The Effectiveness of the Kyoto Protocol and Consummating the Legal Institution for International Technology Transfer

Zhongfa Ma
Law School, Fudan University
2005 Songhu Road, Shanghai 200438, China
Tel: 86-21-5163-0093 E-mail: zfma@fudan.edu.cn

Abstract

Kyoto Protocol has several provisions and established mechanisms concerning technology transfer which is supposed to favoring technology transfer for reducing the emission of greenhouse gases (GHG) in the world. However, mainly due to the flaws of the provisions and mechanisms, the environmentally sound technologies have not been transferred as smoothly as possible to realize the Kyoto Protocol's objectives. Therefore, the international community shall take the effectiveness of Kyoto Protocol as a fresh impetus to consummate the legal system of international technology transfer, that is, developing a uniform technology transfer agreement under the WTO with a focus on promoting environmentally sound technology, which may make the developing countries to acquire the technologies they need under the fair conditions and help them build their capacities to develop in a sustainable manner. China does not need to perform the obligation of reducing GHG emission until 2013 according to Kyoto Protocol, but precautions shall be taken to improve its legal systems on technology transfer to make preparations for implementing the policy of scientific development and playing roles in related international legislation.

Keywords: Kyoto Protocol, Legal institution of international technology transfer, Sustainable development, Environmental protection

1. Introduction

Environmental protection, sustainable development and technology transfer are closely correlated with each other. The international community, with much effort, has created the Kyoto Protocol (Note 1) which aims at reducing the emission of greenhouse gases (GHG). (Note 2) Although it is regarded as an international agreement for the first time binding wealthy countries to specific cuts in GHG emissions by some scholars, (Note 3) in my opinion, the more important obligation for wealthy countries is to transfer environmentally sound technologies to poorer countries. The legal institutions for international technology transfer existing before the Protocol have not worked as well as they might to reach an objective of slowing down and reducing GHG emissions, but there are more definite provisions and mechanisms concerning technology transfer in the Protocol. And also, after the Protocol, no binding international treaty or agreement on reducing GHG emissions has been reached, including the fifteenth session of the Conference (COP 15) held in Copenhagen between December 7th and 18^{th,} 2009. (Note 4) This paper examines the legal institutions created by the Kyoto Protocol to regulate technology transfer and tries to asses their likely effectiveness.

2. The Stipulations Concerning Technology Transfer in the Kyoto Protocol

It was not until the late 1960s that the world began to pay much attention to the importance of the environment, technology transfer and globalization. By the 1990s, the inter-relationship of these three phenomena became apparent. Efforts are now underway to establish an international legal system to protect the environment. One element of these efforts has been the focus on technology transfer. As yet, there is no universal treaty on international technology transfer but only a variety of provisions scattered throughout a number of legal documents promulgated by the World Intellectual Property Organization (Note 5); other related international organizations within the United Nations system; (Note 6) and a few related provisions in the framework agreements of the World Trade Organization (WTO). (Note 7) There are now about twenty-eight multilateral agreements concerning technology transfer about half of which relate to the global environment or environmental protection. (Note 8)

The Kyoto Protocol was adopted as an addition to the United Nations Framework Convention on Climate Control (UNFCCC). (Note 9) The ultimate objective of the UNFCCC was to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the world's climate system. The stabilized level was to be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner. (Note 10) To realize UNFCCC's ultimate objective, various provisions of the Convention recognize the necessity for the rapid development of transferring and using technologies that can effectively reduce GHG emissions. Transferring such technologies is seen as a crucial factor for reducing climate change and enabling sustainable economic development to proceed. Article 4, paragraph 5 of UNFCCC specifically requires that:

"The developed country Parties and other developed Parties included in Annex II [of UNFCCC] 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. Other Parties and organizations in a position to do so may also assist in facilitating the transfer of such technologies."

In order to implement the provisions of the UNFCCC and to make its objectives a reality the parties to the Convention, driven by common human interests, held the third conference of parties in Kyoto between the 1st and 11th of December, 1997 and adopted the Protocol after intense negotiations and sometimes furious arguments.

The Protocol's provisions directly concerning technology transfer can be found in a number of its articles. Article 2 provides that:

"Each party included in Annex I [mostly developed countries] in achieving its quantified emission limitation and reduction commitments under Article 3, in order to promote sustainable development, shall:

"(a) Implement and/or further elaborate policies and measures in accordance with its national circumstances, such as: ...

