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CLEAN TECHNOLOGY TRANSFER AND INTELLECTUAL PROPERTY RIGHTS

by Nitya Nanda & Nidhi Srivastava*

INTRODUCTION

It is generally agreed upon that an efficient diffusion and deployment of technology has the potential to mitigate the adverse impacts of greenhouse gas (“GHG”) emissions and to reduce emissions.¹ If developing countries were able to use available technologies to reduce their energy consumption by twenty percent, the currently projected increase between 2000 and 2020 in carbon dioxide (“CO₂”) emissions from developing countries could be cut by almost half.² Although the role of technology transfer in reducing emissions is widely recognized, effective wide-scale transfer has been hindered by a number of factors, including international property rights regimes.

Transfer of technology in the international context commonly refers to sale or licensing of intellectual property, but the term includes any process by which users in one country gain access to and utilize technology developed in another country.³ The term technology implies any practical application of knowledge in a particular area,⁴ but it is usually associated with machines and related infrastructure, and technology is often discussed in this constricted sense. This narrow view combined with developing countries’ large-scale import of knowledge based machinery, products, and process licenses creates the perception of developing countries as “technology users” and “passive recipients” of developed country technologies.⁵

In a globalized world, technology may be transferred from developed countries to developing or between developing countries, based on cost or other considerations, even if similar technology is locally available. Hence, using a foreign source of technology does not necessarily mean a “transfer of technology” has occurred. An analysis of the sixty-three Clean Development Mechanism (“CDM”)⁶ projects that were registered on January 1, 2006 offers a picture of the current state of technology transfer.⁷ Of the twenty-nine overall CDM projects that involved foreign technology, the largest number (twelve) were in hydropower, and the technology for them came from all over the world, including several developing countries like Brazil, China, India, Panama, Peru, and Sri Lanka.⁸ Technology for hydropower is fairly standardized and the use of a foreign source of technology in many CDM projects may not mean that transfer of high value technology was involved.

This paper provides an overview of barriers to technology transfer and specifically examines problems posed by both strong and weak international property rights (“IPR”) regimes. Whether and how IPR regimes act as limiting factor in effective

Technology	Number of projects	Emission reduction [Ton of CO ₂ -eq]	Share of total emission reduction [%]
Biogas	6	387,591	1.4
Biomass	10	302,735	1.1
Energy efficiency	1	6,580	0.0
Fuel switch	1	19,438	0.1
HFC-23 destruction	3	8,233,566	28.9
Hydropower	22	775,471	2.7
Landfill gas	10	2,712,395	9.5
Methane capture	3	410,378	1.4
N ₂ O destruction	2	15,111,165	53.0
Wind energy	5	573,013	2.0
Total	63	28,532,332	100

Figure 1. Emission Reductions by Technology in the 63 Registered CDM Projects.⁹

diffusion are considered and a range of mechanisms to improve technology transfer are proposed.

FACTORS RESTRICTING TECHNOLOGY TRANSFER

Despite clear recognition of the benefits technology diffusion offers to mitigate climate change, not enough has been done to advance that role. There are various factors acting as barriers to efficient and useful technology transfer from advanced and developed countries to recipient developing countries.

The Intergovernmental Panel on Climate Change (“IPCC”) has listed high capital costs, limited access to capital, poor access to information, institutional and administrative difficulties in developing technology transfer contracts, lack of infrastructure to absorb riskier technologies, absence of economic incentives, and intellectual property rights as hurdles for technology

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transfer.¹⁰ Causes may vary not only from country to country, but technology to technology as well.

