brazilian government in 2002 that sought to promote wind, biomass, and mini-hydro projects. Ever since the government eased restrictions on foreign wind turbine imports, there has been a build-up of proposed wind projects; however the high costs of shipping wind turbines from Europe has caused a bottleneck of projects, which is expected to ease soon.

[89] "Growth in South-South Trade" *Reuters India,* February 8, 2009. <http://in.reuters.com/article/domesticNews/idINL571378720090208>.

[90] World Bank, *International Trade and Climate Change: Economic, Legal, and Institutional Perspectives* (Washington D.C.: World Bank Publications, 2008) p.101.

[91] Ermias Tekeste Biadgleng and Viviana Munoz Tellez, "The Changing Structure and Governance of Intellectual Property Enforcement," *South Centre Research Paper* 15, January 2008, p. 21.

commercial-scale IPR violations. However, one has to be careful since in some countries, while legal avenues for redress of IPR protective mechanisms may exist on paper, in reality litigants face long legal delays in gaining access to courts, administrative reviews, etc. Unreliable courts offer no redress at all. While many of these trends towards increased judiciary transparency possibly stem from the pressure by developed countries to see better conditions in host countries before considering investing, at least in some major emerging market economies there is an embryonic perception that major investments will not occur until companies are convinced that their IPR interests will be protected.[92]

[92] Walter G. Park and Douglas C. Lippoldt, "Technology Transfer and the Economic Implications of the Strengthening of Intellectual Property Rights in Developing Countries," *OECD Working Party of the Trade Committee*, TAD/TC/WP(2007)19/FINAL, Trade Policy Working Paper No. 62, January 25, 2008. Paris. 92 James Shepherd, "The Future of Technology Transfer Under Multilateral Environmental Agreements," Environmental Law Institute, July 2007, Washington DC.

PART IV

Setting a New IP Framework

Weaknesses in Existing Multilateral Environmental Agreements Vis-à-vis Intellectual Property

International institutions have assumed responsibility to lead comprehensive global efforts to combat climate change and to promote adaptation strategies to mitigate its damage. The UNFCCC, the WTO, the World Bank Group, and the Global Environment Facility (GEF) are examples of institutions that have adopted programs for adapting to, and mitigating the threats posed by climate change.

Although each institution's efforts allude to the protection of intellectual property and facilitating the transfer of ESTs, rampant inefficiencies, vague policies, and lack of enforcement mechanisms impede each from being adequately set up to tackle IP solutions in an expeditious and cost-effective manner. Fervent disagreements during negotiations result in unclear policies that lack implementation or enforcement potential.[93]

United Nations

World Intellectual Property Organization

Developed nation disdain over what they perceived was a "toothless" World Intellectual Property Organization (WIPO) resulted in efforts to include intellectual property on the agenda at the 1986 Uruguay Round of negotiations in the GATT, which concluded with the implementation of TRIPS within the WTO.[94] According to an observer, WIPO was "largely incapable of disciplining even the most egregious forms of trademark and copyright infringement."[95]

Though WIPO proponents were not keen initially on the implementation of TRIPS, worrying that WIPO and its delegates would be ignored at future IP negotiations, it remains relevant, if only as an invitee to all TRIPS meetings.[96] However, in many eyes WIPO has lost significant political clout due to its inability to implement viable enforcement mechanisms.[97] WIPO's relevance now lies in releasing research providing economic evidence for

[93] James Shepherd, "The Future of Technology Transfer Under Multilateral Environmental Agreements," Environmental Law Institute, July 2007, Washington DC.
[94] Charan Devereaux, Robert Z. Lawrence, and Michael Watkins, *Case Studies in US Trade Negotiations: Making the Rules* (Washington D.C.: Peterson Institute for International Economics, 2006) p.46.
[95] Ibid.
[96] G. Bruce Doern, *Global Change and Intellectual Property Agencies: an Institutional Perspective* (New York: Routledge, 1999) p.95, 97.
[97] Ibid.

the purpose of intellectual property as a stimulant for international economic development and as a central database for all patented goods and services.[98] Due to its shortcomings, WIPO will play a secondary role to TRIPS in enforcement and dispute resolution of intellectual property.

United Nations Framework Convention on Climate Change

The foundation for the thesis of this policy brief is a proposal by William Antholis and Todd Stern (now the United States' Special Envoy for Climate Change) lauding the benefits of smaller negotiating forums. In Antholis and Stern's proposal for a group of major emitters to convene in lieu of UNFCCC commitments they state: "just as you can't run a company through plenary meetings of the shareholders, you can't manage crucial global issues that way either."[99] As evidence, Antholis and Stern, along with many other experts and analysts,[100] highlight the historic inability of the UNFCCC and its 192 member nations, to reach concrete agreements.

Inefficiency is one of the UNFCCC's glaring shortcomings as an appropriate institution for an effective climate change agreement. The intricacies of developing an IPR-friendly technology transfer agreement will inhibit negotiation progress still further. Inefficiency is usually the most cited of UNFCCC's deficiencies—particularly because of the nature of the 'Convention-Protocol' approach to international agreements.[101] Many conventions, including the UNFCCC, are inefficient because "the convention-protocol approach … encourages a process that is often long and drawn out."[102] Despite the very real threat of climate change, vociferous disputes between nations and an emphasis on inclusivity have deprived international climate change negotiations of any noticeable progress.[103] Any momentum is often diminished by delegates who include symbolic and unenforceable commitments void of any possibility for implementation.[104]

Vague language often leaves policies up to interpretation by individual parties.[105] For instance, ambiguity in the agreement at the 1989 Basel Convention allowed for signatory parties to trade wastes but also allowed for bilateral trade between signatory and non-signatory parties, which was in direct contradiction to an earlier provision forbidding signatory nations from shipping hazardous wastes to non-signatory nations.[106] There is a general consensus among scientists that emissions must be curbed soon; a UNFCCC consensus built upon indefinite and confusing regulations will continue to delay pressing reforms.