(iv) Research on, and promotion, development and increased use of, new and renewable forms of energy, of carbon dioxide sequestration technologies and of advanced and innovative environmentally sound technologies; ...."

Article 3, paragraph 14 provides that:

"Each Party included in Annex I shall strive to implement the commitments mentioned in paragraph 1 above in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention. In line with relevant decisions of the Conference of the Parties on the implementation of those paragraphs, the Conference of the Parties serving as the meeting of the Parties to this Protocol shall, at its first session, consider what actions are necessary to minimize the adverse effects of climate change and/or the impacts of response measures on Parties referred to in those paragraphs. Among the issues to be considered shall be the establishment of funding, insurance and transfer of technology."

The parties to the Protocol are also required to:

"Cooperate in the promotion of effective modalities for the development, application and diffusion of, and take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies, know-how, practices and processes pertinent to climate change, in particular to developing countries, including the formulation of policies and programmes for the effective transfer of environmentally sound technologies that are publicly owned or in the public domain and the creation of an enabling environment for the private sector, to promote and enhance the transfer of, and access to, environmentally sound technologies...." (Note 11)

The above provisions provide an explicit description of the commitment to technology transfer required under the Protocol.

2.1 The Three Flexible Mechanisms

Besides the above provisions, there are, however, several implicit or indirect stipulations involving technology transfer to be found in the Protocol. These are often called the "Three Kyoto Flexible Mechanisms", which are known as: the "joint implementation mechanism" (JIM) (Note 12); the "clean development mechanism" (CDM)

(Note 13); and the "international emissions trading mechanism" (IET). (Note 14) The provisions on the funding mechanisms also relate to technology transfer.

The joint implementation mechanism (JIM) was one of the earliest flexible mechanisms introduced into the UNFCC. The Protocol refers to this mechanism and develops it further. It permits the developed countries to proceed with cooperation on certain programmes with other countries in order to share jointly the quotas of the reduction of GHG emissions. The fundamental model of this mechanism suggests that developed countries' companies, or other economic organizations, should provide funds, advanced technologies and experts to cooperate with companies or organizations in other countries to develop programmes to elevate the efficiency of energy sources and reduce GHG emissions. The Protocol provides that any party included in Annex I:

"may transfer to, or acquire from, any other such Party emission reduction units resulting from projects aimed at reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks of greenhouse gases in any sector of the economy ...." (Note 15)

At present the programmes using this mechanism mainly focus on energy, forestation and protection of existing forests. The projects so far have mostly been carried out in Eastern Europe and Central America with very few located in Africa which is in great need of such cooperative programmes.

The central element of the clean development mechanism (CDM) lies in its emphasis on cooperation between developed and developing countries to reduce GHG emissions in a manner that is conducive to the sustainable development of developing countries. The cooperative mechanism represents a specific application of the principle of "common but differentiated responsibilities." (Note 16) It makes clear that the purpose of CMD is to assist developing countries "in achieving sustainable development and in contributing to the ultimate objective of the Convention" (Note 17) of assisting developed countries "in achieving compliance with their quantified emission limitation and reduction commitments…." The Protocol expresses the belief that developing parties "will benefit from project activities resulting in certified emission reductions." Under the CDM the developing countries are to be assisted "in arranging funding of certified project activities as necessary" and gaining access to essential materials, equipment and technology. Emission reductions in developing countries achieved by certified projects can be transferred to developed countries. (Note 18) The Protocol also provides that: "Certified emission reductions obtained during the period from the year 2000 up to the beginning of the first commitment period can be used to assist in achieving compliance in the first commitment period." (Note 19) Theoretically then this mechanism will promote R&D activities and transfer of environmentally sound technologies and spur developed countries to encourage their public and private enterprises to cooperate with developing countries in the field of energy production which should accelerate the pace of technological improvement and equipment renovation.

The content of the international emissions trading mechanism (IET) is mainly prescribed in article 17. This mechanism is only applied between developed states. If an industrialized country reduces more quantities of GHG than that meets its reduction commitments under the Protocol, it may participate in emissions trading, that is, it can sell emission reduction units to another developed country. That country can then use the reduction units to meet its own reduction goals. This mechanism may encourage developed countries to develop new energy technologies in order to exceed their reduction requirements.