Both developed and developing countries accept that transfer of technology has been slow and ineffective, but they attribute it to different causes. The Institute for Global Environmental Strategies (“IGES”), in *Asian Aspirations for Climate Change beyond 2021*, has highlighted the contrasting perspectives of developed and developing countries with regard to technology transfer.¹¹ The developed countries hold lack of robust legal mechanisms and domestic institutions in developing countries responsible.¹² Since most of the CDM technologies are developed and owned by a few private companies, developed countries cite the need for friendly domestic policies, institutions, and strong intellectual property rights protection in developing countries to encourage technology diffusion.¹³

On the contrary, from the perspective of developing countries, the failure of developed countries to meet their obligations under the UN Framework Convention on Climate Change (“UNFCCC”), and their lack of awareness and willingness to do so, are cited as primary reasons for inadequate technology transfer.¹⁴ Other reasons often cited are the lack of programs and initiatives at the government level, as well as high capital and licensing costs.¹⁵

INTELLECTUAL PROPERTY RIGHTS (“IPR”)

Intellectual property is a category of intangible rights protecting commercially valuable products of human intellect.¹⁶ It refers to creations of the mind: inventions, literary and artistic works, as well as symbols, names, images, and designs used in commerce.¹⁷ The impact of IPR on technology diffusion is context specific and complex. IPR in the hands of a few has the ability to create a monopolistic situation where dissemination of knowledge is restricted on account of limited access and higher prices for climate friendly technologies. Strongly protected IPR held by supplier firms may also prevent users or recipients from obtaining access to technologies in order to adapt them to suit their own needs and requirements. However, an assurance of one’s IPR being protected may encourage the owner to transfer his technology to another country. Therefore, a lack of adequate protection for IPR in the recipient country can also inhibit transfer of technology.

LACK OF IPR PROTECTION

In its *Special Report on Climate Change*, the IPCC observes that a “major requirement for successful agreement in technology transfer is the guarantee of intellectual property rights.”¹⁸ An effective and enforceable IPR law provides an incentive for private companies to disseminate or transfer their technology. A strong IPR protection may also facilitate transfer of technology through increased trade in goods and services, foreign direct investment (“FDI”) by private companies, technology licensing, and joint ventures.¹⁹ IPR protection may result in larger trade flows, “albeit mainly for countries with imitative capability” involving “substitution of domestic innovation for technology produced abroad.”²⁰

It is generally believed that most developing countries do not fully enforce their IPR protection laws.²¹ Hence, one may hasten to conclude that the lack of adequate IPR protection might have been a factor inhibiting transfer of technologies. Though much is unknown about the actual extent of weakness in the IPR protection regimes in developing countries by way of comprehensive survey, the annual “Special 301” reports, prepared by the Office of the U.S. Trade Representative on the adequacy and effectiveness of IPR protection by U.S. trading partners, can shed some light.²² Along with many developing countries, the EU has been on the list of countries that infringes on IPR and only recently moved off of the list in 2007.²³

It is difficult to infringe on the IPR of a sophisticated technology that requires extensive scientific and technical knowledge. In some cases, the basic scientific knowledge of patented technologies is accessible—what is not available is the right to use such knowledge. If developing country companies are not using such technologies, they are either respecting the patent rights or they are not technologically capable of using them.

IPR-BASED MARKET POWER

A technology protected by a strong IPR regime is less likely to reach a vast number of users in developing countries as there may be high licensing costs.²⁴ In some cases, the owner may refuse to grant a license altogether, halting the spread of the technology. DuPont, for example, refused to grant licenses for the production of chlorofluorocarbon substitutes to Korean and Indian firms that sought to use the substitutes to meet the phase out requirements for ozone depleting substances.²⁵ When a particular technology is not licensed to other users and the owner sells it in the form of products and equipment, a monopoly is created. Monopoly production is often inefficient and pushes prices even higher.²⁶

In the context of most technologies, especially climate change mitigation, gaining access or ownership of the IPR is not the sole and sufficient requirement for a successful diffusion and deployment of technology. The licensing of a technology may have to be accompanied by large investments in developing the skills and know-how to incorporate, adapt, and develop further the technology obtained. Some experts opine that IPR regimes should address factors such as absorptive capacity and tacit knowledge in addition to technology access issues.²⁷ The importance of this assertion can be highlighted through two examples in India, light-emitting diode (“LED”) manufacture and Integrated Gasification Combined Cycle (“IGCC”) power plant technology. Without technological capacity, IPR ownership would not have improved India’s ability to manufacture LEDs.²⁸ Similarly, the main barrier to the use of IGCC technology is lack of knowledge about its performance with low quality Indian coal, rather than IPR ownership.²⁹

The present IPR regime has a limited scope for improving transfer of technology to developing countries in this respect. Lynn Mytelka, former director of the United Nations University