---

[98] Ibid., p.98.

[99] William Antholis and Todd Stern, "Climate Change: Creating an E8," *The Brookings Institution*, January 1, 2007.

[100] At a Conference on Technology Transfer and Climate Change on August 27-28, 2009, at the Center for American Progress, much informal conversation centered on the inability of the UNFCCC to reach agreements because of its cumbersome policy-making nature. Although formal discussion certainly promoted the UNFCCC's involvement, the authors report private, public, and NGO disillusion with lack of implementable UNFCCC progress.

[101] The 'Convention-Protocol- approach is one in which, after numerous years of multilateral negotiations to encourage further action on a global issue, parties acknowledge the need for further action, which typically results in the signing of a treaty or 'convention'. Conventions will generally broadly define the scope of the agreement and the steps necessary for progress. Parties then reconvene at 'protocols' in order to establish more concrete policies. Examples include the Vienne Convention of 1985, which lead to the 1987 Montreal Protocol, and the Rio Convention in 1992 (and the creation of the UNFCCC) which developed the Kyoto Protocol in 1997.

[102] Lawrence Susskind and Connie Ozawa, "Negotiating More Effective International Environmental Agreements," in *The International Politics of the Environment,* ed. Andrew Hurrell and Benedict Kingsbury (Oxford University Press: Oxford, 1992) p.146.

[103] Elliot Diringer. "Toward a New International Climate Change Agreement," *Climate Change and Global Poverty: A Billion Lives in the Balance?* eds. Lael Brainard, Abigail Jones, and Nigel Purvis (Washington D.C.: Brookings Institution Press, 2009), p.65.

[104] Lawrence Susskind and Connie Ozawa, "Negotiating More Effective International Environmental Agreements," in *The International Politics of the Environment,* ed. Andrew Hurrell and Benedict Kingsbury (Oxford University Press: Oxford, 1992) p.147.

[105] Ibid.

[106] Ibid.

Beyond the scope of efficiency, the UNFCCC lacks the basic enforcement mechanism that makes any agreement implementable; despite this glaring handicap, the convention continues to exercise an impractical tone. As Susskind and Ozawa indicate:

"Without effective monitoring and enforcement, real implementation of any agreement is highly unlikely. Ad hoc negotiations sponsored by a less-than-powerful agency of the United Nations will never be able to overcome the resistance to instituting a comprehensive multilateral system for ensuring compliance."[107]

UNFCCC officials have expressed similar concerns that negotiations have adopted an unfeasible tone with little tangible progress. Prior to COP-13 in Bali, the United Nation's Special Envoy for Climate Change, Han Seung-soo regretted, "It is most likely that we will end up with a lot of hot air or just growth-capping unless we are capable of making precise, long-term projections for major developing countries, which I believe is highly unlikely."[108]

Problems at Kyoto

Under the auspices of the United Nations, climate change negotiations have seen little success beyond the Montreal Protocol. The most famous agreement, the Kyoto Protocol, established at COP-3 in Kyoto in 1997, has widely been considered merely a "symbolic" treaty;[109] instead, Kyoto's high costs, marginal impact, and inability to include the United States has left the treaty vulnerable to widespread criticism.

The Kyoto protocol serves as an unfortunate precedent for future climate change negotiations under UNFCCC guidance. McKibbin and Wilcoxen summarized Kyoto as "an agreement that looks strong on the surface but has no viable mechanism for enforcement and does little or nothing to control emissions,"[110] disregards costs, and is "economically flawed and politically unrealistic," opinions echoed by many other economists and analysts.[111] The agreement lack's even minimal capacity to enforce any agreed emissions reductions as evident by the inability to force signatory parties to adhere to their commitments; to date, the developed nations pushing for agreement at Kyoto—Canada, Japan, and the European Community[112]—are all failing to meet their emissions requirements.[113]

The Protocol established three mechanisms to help Annex I parties achieve their emissions reduction targets: the Clean Development Mechanism, Joint Implementation and Emissions Trading.

Article 12 of the Kyoto Protocol defines the Clean Development Mechanism (CDM), a mechanism that enables sustainable development in the developing world while assisting industrialized nations

---

[107] Ibid, p.153, 154.
[108] Pennepa Hongthong, *"Asia must focus on environment, not just wealth, in its quest for growth: UN,"* The Nation (Thailand), November 24, 2007.
[109] Editorial, "Kyoto Ratification," *Washington Post*, November 6, 2004.
[110] Warwick J. McKibbin and Peter J. Wilcoxen, *Climate Change Policy after Kyoto: Blueprint for a Realistic Approach* (Washington D.C.: Brookings Institution Press, 2002), p.51.
[111] Ibid.
[112] In fact, the European Community, which was the only industrialized group of the Annex I parties to see emissions reduce from 1990-2004, statistically benefits from the inclusion of former Soviet and Eastern Bloc States. Belarus, Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and the Ukraine, all saw emissions reductions of at least 25 percent from 1990-2004. Much of this can be explained by the precipitous decline in industrial production following the fall of communism in Eastern Europe in the early 1990s, and not on the adoption of environmentally-friendly policies. For evidence, the authors point out that of those nations, only the Czech Republic and Lithuania maintained emissions reductions from 2000-2004 and both nations' emissions levels continue to grow steadily.
[113] UNFCCC, "Changes in GHG Emissions from 1990 to 2004 for Annex I Parties," <http://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/ghg_table_06.pdf>.

in achieving their emissions reductions requirements. Designed as an instrument to reduce the costs of mitigation, the CDM enables Annex I parties to develop clean technology projects in non-Annex I nations as a cheaper alternative to developing clean technology projects domestically. Critics of CDM maintain that it provides a perverse incentive to invest in projects in developing nations while ignoring reduction efforts domestically. Although the CDM is required to be only a supplementary mechanism to domestic efforts, many developing nations contend that the language enforcing this provision is ambiguous and that industrialized nations have abused the practice.[114] Furthermore, the concept of 'additionality' whereby developed nations must invest in projects that result in an additional reduction in emissions as opposed to a 'business-as-usual' scenario, has come under increased scrutiny.[115]