2.2 The Funding Mechanism

As to the funding mechanism, the developing countries have generally taken the position that without considerably more funds and technology transfer from developed countries, they will be incapable of taking effective measures to reduce GHG emissions. (Note 20) The Protocol provisions on this issue build upon provisions in UNFCCC. The Protocol states that when fulfilling the obligation of transferring technology, the parties shall consider the related provisions of UNFCCC and "what actions are necessary to minimize the adverse effects of climate change and/or the impacts of response measures on Parties referred to in the Protocol. Among the issues to be considered shall be the establishment of funding insurance and transfer of technology". (Note 21)

The developed countries shall "cooperate in the promotion of effective modalities for the development, application and diffusion of, and take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies, know-how, practices and processes pertinent to climate change, in particular to developing countries, including the formulation of policies and programmes for the effective transfer of environmentally sound technologies that are publicly owned or in the public domain and the creation of an enabling environment for the private sector, to promote and enhance the transfer of, and access to, environmentally sound technologies;…." (Note 22) They shall also "provide new and additional financial

resources to meet the agreed full costs incurred by developing country parties in advancing the implementation of existing commitments" (Note 23) to the Protocol. They shall "also provide such financial resources, including for the transfer of technology, needed by the developing country Parties to meet the agreed full incremental costs of advancing the implementation of existing commitments under Article 4, paragraph 1 of the Convention that are covered by Article 10.The implementation of these existing commitments shall take into account the need for adequacy and predictability in the flow of funds and the importance of appropriate burden sharing among developed country Parties. The guidance to the entity or entities entrusted with the operation of the financial mechanism of the Convention in relevant decisions of the Conference of the Parties…." (Note 24) The developed countries can also provide funds to the developing countries to perform their obligations described in Article 10 "through bilateral, regional or multilateral" treaties or other channels. This indicates that the financial support from developed countries is an indispensable condition for the control of global climate change, while financial support is also frequently associated with technology transfer.

The above provisions aim at promoting environmentally sound technology transfer, especially focused on requiring developed countries to transfer technologies to developing countries and providing necessary funding.

3. Effectiveness of the Protocol and the Legal Institutions of International Technology Transfer

3.1 Comments on the Related Provisions in the Protocol

Technology is perceived as the main method to be used to tackle the problem of global climate change. Its decisive role in reducing the emissions of GHG has already been recognized universally. The conflict between emission reduction of GHG and economic development has received a great deal of attention but the essence of such a conflict is the problem of how to develop environmentally sound technologies and how to disperse them to developing countries. The nucleus of solving the climate change/development conundrum is to pursue social advancement but only when based on sustainable development. Innovative technology transfer needs to proceed through flexibly and practical international cooperation.

Under the current system of international technology transfer, however, developed countries have been reluctant to transfer technology to developing countries or have charged them unreasonably high prices for transferable technologies, which has made it impossible for developing countries to acquire the necessary technology or to be capable of using environmentally sound technology. As a result, developing countries have further impoverished their resources, such as forests, and this has weakened the earth's capacity to support photosynthesis and thus the climate and environment have seriously deteriorated. (Note 25) The Protocol has some provisions addressing these problems; its fatal weakness is that it lacks any enforcement mechanisms to ensure that the parties fulfill their treaty obligations. If a party fails to perform its obligations, there is no punishment mechanism. Furthermore, many provisions in the Protocol are vague. Implementation depends on existing operable national mechanisms and the domestic regulations of each party. Although the Protocol stipulates that:

"the Conference of the Parties serving as the meeting of the Parties to this Protocol shall, at its first session, approve appropriate and effective procedures and mechanisms to determine and to address cases of non-compliance with the provisions of this Protocol, including through the development of an indicative list of consequences, taking into account the case, type, degree and frequency of non-compliance;" (Note 26) there are still no specific measures binding the Parties.