Institute for New Technologies, suggests that the possibility for the transfer of technical assistance and capacity building to developing countries in areas capable of meeting local development needs and global environmental concerns should be enhanced through the patent system itself.³⁰

The stage of commercialization of a technology determines the extent to which the developer needs and expects returns.³¹ The level of a country's development is also a determining factor for the IPR impact on technology transfer. In cases of developed and technologically advanced countries, strengthening IPR can increase innovation and technology diffusion. In middle-income countries, a stronger IPR regime may encourage both domestic innovation and technology diffusion through foreign patenting and international trade, both of which can encourage growth. But the beneficial impact of stronger IPR protection on domestic innovation and technology diffusion can offset the growth-enhancing benefits otherwise obtained from imitation.³²

Apart from IPR, a range of other factors, including the level of development, nature of technology, and technical know-how to adapt and develop technologies, affect transfer of technology. These factors also determine the manner in which IPR impacts technology transfer for fighting climate change in developing countries.

ADDRESSING IPR AS A CHALLENGE

It is difficult to determine the precise impact that IPR has on technology transfer, either by way of reduced access or increased prices. To do so would require a detailed product-by-product and country-by-country analysis. There have been many suggestions in the recent past to address IPR as a challenge to efficient transfer of climate change fighting technologies. Suggestions range from compulsory licensing, to joint ownership, to technology acquisition, and knowledge repository funds. Some of these are discussed below as possible mechanisms to mitigate the negative impact of IPR.

COMPULSORY LICENSING

A compulsory license is a statutorily created license that allows certain people to pay a royalty and use an invention without the patentee's permission.³³ Ordinarily, compulsory licensing refers to the government authorizing itself to use otherwise protected intellectual property without having to obtain the permission or authorization of a patent holder in cases of national emergency or for public good.³⁴

An old IPR concept, the term compulsory licensing is not explicitly incorporated into the Trade Related Aspects of Intellectual Property Rights ("TRIPS") regime of the World Trade Organization ("WTO"). However, compulsory licensing can be read into the provision of TRIPS Agreement on "Other Use [of the patented subject matter] Without Authorization of the Right Holder."³⁵ Articles on "Exceptions to Rights of Conferred"³⁶ and "Principles," including reference to measures "needed to prevent

the abuse of intellectual property rights by right holders" and "the resort to practices which unreasonably restrain trade or adversely affect the international transfer of technology"³⁷ also provide reasonable flexibility for countries to use compulsory licensing. Drawing from TRIPS and the Doha Development Declaration, a compulsory license can be granted to meet government requirements, overcome an abuse of patent rights, in a national emergency, for public non-commercial use, and for a technical advance of considerable economic significance over the existing patent.³⁸

Article 31(c) of TRIPS also provides that a country can use such a measure "to remedy a practice determined after judicial or administrative process to be anti-competitive."³⁹ Hence, countries can invoke their competition law where "abuse of dominance" is included as one of the anti-competitive practices and the source of dominance is an IPR.⁴⁰

Similarly, Article 40 of TRIPS, dealing with control of anti-competitive practices in contractual licenses, states that "[n]othing in this Agreement shall prevent Members from specifying in their legislation licensing practices or conditions that may in particular cases constitute an abuse of intellectual property rights having an adverse effect on competition in the relevant market."⁴¹ Hence, refusal to give license can also be included as an anti-competitive practice and may be remedied with compulsory licensing.

COMPULSORY LICENSING IN PUBLIC HEALTH

Rights of the TRIPS member countries to make use of compulsory licensing in the interest of public health have been explicitly recognized in the Doha Declaration on Public Health. In order to make use of compulsory licensing in the CDM context, climate change mitigation must be treated as a public good. Here, we briefly examine the issues of compulsory licensing in public health and then we will look at clean technology.