Similar to the CDM, Kyoto established a Joint Implementation (JI) mechanism, which allowed Annex I parties to invest in clean technology projects in other Annex I parties and applying the resulting credits to its emissions reduction goals. Unlike CDM, which is between Annex I and non-Annex I parties (who do not have emissions reduction targets), JI is solely between Annex I parties, both of which have concrete emissions targets as established by the Kyoto accord. As JI refers only to inter-Annex I abatement projects, it has not had to endure the criticisms of the CDM; however, JI is handicapped by the same nebulous demand that efforts must be "supplemental to domestic actions"[116] that stops short of imposing quantitative limitations on CDM and JI usage.[117]

The third and final mechanism implemented in the protocol is Emissions Trading, or the "carbon market". Each developed nation is given a specific amount of assigned amount units (AAUs). Should a developed nation have spare units, they may sell them to another nation, treating emissions as a tradable commodity. Both CDM and JI have units that are also tradable within the carbon market. Emissions trading has seen widespread usage by governments as a climate change mitigation strategy.

Costs of Kyoto Protocol

Though its high costs were not exclusively the result of profligate technology transfer provisions, Kyoto's uneconomical financing mechanisms lead the authors to contend that the UNFCCC is the inappropriate venue for a cost-effective IP-friendly technology transfer accord. Though the uncertainties of climate change will forever prevent an exact cost-benefit analysis of Kyoto, most studies "provide little justification for the protocol."[118] In fact, Nordhaus and Boyer concluded that "Kyoto has no grounding in economics or environmental policy" after determining that costs for the most efficient implementation of Kyoto ranged from $800 billion to $1.5 trillion, while achieving benefits of emissions reductions worth approximately $120 billion.[119] Therefore, according to Nordhaus and Boyer's estimates, every dollar spent on Kyoto will return only between eight and fifteen cents of benefit.

Proponents of the protocol dispute the charges of profligacy and reason that market-based mechanisms were implemented to reduce the costs of

[114] Worldwatch Institute, *State of the World 2008: Toward a Sustainable Global Economy* (New York: W.W. Norton and Company, 2008), p.96.
[115] Brian Dawson and Matt Spannagle, *The Complete Guide to Climate Change* (London: Taylor & Francis, 2009), p.80.
[116] UN, 1998. *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, Article 6.1d. United Nations, New York.
[117] Warwick J. McKibbin and Peter J. Wilcoxen, *Climate Change Policy after Kyoto: Blueprint for a Realistic Approach* (Washington D.C.: Brookings Institution Press, 2002), p.46.
[118] Ibid., p.52.
[119] William D. Nordhaus and Joseph G. Boyer, "Requiem for Kyoto: An Economic Analysis of the Kyoto Protocol," Yale University, February 8, 1999. p.38.

abatement. Despite the ability of CDM, JI, and Emissions Trading to reduce overall mitigation costs, the true measurement of cost is in the actual amount of emissions reductions. Research illustrates that "abatement costs fall simply because less abatement is being done."[120]

UNFCCC and IP

Given the history of costly agreements with little definite environmental impact, it is imprudent to establish an intellectual property mechanism within the confines of the UNFCCC. Despite the evidence that nullifies intellectual property as a major barrier to technology transfer as detailed in Part I, consideration of intellectual property in Copenhagen will almost certainly grind discussions to a halt. For evidence, see the WTO's Doha Round of negotiations in 2001, where IP was intended to be a minor point of contention, only to hamper negotiations with more than two years of contentious argument.

IPR has already become a significant point of contention in meetings and summits leading to Copenhagen. The Bali Action Plan provided the first opportunity to establish patent provisions within the UNFCCC, whereby the schism was clear: China, Malaysia, and Zambia declared that "the existing IPR system does not match the increasing needs for accelerating [development, transfer, and diffusion] of ESTs to meet challenges of climate change" and suggested compulsory licenses and IPR sharing agreements as solutions; by contrast, Japan found "that IPRs are fundamental tools to recoup research and development investments and to promote future technology transfer" stating that "it is necessary to improve the business environment including the proper protection of IPRs."[121] Nevertheless, the UNFCCC has no IP regulatory framework in place.

Technology Needs Assessments (TNAs)

Perhaps the most useful tool of the UNFCCC are the Technology Needs Assessments (TNAs), country-specific assessments of the technological needs of a nation to achieve sustainable development. Much of the debate surrounding intellectual property has focused on 'blanket' solutions for technology transfer, without recognition that regional and geographic characteristics must be considered when transferring technology. Furthermore, differences in technical and physical capacity present further need for the appropriate allocation of technology.[122] The Policy Brief will later discuss how TNAs will play a vital role in a realistic solution to a climate change framework through the UNFCCC.

United Nations Environment Program,[123] World Meteorological Organization

Though somewhat removed from the heart of technology transfer negotiations and though they have no IP-framework in place, the United Nations Environment Program and World Meteorological Organization do have minor technology transfer mechanisms in place which, in the interests of an exhaustive analysis, should be noted.