The Doha Declaration on the TRIPS Agreement and Public Health clarified the rights of member countries with regard to

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the compulsory licensing system by recognizing that each member has the right to grant compulsory licenses and the freedom to determine the grounds upon which such licenses are granted.⁴² Subsequently, Thailand issued a compulsory license in late 2006 for five years on Efavirenz, a patented AIDS drug from Merck.⁴³ More recently, Brazil issued a compulsory license in May of 2007 for the same product.⁴⁴ However, countries still face difficulties with compulsory licensing for pharmaceuticals. For example, Brazil came under tremendous pressure from the United States—which filed and later withdrew a complaint to the WTO—to repeal a law that allowed the government to issue a compulsory license when patent holders do not manufacture the drug in Brazil. Although Brazil successfully defeated the challenge by the United States, many smaller countries are not able to do so.⁴⁵

Although some steps have been taken in this direction, the declaration and the subsequent TRIPS amendment have left many issues untouched and lack guidelines for eligibility for compulsory licensing.

COMPULSORY LICENSING IN CLEAN TECHNOLOGIES

At the UN Climate Change Conference in Poznan in December 2008, developing countries advocated a paradigm shift in the way climate mitigation technologies are subject to intellectual property rights protection. Many suggested a strategy similar to affordable medicines.⁴⁶ For example, India proposed an approach analogous to pharmaceuticals: creating a mechanism that would ensure that privately owned technologies are available on an affordable basis, including through measures to resolve the barriers posed by intellectual property rights and addressing compulsory licensing of patented technologies.⁴⁷

TRIPS has recognized countries' freedom to determine for themselves what constitutes national emergency for the purposes of compulsory licensing. Although countries have some flexibility to determine when and in which cases to make use of compulsory licensing, confusion and conflict will likely result without guidelines or directives. As mentioned above, to make use of the provisions of compulsory licensing, first and foremost climate change mitigation has to be treated as a public good. Detailed guidelines and specifications to help a country identify a technology that can be eligible for issuing of a compulsory license are needed. Similarly, an eligibility criterion for countries should be created because many developing countries lack domestic capabilities for production and may not be able to use

a technology unless there is an amendment in TRIPS in line with the one made for pharmaceutical products.⁴⁸

Even if compulsory licensing is adopted for climate change technologies, it may not alone solve the problem as incremental costs for adapting and putting the technology to use in local context may also be high.

It is not an easy task to accommodate the interests of the developer of the technology (and indirectly incentives for further research and development) on the one hand and the need to address rapid climate change on the other. This balance has to be met in a manner that is diplomatic and as minimally politically contentious as possible. There have been only few instances of compulsory license issuing, and instances of compulsory licensing by a national authority where the IPR-owner is a foreign national or domiciliary are even less common.⁴⁹ It is a very political issue.⁵⁰

OTHER FLEXIBILITIES IN THE EXISTING REGIMES

In addition to compulsory licensing, other measures beyond the TRIPS regime, such as cooperative research and development and technology acquisition funds, could be used to reduce the high costs resulting from strong IPR protection. Creation of a technology acquisition fund has been proposed within the framework of the UNFCCC.⁵¹ Such a fund could be managed by a multi-lateral organization or a trust, which serves to acquire or buy out patented technologies that are climate friendly and make

them available to developing countries in need of technology to reduce or mitigate GHG emissions.

Most of the clean technologies are owned by a handful of Organisation for Economic Co-operation and Development ("OECD") countries. The largest environmental corporations in the world are from Germany, France, Japan, the United Kingdom, and the United States, who export equipment, technology, and services worldwide.⁵² These large corporations typically provide integrated products and services and account for about fifty percent of the global market.⁵³ If one considers the market for technology only, their share is likely even higher. Within specific segments of the environmental industry, a few large corporations virtually dominate.⁵⁴ Three countries—Germany, Japan, and the United States—submit about sixty-four percent of the patent applications related to environmental technology in the European Patent Office.⁵⁵ A patent buy-out mechanism is an option that could avoid the need for compulsory licensing, thereby accounting for the patent owners' concerns as well.

The fact that the companies holding [climate-related] technologies are powerful companies from powerful countries makes technology transfer difficult for politically weaker developing countries.