Established in 1972 at the Stockholm Convention, the United Nations Environment Program (UNEP) is one of the oldest institutions dealing with facilitating technology transfer of ESTs. To be sure, UNEP's Agenda 21, the proposal that created the UNFCCC at the 1992 Rio Convention, does

[120] Warwick J. McKibbin and Peter J. Wilcoxen, *Climate Change Policy after Kyoto: Blueprint for a Realistic Approach* (Washington D.C.: Brookings Institution Press, 2002), p.54.
[121] UNFCCC, 2009. Ad-hoc Working Group on Long-term Cooperative Action Under the Convention, Bonn March 29-April 8 2009. *Ideas and proposals on the elements contained in the paragraph 1 of the Bali Action Plan: Submissions from Parties,* U.N. Doc FCCC/AWGLCA/2009/MISC.1. United Nations, New York.
[122] James Shepherd, "The Future of Technology Transfer Under Multilateral Environmental Agreements," Environmental Law Institute, July 2007, Washington DC.
[123] For more information on UNEP, please visit <www.unep.org>.

include that "consideration must be given to the role of patent protection and intellectual property rights along with an examination of their impact on the access to and transfer of environmentally sounds technology, in particular to developing countries," but there is no specification as to how this examination will occur other than a reference to "acquisition through compulsory licensing."[124] Much of the private sector is adamantly opposed to compulsory licensing as the most effective mechanism for maintaining private sector interest in R&D projects. A more detailed and comprehensive regulatory framework is necessary to ensure the most efficient form of technology transfer.

Established in 1950 and included as part of the United Nations in 1951, the World Meteorological Organization (WMO) is the UN's specialized agency for geophysical sciences, meteorology, and scientific analysis of climate change. Many of the WMO's programs provide extensive research and analysis for climate and water-related hazards that can endanger lives and cause potentially colossal economic loss.[125] Concerning technology transfer and climate change, the WMO created the Technical Cooperation Program (TCOP) for "international cooperation in capacity building" and to assist member nations in ensuring the availability of relevant technical resources.[126] Though a vital organization for monitoring weather patterns and minimizing the effects of climate-related disasters, the WMO has minimal capacity and background in intellectual property and technology transfer and therefore is not an effective solution.

World Trade Organization

Not unlike the UNFCCC, the WTO represents a fundamentally inefficient organization. The global scope of membership fosters inefficiency and time-intensive decision making processes. For instance, the Doha Round of negotiations started in 2001 and has yet to see a general conclusion.[127] Among issues discussed in the Doha Round are that of IPR and public health. The agreement on TRIPS and Public Health was adopted in 2003 with full approval of amendments and implementation originally slated for December 1, 2007. The WTO has since delayed the deadline to December 31, 2009. For full implementation of the amended agreement, two-thirds of the member states (102 of the 153 WTO member nations) must sign on; as of early August 2009, twenty-four nations (including the United States) and the European Union have signed.[128]

In spite of its inefficiencies, the WTO is better suited to develop an intellectual property framework for technology transfer of ESTs, as it already has established an enforceable regulatory framework for IP in the form of the TRIPS Agreement. WTO critics insist that TRIPS does not have any enforceable measures that require member nations to transfer technologies, merely vague language requesting member states to exercise good efforts to do so. Indeed, the TRIPS document itself is light on technology transfer provisions; even articles that mention technology transfer have little operational value. Unlike most other WTO provisions, many TRIPS stipulations require further domestic government action.[129] For example,

---

[124] UNCED, 1992. Rio de Janeiro, Brazil, June 3-14. *Agenda 21,* Section 4, Chapter 34.10, 34.18. United Nations, New York.
[125] WMO, <www.wmo.int>.
[126] Ibid.
[127] Recently, India furthered complicated any agreement, announcing their intention to stand up for developing nations' interest. (*The Press Trust of India,* July 29, 2009)
[128] TRIPS and Public Health, "Members Accepting Amendment of TRIPS Agreement," World Trade Organization, <http://www.wto.org/english/tratop_e/trips_e/amendment_e.htm>.
[129] Matthew Littleton, "The TRIPS Agreement and the Transfer of Climate-Change-Related Technologies to Developing Countries," *United Nations Department of Economic and Social Affairs*, ST/ESA/2008/DWP/71, Working Paper No.71, October 2008. New York.

Article 66.2 of TRIPS states: "Developed country Members shall provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least-developed country members in order to enable them to create a sound and viable technological base."[130] Nowhere does TRIPS specify what measures must be taken; however, one must not neglect the fact that TRIPS is the only IP mechanism in place with an appropriate enforcement mechanism, the Dispute Settlement Board (DSB). The DSB resolves any trade disputes between WTO member nations, resulting in a decision and concessions or a punishment for the winning or losing party, depending on the case. The DSB distinguishes the WTO from the UN's World Intellectual Property Organization (WIPO) which lacks an enforcement mechanism. Conflicts that reach the DSB are not often resolved in the expected 9-12 month (15 months with appeal) time frame.[131] Most disputes require 2-3 years for resolution.[132] While some people argue that the DSB is inefficient and the WTO would benefit from establishing a tangential DSB exclusively for EST disputes, the current resolution time allows governments to economically adjust to the WTO's verdict.

The authors conclude that the sheer size of WTO negotiations, similar to those of the UNFCCC, exclude it from being an efficient institution to develop a technology transfer framework; however, the TRIPS agreement is the most effective set of international IP regulations and is best positioned to address IP disputes or to act as a legal patent framework under an external agreement.

The World Bank Group

The World Bank Group (WBG) is a family of five agencies including: (1) the World Bank, which houses the International Bank for Reconstruction and Development (IBRD); (2) the International Development Association (IDA); (3) the International Finance Corporation (IFC); (4) the Multilateral Investment Guarantee Agency (MIGA); and (5) the International Center for Settlement of Investment Disputes (ICSID). Each agency provides distinct services in a cohesive effort to achieve the Group's mission of poverty eradication and economic development. While the IBRD focuses efforts on middle-income and poor developing nations, the IDA gives concessional financing to the poorest nations. In sharp contrast, the IFC acts as the Group's private-sector arm, financing private sector investment and business development, developing international financial markets, and advising developing nation businesses and governments on attaining sustainable economic development. MIGA, in turn, provides investment insurance to groups investing in developing country projects; and ICSID represents the financial enforcement structure that settles investor-state legal disputes through conciliation or arbitration.[133]

Over the past twenty years, the World Bank Group has increased its focus on environmental protection and attaining sustainable development.[134] Though critics argue that financing clean energy initiatives remains a mere fraction of total WBG energy financing projects, the Group has seen a steady rise in the proportion of energy financing

---

[130] World Trade Organization, *The Uruguay Round Agreements: Agreement on Trade Related Aspects of Intellectual Property Rights.* Geneva: WTO, Geneva: 1994.
[131] M.D. Nair, "TRIPS, WTO, and IPR – How Effective is the Dispute Settlement Process?" *Journal of Intellectual Property Rights*, Vol. 14, July 2009, p.346-348.
[132] World Trade Organization, "Chronological List of Disputes Cases," <http://www.wto.org/english/tratop_e/dispu_e/dispu_status_e.htm>.
[133] The World Bank Group, <www.worldbankgroup.org>.
[134] Martin A. Weiss and Jeffrey Logan, CRS Report for Congress, "The World Bank's Clean Technology Fund (CTF)," November 24, 2008. Order Code: RS22989. Washington D.C.

allocated to ESTs. From 1990-1994 renewable energy and energy efficiency projects represented a mere 13 percent of all WBG energy commitments. The proportion grew to 21 percent from 2000-2004 and, as of 2007, comprised 40 percent of all energy commitments.[135]

One of the Bank's most notable achievements was the 1991 establishment of the Global Environment Facility, a $1 billion pilot program. Though it became an independent institution in 1994 with the implementation of the Rio Convention, the WBG still serves on the Board of Trustees and funds abatement projects through the GEF.[136] The Facility's progress and relevance will be discussed in the following section.

The implementation of the Kyoto Protocol and its Clean Development Mechanism (CDM) led to the formation of the World Bank's Carbon Finance Unit (CFU), a global initiative to purchase greenhouse gas emissions reductions in developing nations. Donor nations provide funding to the CFU through twelve carbon finance funds.[137] The WBG also instituted eight other environment-oriented funds: the Asia Alternative Energy Unit (ASTAE), the Energy Sector Management Assistance Program (ESMAP), the Solar Initiative, the Biodiversity Enterprise Fund for Latin America, the Forest Market Transformation Initiative, the Photovoltaic Market Transformation Initiative (PVMTI), the Clean Coal Initiative (CCI), and the Renewable Energy and Energy Efficiency Fund.[138]

This Policy Brief will not focus on most of the previously mentioned funds and mechanisms as they do not pertain directly to the financing of technology transfer and therefore lie beyond this Brief's intended scope. Of the funds referred to above, only ASTAE, PVMTI, and the Renewable Energy and Energy Efficiency Fund speak specifically of technology transfer although only in a marginal way. While ASTAE focuses solely on Asia and Pacific Island alternative energy needs, PVMTI exclusively finances solar investment projects in India, Kenya, and Morocco.[139]

As the private-sector representative of the WBG, the IFC has to potential to make an indelible contribution to climate change mitigation and adaptation efforts. Private sector prominence in alternative energy financing and production will help make markets more efficient while encouraging technological diffusion.[140] At a WIPO Conference in Geneva this year, General Electric's Chief IP Counsel Carl Horton estimated that between 60-80 percent of all alternative energy R&D comes from the private sector.

IFC involvement in abatement technologies and investment followed the Gleneagles Summit in June 2005, after which the corporation encouraged its departments to develop and implement strategies for alternative energy investment.[141] The IFC's investments are noteworthy, having provided developing countries with $450 million of its own funds in 2007.[142] It is important to note that along with funding, the IFC has undergone a drastic policy

---

[135] IFC, "Toward a Low-Carbon Economy: Renewable Energy and Energy Efficiency Portfolio Review," <http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/p_CatalyzingPrivateInvestment_LowCarbonEconomy/$FILE/LowCarbonEconomy.pdf>.
[136] GEF, <www.gefweb.org>.
[137] World Bank, Carbon Finance Unit, <http://go.worldbank.org/51X7CH8VN0>.
[138] William Arthur Delphos, *Inside the World Bank Group: the practical guide for international business executives* (Washington D.C.: World Bank Publications, 1997) p.156-161.
[139] PVMTI, <www.pvmti.com>.
[140] Charles K. Ebinger, World Bank IEG Evaluation Report, "Energy and Climate Change: An Assessment," *International Resources Group Ltd.,* June 2008, Washington D.C.
[141] Ibid.
[142] IFC, "Toward a Low-Carbon Economy: Renewable Energy and Energy Efficiency Portfolio Review."

shift from a "do no harm" strategy of mitigating negative externalities of projects, to a "doing good" strategy of financing projects with positive socio-economic and environmental impacts.[143] While this represents a considerably constructive step, it is the authors' contention that the corporation's current involvement falls far short of its potential impact on disseminating climate change technologies.

In 2007 The World Bank Group introduced the "Strategic Framework on Climate Change and Development." Part of the Strategic Framework (SF) was the development of a Climate Investment Fund (CIF) within the World Bank (WB), a two-pronged financing mechanism targeting technology transfer of ESTs. The two branches of CIF are the Clean Technology Fund (CTF) and the Strategic Climate Fund (SCF). Of the two, the CTF is of more direct relevance to technology transfer as it seeks to "promote[s] scaled-up financing for demonstration, deployment, and transfer of low-carbon programs and projects."[144] Of the $6.1 billion in the CIF fund, financed by ten nations (Australia, France, Germany, Japan, the Netherlands, Norway, Sweden, Switzerland, the United Kingdom, and the United States),[145] $5.2 billion is allocated to the CTF as a trust fund facilitating technology transfer.[146]

Though the fund represents a sizable investment and may be leveraged for greater future investment, relative to the high cost of some of these technologies, the CTF's impact may remain marginal. For example, the estimated cost of building a single carbon capture and sequestration (CCS) plant ranges from $500 million to upwards of $2 billion, potentially accounting for a third of the fund's resources. Granted, the fund will not be used on such large-scale technologies, but such figures should sober trust fund proponents, as it becomes evident that a technology transfer fund, if relied upon as the sole vehicle for technology diffusion, will prove exorbitantly expensive, especially given the International Energy Administration's estimate of the need for additional $9.3 trillion in energy investment between 2008 and 2030.[147] Given the projected expense of climate change mitigation and adaptation strategies, it will be important that the World Bank makes a realistic assessment of how best the CTF can be leveraged to have the greatest environmental impact.[148]

The World Bank Group (specifically the IFC and the WB) are taking deliberate steps towards greater financing of ESTs. The authors contend, however, that while the World Bank's initiatives are centered on transferring technologies and implementing programs to combat climate change there is no existing framework for the Bank to tackle the potential proprietary and patent disputes that may arise under its proposed mechanisms. The World Bank dictates that any program implementation will follow IPCC and UNFCCC obligations as they arise out of the Conference of Parties,[149] further cementing institutional inflexibility in dealing with IP protection.