It is likely the “most diplomatic alternative” to compulsory license.⁵⁶

Kevin Outterson, a law professor at Boston University who focuses on achieving equitable access to pharmaceuticals while still encouraging innovation, has outlined a detailed process for a suitable buy-out mechanism.⁵⁷ He suggests that it may be owned or purchased by an intergovernmental organization or a philanthropic foundation and should not be limited to any one technology or region. To make the provision attractive to developers of technology as well, the compensation to be paid in an acquisition could be determined by the net present value of expected future profits.⁵⁸ Such a proposal has also been advocated by Mytelka, suggesting a knowledge fund as the repository of patents dealing with environmentally sound technologies.⁵⁹

In setting up a technology acquisition or repository fund, many details will have to be considered. These may include how to gain the knowledge required to work the acquired patents locally, whether the patents will be in public domain or the purchaser would have exclusive rights, what the grounds and conditions for transfer will be, what modes of acquisition will be used, and how much will be adequate compensation to the patent holder.

Another possible mechanism is mandatory price negotiation. This is very common in many countries, both developed and developing, in pharmaceutical products.⁶⁰ Price regulation can be imposed even as a competition-remedy measure. Since countries are empowered to act under their competition regimes, such a mechanism is legally possible. However, for many developing countries, it would not be easy to enforce when the companies in question are large transnational companies from powerful countries. There are very few cases of a country taking action on a foreign company under competition law, even in

the developed world. In the developing world such an action is almost non-existent.⁶¹

CONCLUSION

Transfer and diffusion of technology from developed to developing countries is happening at a very slow pace. Transfer is even slower in climate-related technologies. The intellectual property rights regime can be an important factor. In the developed world, compulsory licensing has often been used to make technology readily available. Mandatory price negotiations, as well as price regulations, are also used in some measure especially in pharmaceutical products. However, what is legally possible is not always practically feasible. The fact that the companies holding such technologies are powerful companies from powerful countries makes technology transfer difficult for politically weaker developing countries. Thus, the economic and political factors make it difficult to invoke the basic legal instruments to access these technologies.

Given this, it appears that a global technology acquisition fund is the most promising means to spread these technologies. This is, of course, not in lieu of other available instruments, but in addition to them. It would be difficult to create such a mechanism given the present global geo-political context. It is often said that developed country governments cannot control technology transfer, as it is private companies, not governments, that actually own the technologies. However, the governments may be able to pay their companies adequate compensation in order to make the technologies available to developing countries. But merely making the technologies available may not be enough. The use of technologies may be expensive and difficult in developing countries without the necessary capacity. Generous financial assistance would also be required, even for deployment of technologies that are available at concessional rates. 

Endnotes: Clean Technology Transfer and Intellectual Property Rights

¹ SPECIAL COMMITTEE ON A FUTURE FRAMEWORK FOR ADDRESSING CLIMATE CHANGE, MINISTRY OF ECONOMY, TRADE AND INDUSTRY [JAPAN], SUSTAINABLE FUTURE FRAMEWORK ON CLIMATE CHANGE (2004), available at <http://www.meti.go.jp/english/information/downloadfiles/cPubComFramework.pdf>.

² *Id.* at 30.

³ LYNN MYTELKA, TECHNOLOGY TRANSFER ISSUES IN ENVIRONMENTAL GOODS AND SERVICES vii (2007), available at <http://ictsd.net/downloads/2008/04/2007-04-lmytelka.pdf>.

⁴ Merriam-Webster Online Dictionary, <http://www.merriam-webster.com/dictionary/technology> (last visited Mar. 28, 2009).

⁵ MYTELKA, *supra* note 3, at 3.

⁶ The CDM creates opportunities for emission-reduction projects in developing nations to earn Certified Emission Credits that may be used by developed nations to meet emission goals prescribed in the Kyoto Protocol. UN FRAMEWORK CONVENTION ON CLIMATE CHANGE, CLEAN DEVELOPMENT MECHANISM 2008 IN BRIEF (2008), available at http://unfccc.int/resource/docs/publications/08_cdm_in_brief.pdf.

⁷ H.C. DE CONINCK ET AL., ENERGY RESEARCH CTR. OF THE NETH., TECHNOLOGY TRANSFER IN THE CLEAN DEVELOPMENT MECHANISM 8 (2007), available at <http://www.ecn.nl/docs/library/report/2007/e07009.pdf> (last visited Mar. 31, 2009).