---

[143] Andres Liebenthal et al., *Extractive Industries and Sustainable Development: An Evaluation of World Bank Group Experience* (Washington D.C.: World Bank Publications, 2005) p.124.

[144] Climate Change: Clean Investment Fund, "Clean Technology Fund," The World Bank, Washington DC.

[145] "Donor Nations Pledge Over $6.1 Billion to Climate Investment Funds," The World Bank, Press Release No: 2009/092/SDN, September 26, 2008, <http://go.worldbank.org/36H73DPMV0>.

[146] "Turkey Receives World Bank and First-Ever Clean Technology Fund Financing for Renewable Energy and Energy Efficiency Program," The World Bank, Press release No: 2009/ECA/368, May 28, 2009, <http://go.worldbank.org/LS85BISH50>.

[147] Martin A. Weiss and Jeffrey Logan, CRS Report for Congress, "The World Bank's Clean Technology Fund (CTF)," November 24, 2008. Order Code: RS22989. Washington D.C.

[148] Charles K. Ebinger, World Bank IEG Evaluation Report, "Energy and Climate Change: An Assessment," *International Resources Group Ltd.*, June 2008, Washington D.C.

[149] "The Clean Technology Fund," The World Bank, June 8, 2008, Washington DC, <http://siteresources.worldbank.org/INTCC/Resources/Clean_Technology_Fund_paper_June_9_final.pdf>.

Global Environment Facility

The Global Environment Facility (GEF) represents a similar framework to the CTF. The GEF distributes more than $250 million per year to renewable energy and energy efficiency projects. The GEF aids nations in achieving any standards agreed upon in multilateral environmental agreements. Since 1991, the GEF has provided more than $8.6 billion in aid and leveraged $33.6 billion in co-financing for over 2,400 environmental projects. While the GEF plays a significant and sizeable role in technology transfer, the absence of any reference to intellectual property deems it an inappropriate institution for an IP framework.

PART V

A Realistic Agreement

The E-10 Solution

This Policy Brief has identified the problems with existing multilateral institutions in creating a climate change mitigation framework and attempting to establish a mechanism to transfer technology within an intellectual property-friendly network. Not only do the authors point to evidence that indicates the institutions on-hand are ill-equipped to deal with such issues, but also experience suggests that negotiations in Copenhagen will conclude with copious political rancor and no agreement. Assuming Copenhagen negotiations end fruitlessly, the authors recommend an E-10 solution. Parallel to the E-8 concept proposed by William Antholis and Todd Stern in 2007, an E-10 (a group of ten major emitting nations) would be a more productive forum in which to attain consensus on future emissions reduction levels. As Antholis and Stern elucidated, rarely has the UNFCCC come to an effective and enforceable agreement. By contrast, the leaders of G-8 and G-8+5 have routinely reached paramount agreements including a deal in 1978 that launched the Tokyo Round of the GATT; a prompt response to financial crises in 1999 and 2009; and the 2002 Africa Action Plan.[150]

Antholis and Stern rationalize the case for an environment-specific meeting, as the G-8 forum —and the other "G's" 8+5, 20, 77—often dispose of climate change as a secondary issue (most recently in this year's summit in Aquila, Italy, where regulating the financial crisis took precedence). The E-10 would identify the most pressing global environmental challenges exclusively and impose standards upon themselves, detached from the clamor of a 192-nation circus.

Member nations of the E-10 would include: the United States, the European Union, China, Russia, India, Japan, Canada, South Africa, Australia, and Brazil. By 2006 estimates, E-10 nations, which comprise seven of the top ten largest emitters (South Africa, Australia, and Brazil are in the top 20), would include over 76 percent of total global CO_2 emissions.[151]

All E-10 members are in economic positions to acquire climate change mitigation technologies without the need for special financing mechanisms like compulsory licensing and patent pools.[152] Furthermore, each E-10 nation represents a leader in R&D and patenting of clean technologies. China

[150] William Antholis and Todd Stern, "Climate Change: Creating an E8," *The Brookings Institution*, January 1, 2007.
[151] Energy Information Administration, *International Energy Annual 2006*, "World Carbon Dioxide Emissions from the Consumption and Flaring of Fossil Fuels, 1980-2006," <http://www.eia.doe.gov/environment.html>.
[152] Jon C. Lovett et al., "Review of the 2008 UNFCCC meeting in Poznan," *Energy Policy*, Vol. 37, 2009, p.3701-3705.

and India are home to a large percentage of scientists and engineers and Brazil is a world leader in liquid fuel technologies.[153] Even less wealthy E-10 nations like South Africa and Brazil have recently seen a significant rise in patented ESTs. In fact, the United States and the European Union do not hold monopolistic control over technologies as is often perceived. Only one of the top ten solar photovoltaic (PV) producers in the world is American; only one of the top ten wind turbine producers is American; and only two of the top ten advanced battery producers are from the U.S. China and Japan host seven of the ten leading producers of photovoltaics. India's Suzlon Corporation is a leading producer of wind turbines, another renewable energy category dominated by Chinese firms. Brazil and Russia are also seeing increases in domestic patent ownership, although at a more measured rate.[154] Brazil's and South Africa's emerging clean technology hubs owe much credit to the failure of the CDM. As developed nations sought clean development projects abroad to eschew domestic commitments, Brazil and South Africa (along with China and India) hosted numerous projects, with little being distributed elsewhere.[155] Consequently, E-10 members all harbor established EST sectors, thereby enabling technology transfer for significant emissions reductions while maintaining private sector incentives for research, development, and deployment.