⁸ *Id.* at 10.

⁹ *Id.* at 8.

¹⁰ INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, METHODOLOGICAL AND TECHNOLOGICAL ISSUES IN TECHNOLOGY TRANSFER 148 (Bert Metz et al. eds., 2000) [hereinafter IPCC], available at <http://www.ipcc.ch/ipccreports/sres/tectran/510.htm>; see also THE ENERGY AND RESOURCES INSTITUTE, CLIMATE CHANGE AND TECHNOLOGY: BUILDING CAPABILITIES 2 (2008), available at <http://www.teriin.org/events/docs/Cop14/TechPosition.pdf>.

¹¹ KENTARO TAMURA, INST. FOR GLOBAL ENVTL. STRATEGIES, *Technology Development and Transfer, in ASIAN ASPIRATIONS FOR CLIMATE REGIME BEYOND 2012*, at 68 (Ancha Srinivasan ed., 2006), available at http://enviroscope.iges.or.jp/modules/envirolib/upload/535/attach/complete_report.pdf.

¹² *Id.*

¹³ *Id.*

¹⁴ *Id.* at 68.

¹⁵ *Id.*

¹⁶ BLACK'S LAW DICTIONARY 824 (7th ed.1999).

¹⁷ World Intellectual Property Organization, What is Intellectual Property?, <http://www.wipo.int/about-ip/en/> (last visited Mar. 10, 2009).

¹⁸ IPPC, *supra* note 10.

¹⁹ *Id.*

²⁰ ROD FALVEY ET AL., UN INDUS. DEV. ORG., THE ROLE OF INTELLECTUAL PROPERTY RIGHTS IN TECHNOLOGY TRANSFER AND ECONOMIC GROWTH: THEORY AND EVIDENCE 46 (2006), available at http://www.unido.org/fileadmin/import/60030_05_IPR_rights_in_technology_transfer.pdf.

²¹ See SANJAYA LALL, INDICATORS OF THE RELATIVE IMPORTANCE OF IPRs IN DEVELOPING COUNTRIES 9 (2003), available at <http://www.ppl.nl/bibliographies/wto/files/972.pdf>.

²² See generally OFFICE OF THE U.S. TRADE REPRESENTATIVE, 2008 SPECIAL 301 REPORT (2008), available at http://www.ustr.gov/assets/Document_Library/Reports_Publications/2008/2008_Special_301_Report/asset_upload_file553_14869.pdf.

²³ *Id.*

²⁴ Earth Summit Plus Briefing No. 4: Technology Transfer, Intellectual Property Rights and the Environment (1997), <http://www.twinside.org.sg/title/brie4-cn.htm> (last visited Apr. 8, 2009).

²⁵ *Technology Transfer Stops at Paper Promises*, S. BULL. (S. Ctr. Geneva, Switz.), Aug. 30, 2001, at 10-11, available at http://www.southcentre.org/index.php?option=com_docman&task=doc_download&gid=588&Itemid=

²⁶ *Id.* at 4.

²⁷ DAVID OCKWELL ET AL., SUSSEX ENERGY GROUP, UK-INDIA COLLABORATION TO IDENTIFY THE BARRIERS TO THE TRANSFER OF LOW CARBON ENERGY TECHNOLOGY: FINAL REPORT 109 (2006), available at http://www.sussex.ac.uk/sussexenergy-group/documents/uk_india_full_pb12473.pdf.

²⁸ *Id.* at 60.

²⁹ *Id.* at 13.

³⁰ MYTELKA, *supra* note 3, at 26, 29.

³¹ OCKWELL ET AL., *supra* note 27, at 108.

³² FALVEY ET AL., *supra* note 20, at vii.

³³ BLACK'S LAW DICTIONARY, *supra* note 16.

³⁴ *Id.*

³⁵ See Agreement on Trade-Related Aspects of Intellectual Property Rights art. 31, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 108 Stat. 4809, 1869 U.N.T.S. 299, available at http://www.wto.org/english/docs_e/legal_e/27-trips.pdf [hereinafter TRIPS].