The second major benefit of an E-10 agreement as opposed to one engendered by the UNFCCC is the ability for enforcement. An E-10 Agreement would use TRIPS provisions as a legal structure of enforcing any patent transgressions. Russia is the only E-10 nation not currently in the WTO, but progress is being made for Russia's accession to the group and there is political momentum for accelerating the process.[156] Although TRIPS' difficulties of implementation of provisions, spelled out in the previous section, have diminished the incentives for technology transfer, should the E-10 reach an agreement on comprehensive emissions reductions, incentives will inevitably follow. Jennifer Haverkamp of the Environment Defense Fund stated to Congress that, "the incentive we are lacking is the clear policy signal that tells our entrepreneurs, our venture capitalists, our innovators, our market leaders that it's time to put their money down and invest the intellectual and material capital in reducing greenhouse gas emissions."[157] To be sure, Haverkamp was referring to domestic action by the U.S. government; however, the same can be said for international negotiations: an agreement on emissions reductions will ignite incentives to transfer technologies. History illustrates that policy agreements can spark private sector investment: parties that signed Kyoto, namely the EU and Japan, increased clean technology patents at a rate of 9 percent per year, eclipsing the United States and Australia, who did not initially sign the Protocol.[158] Domestically, the United States has seen drastic declines in sulfur dioxide and an increase in pollution control patents due to legal requirements capping the generation of sulfur dioxide and the emergence of a subsequent cap-and-trade market for sulfur

[153] Jerome Reichman et al., "Intellectual Property and Alternatives: The Strategy for Green Innovation," *Chatham House*, December 2008, Cambridge, p.34.
[154] Copenhagen Economics A/S and The IPR Company ApS, "Are IPR a Barrier to the Transfer of Climate Change Technology?" Copenhagen: 19 January 2009, p.23.
[155] Jennifer A. Haverkamp, Statement to the U.S. House of Representatives Select Committee on Energy Independence and Global Warming, "Climate for Innovation: Technology Transfer and Intellectual Property In Global Climate Solutions," July 29, 2009.
[156] Gregory L. White and John Miller, "Russia Changes Its WTO Strategy," *Wall Street Journal*, June 10, 2009.
[157] Jennifer A. Haverkamp, Statement to the U.S. House of Representatives Select Committee on Energy Independence and Global Warming, "Climate for Innovation: Technology Transfer and Intellectual Property In Global Climate Solutions," July 29, 2009.
[158] Australia would sign the Protocol in 2007, with the election of a new administration. The United States, famously, has not signed the Protocol.

dioxide emissions in the 1990s.[159] There is no doubt that an E-10 agreement will generate the incentives necessary to overcome the operational deficiencies of TRIPS' provisions.

A key asset to E-10 negotiations would be the engagement of world leaders. As the G-7 (as it was initially founded) discovered more than thirty years ago, gathering world leaders stimulates constructive discussion that is absent from multilateral negotiations between delegates from nearly 200 nations. Similarly, the involvement of world leaders in E-10 discussions would provide the impetus to establish a concrete, impactful decision.[160]

Finally, it is critical to remember that 120 nations have each contributed less than 0.1 percent of global carbon dioxide emissions.[161] Forcing climate change technologies upon them would see little benefit to emissions levels. Under the E-10 approach, poorer non E-10 nations can continue to focus on other development goals such as fighting malnutrition and disease, supplying clean, potable water, and alleviating millions from abject poverty. The World Bank and UNFCCC will, as a result, have the resources available (through already present funds, such as the CTF) to tackle necessary adaptation strategies in nations confronting the direst effects of climate change and to stay out of policies where others are better equipped to bring about real change. Rather than imposing irrelevant emissions caps on underdeveloped nations and flooding markets with incompatible technologies, the United States and other industrialized parties can monitor emissions in poorer nations and assiduously enable access to clean energy and electricity (e.g. by introducing or increasing grid connectivity), in conjunction with achieving other significant development goals.

A UNFCCC Framework Proposal

The E-10 solution represents a diplomatic tool in the event of an impasse at Copenhagen. Should COP-15 result in an agreement amongst parties, certainly a different solution will be necessary. Under such circumstances an effective IP solution to technology transfer must focus on four factors: (1) maintaining private sector interests through adequate profit potential; (2) ensuring that developing and poor nations procure technologies at the least possible cost; (3) implementing effective enforcement mechanisms; and (4), providing regionally or geographically-appropriate technologies to each nation.

For an agreement to satisfy the aforementioned criteria, the TRIPS agreement is limited. As detailed in Part II's explanation of TRIPS and ESTs, TRIPS' provisions for public health should not extend to the transfer of climate change technologies. Although an argument can be made (and often is) that global warming should be included within the sphere of public health, there are several fundamental characteristic differences between environmentally sound technologies and public health technologies, including the number of competitors and the number of patents required for a specific technology. Furthermore, although implementing emissions caps will encourage private sector investment and technology transfer, the threat of compulsory licensing, as requested by vocal developing nations, will stem most innovative progress. Though some studies have illustrated that compulsory licensing will have mid- to long-term positive effects on competition and

[159] Ibid.
[160] William Antholis and Todd Stern, "Climate Change: Creating an E8," *The Brookings Institution*, January 1, 2007.
[161] Energy Information Administration, *International Energy Annual 2006*, "World Carbon Dioxide Emissions from the Consumption and Flaring of Fossil Fuels, 1980-2006," <http://www.eia.doe.gov/environment.html>.

profits,[162] the authors' conversations with officials from the private sector indicate significant resistance in embracing compulsory licensing.