³⁶ See *id.*, art. 30 (allowing members to provide limited reasonable exceptions to the exclusive rights conferred by a patent, if it does not unreasonably prejudice the legitimate interests of the patent-owner and takes into account the legitimate interest of third parties).

³⁷ See *id.*, art. 8.

³⁸ B. K. Keayla, Center for Trade and Development, Compulsory Licensing: Suggestions For Change, http://www.centad.org/focus_40.asp (last visited Mar. 10, 2009).

³⁹ See TRIPS, *supra* note 35, art. 31.

⁴⁰ *Id.*

⁴¹ See TRIPS, *supra* note 35, art. 40.

⁴² World Trade Organization, Ministerial Declaration of 14 November 2001, WT/MIN(01)/DEC 1, available at http://www.wto.org/english/thewto_e/minist_e/min01_e/mindecl_trips_e.pdf.

⁴³ See Celia W. Dugger, *Clinton Foundation Announces a Bargain on Generic AIDS Drugs*, N.Y. TIMES, May 9, 2007, <http://www.nytimes.com/2007/05/09/world/09aidsdrugs.html?scp=4&sq=Thailand%20%20Efavirenz&st=cse>.

⁴⁴ *Id.*

⁴⁵ Jacqui Wise, *Access to AIDS Medicines Stumbles on Trade Rules*, 84 BULL. OF THE WORLD HEALTH ORG., 360 (2006) available at <http://www.who.int/bulletin/volumes/84/5/news10506/en/index.html>.

⁴⁶ Meena Raman, *Divergence over IPR Issue in Technology Transfer*, POZNAN NEWS UPDATE (Third World Network, Penang, Malay.) Dec. 10, 2008, <http://www.twinside.org.sg/title2/climate/news/TWNpoznanupdate11.doc>.

⁴⁷ Government of India 2008, Submission to UNFCCC on Technology Transfer Mechanism for CoP14.

⁴⁸ See Jerome H. Reichman & Rochelle H. Dreyfuss, *Harmonization Without Consensus: Critical Reflections on Drafting a Substantive Patent Law Treaty*, 57 DUKE L. J. 85, 94-96 (2007) (comparing the issues for developing countries regarding the TRIPS provisions with the former issues of pharmaceutical patents).

⁴⁹ See Carlos M. Correa, *Intellectual Property Rights and the Use of Compulsory Licenses: Options for Developing Countries* (unpublished working paper, on file with the Centre for Advanced Studies at the University of Buenos Aires, Argentina).

⁵⁰ See Wise, *supra* note 45.

⁵¹ TAMURA, *supra* note 11, at 74.

⁵² UN Conf. on Trade and Dev., *Strengthening Capacities in Developing Countries to Develop their Environmental Services Sector*, TD/B/COM.1/EM.7/2, Geneva (1998), *cited in* Aparna Sawhney, 'Environmental Services' in *TRADE IN SERVICES & INDIA: PROSPECTS AND STRATEGIES* (Rupa Chanda ed., 2006).

⁵³ *Id.*

⁵⁴ *Id.*

⁵⁵ German Federal Government, Environmental Technologies, <http://www.hightech-strategie.de/en/201.php> (last visited Apr. 1, 2009).

⁵⁶ Do Hyung Kim, Research Guide on TRIPS and Compulsory Licensing (2007), http://www.nyulawglobal.org/globalex/TRIPS_Compulsory_Licensing.html (last visited Apr. 1, 2009).

⁵⁷ Kevin Outterson, Access to Global Disease Innovation (Nov. 15, 2006) (submission Submission to WHO IGWG), *available at* <http://ssrn.com/abstract=884241>.

⁵⁸ *Id.*

⁵⁹ MYTELKA, *supra* note 3, at x.

⁶⁰ *See generally* Margaret K. Kyle, *Pharmaceutical Price Controls and Entry Strategies*, 89 REV. ECON & STAT. 88 (2007) (discussing how mandatory price negotiations have affected the pharmaceutical industries of many developed and developing nations).

⁶¹ NANDA NITYA, *EXPANDING FRONTIERS OF GLOBAL TRADE RULES: THE POLITICAL ECONOMY DYNAMICS OF THE INTERNATIONAL TRADING SYSTEM* (2008).