Given the shortcomings of the UNFCCC, WTO, and the World Bank Group, the authors recommend a joint UNFCCC-private sector approach. The new program will utilize the UNFCCC's Technology Needs Assessments (TNAs) as an indicator of the technology requirements of specific nations. Each nation will have the technology requirements on hand and will be responsible for contracting out their specific needs to clean energy firms. Private sector firms will be bound to a segmented/parallel market pricing structure, whereby they may charge market prices to developed and emerging parties, but must supply technology to LDCs and the poor developing nations on a marginal cost basis. For example, the Republic of the Congo's TNA identifies the favorable conditions for the development of solar power,[163] thus the Congolese government would identify manufacturers of solar technology—such as General Electric, First Solar, or Suntech—and would have access to their technologies at affordable rates; however, India, as a wealthy emerging nations with a potential for solar development, would procure identical technologies at market rates. Under such a transfer mechanism, private sector firms are assured returns on invested capital and concurrently, nations unable to afford clean technologies have new access at discounted prices. As a leader in this effort, General Electric has already begun to focus on concessionary pricing schemes like segmented/parallel markets for numerous impoverished nations.

Though the royalties appropriated to businesses from compulsory licensing are insufficient to maintain private sector incentive for future R&D investment, such rates would be useful if used merely as prices for the poorest nations while industrialized and wealthy emerging nations continued to pay market rates.

Enforcement under such a program will be simple and not harmful to environmental gain: in a scenario where a nation either reneges on a contract or engages in technology imitation or re-importation, it will be subject to paying higher costs for the technology. That means, an LDC nation will no longer have access to technologies at concessionary prices, and developed nations will have to pay financial penalties to the firm on purchased goods. By contrast, should the private sector fail to supply technologies to poor nations at marginal cost levels, the UNFCCC will force a specific number of future transactions to be supplied to both LDC and developing nations at the concessionary cost.

[162] Shane Tomlinson, Pelin Zorlu, and Claire Langley, *Innovation and Technology Transfer: Framework for a Global Climate Deal* (London: E3G and Chatham House, 2008) p.101.

[163] Republique du Congo, "Identification des Besoins En Technologie dans le Secteur D'Energie en Republique du Congo," UNDP, October 2004, p.15. <http://unfccc.int/ttclear/pdf/TNA/Congo/Congo.doc#_Toc87335411>.

Conclusion

There has never been a greater need for efficacious environmental policy intervention. As the global climate becomes increasingly unpredictable and violent, it is unmistakable that those most vulnerable are citizens of many of the world's poorest nations and regions.

Recent negotiations have fixated on implementing comprehensive international emissions reductions for deployment after the 2012 expiry of the Kyoto Protocol. To achieve such goals, it is necessary that developing nations gain access to a multitude of environmentally sound technologies (ESTs); however, developing nations argue that obdurate patent protection of "green" technologies brings about high prices for ESTs, making procurement impossible. Thus, financing technology transfer and related concerns regarding intellectual property rights have emerged to the forefront of climate change negotiations.

The most thorough enforceable international legislation vis-à-vis IPR, the WTO's TRIPS agreement, never explicitly refers to climate change. Instead, developing nations cite TRIPS' agreement on public health as precedence for enforcing the compulsory licensing of ESTs; however this comparison is incorrect, as product substitutability and diversity of technological inputs are key properties of ESTs not shared by pharmaceutical products. These differences are cardinal in deterring any misappropriation of compulsory licensing, an IP mechanism that can stymie incentives for research, development, and technology transfers.

Past research disputes the effects of intellectual property on technology transfer to developing economies, but there is a growing consensus that technology transfer is not a barrier, rather a mechanism to nurture transfers. To this point, the authors find that the protection of intellectual property is central to constructive technology transfer and sustaining private sector engagement.

Accordingly, a climate change agreement will require a comprehensive IP framework to administer legal technology transfer. The authors contend that none of the leading international institutions (the UNFCCC, UNEP, the World Bank Group, the WTO, and the GEF) are appropriate forums to arrive at a cost-effective accord. The UNFCCC failed to arrive at such an agreement with the ratification of the Kyoto Protocol, which is widely regarded as expensive and ineffectual. The UNFCCC's attempt at corralling 192 nations has proved cumbersome to negotiations and provides more political acrimony than constructive solutions. In fact, with more than 120 nations each contributing less than 0.1 percent of global emissions, many of which face dire challenges beyond climate change (disease prevention and malnutrition, for example), the authors find the

inclusion of such least-developed countries in negotiations to be unnecessary. Such forums should allocate more attention to developing adaptation strategies to the poorest locales and to safeguard against near-future climate change related catastrophes. UNEP, the World Bank Group, the WTO, and the GEF, are all similarly over-inclusive and inefficient in nature, inhibiting substantive agreements.

It is important to note that, each of the aforementioned groups (except for the WTO) does not have an agreed-upon, comprehensive, and enforceable intellectual property framework in place.

Thus, the authors propose the following two recommendations:

- In the event of an impasse in negotiations at Copenhagen, the creation of the E-10, an environment-specific summit of ten major emitters —the United States, European Union, China, Russia, India, Japan, Canada, South Africa, Australia, and Brazil—to identify urgent environmental concerns and to impose emissions reductions on themselves;

- In the event of a UNFCCC agreement, a joint UNFCCC-private sector pricing framework employing Technology Needs Assessments (TNAs) and a segmented/parallel pricing structure. All nations would use the TNAs to determine the appropriate technological needs for achieving a low-polluting economy, after which developed nations would purchase the technologies at market prices while developing and poor nations would have access to technology procurement on a marginal cost basis. The WTO and the TRIPS agreement would serve as the overseeing regulators, legal framework, and enforcement mechanism.

BROOKINGS
The Brookings Institution
1775 Massachusetts Ave., NW
Washington, D.C. 20036
brookings.edu