Kyoto Protocol concludes, however, by stating: "Any procedure and mechanisms under this Article entailing binding consequences shall be adopted by means of an amendment to this Protocol." (Note 27) But it is very difficult to get an amendment concerning implementation of transferring environmentally sound technologies because of the conflicts of interests between the developed countries and developing countries and conflicts between private enterprises' interests and governmental intervening activities in a country, especially in those developed countries. To date, no implementing provisions have been adopted. At the 2001 Bonn Conference, no agreement concerning this issue was reached. Although the Expert Group of Technology Transfer was established after COP7, (Note 28) the Group has only provided consulting advice as appropriate to the subsidiary bodies (SBSTA--Subsidiary Body for Scientific and Technological Advice and SBI--the Subsidiary Body for Implementation) and rarely exerted its efforts to promote actual activities of technology transfer. Because of the lack of enforceability, the provisions on the obligation to transfer technology are severely impaired.

As far as the CDM, JIM and ITE mechanisms are concerned, there are also some defects. The flaws of CDM can be summarized as follows: In order to acquire emission reduction units, developed countries may slacken the pace of developing new technologies and may not use their best efforts to reduce the emission of GHG in order to take full advantage of developing countries' lack of advanced technologies and funds, which could result in developed countries increasing their own GHG. Currently, there is no satisfactory mechanism to implement the

overall aims of the Protocol. Moreover, CDM resorts to a partial solution which is unlikely to bring about any measurable change. Although the Bonn Agreement, signed in July, 2001 referred to the establishment of a special climate change fund to assist developing countries in technology transfer, the absence of the United States as a party to the Protocol has hindered meaningful implementation. There are very few formal CDM programs and positive effects from such programs have yet to be demonstrated. Some experts now worry that without drastic modification the CDM programs may not survive after 2012 (not included 2012). (Note 29)

The defects of ITE are that the system could encourage some countries to evade solving their own emissions problems by buying other countries' assigned emission amount. This could prove an obstacle to the transfer and use of new technologies and result in no overall reduction of GHG emission. Some countries remain opposed to the ITE mechanisms because they perceive it as perpetuating emissions rather than reducing them. As for JI mechanisms, it is feared that areas that are most in need of investment and development will be ignored as the developed countries simply pursue areas likely to produce the best return on investment. In summary, the three mechanisms envisioned in the Protocol to assist in technology transfer leading to emission reduction may not work. Without effective institutions and enforcement mechanisms, international technology transfer is unlikely to take place on a scale sufficient to make any measurable difference. The obligations imposed on developed countries are simply "soft" law (Note 30) and will evaporate in the competitive environment of self-interest.

In the 15 conferences of the parties to the Protocol (COP1-COP15) held by UNFCCC and the more than twenty conferences held by its subsidiary organizations, technology transfer has been mentioned almost every time, (Note 31) so far with no outstandingly fruitful result. Shortsighted views of some politicians, the dominant concern for economic benefits, the absence of enforcement mechanisms, the lack of liability for failure to perform treaty obligations and the inherent contradiction between mandatory technology transfer and ever increasing intellectual property protection, all lead to the stultification of technology transfer.

To achieve the long-term aim of actually reducing GHG emissions some positive measures should be pursued. The suggestion that "a country's assigned emission amount shall be determined by the margin between the amount of carbon dioxide absorbed and filtered by plantation such as forest or grassland and its emission amount" (Note 32) deserves reconsidering. Actually, developed countries have long attached importance to their forest protection. They simply import timber from developing countries. Nevertheless, because consuming forests from other countries contributes to increasing global GHG, such increases should be assessed against developed countries' emission amounts. Developed countries tend to shift their pollution-prone industries to developing countries which again results in no net reduction of emissions. The most effective solution for GHG emission reduction would be to promote environmentally sound technologies throughout the globe and insist on real reductions in emissions.

3.2 The Effectiveness of the Protocol's Impact on International Technology Transfer

The effectiveness of the Protocol will influence the definition of "technology transfer." That phrase should be defined broadly. The actors or parties involved in technology transfer include international organizations, state governments, private entities (enterprises), financial organizations, non-governmental organizations (NGOs), as well as research/educational institutes and individuals. The kinds of technology transfer within the scope of the Protocol include traditional technology transfer, the knowledge of and the application for slowing down and adapting to climate change, experience gained from past technology transfers, and the instruments and mechanisms necessary to promote cooperation and facilitate construction of the newly introduced technologies. The methods of transfer include programmes promoted through government funding, direct purchase, licensure, foreign direct investment, joint-venture programmes, cooperative research projects, cooperative manufacturing agreements, education and training, as well as direct government investment. The features of the technology transfer, especially transfer from the developed to the developing countries, should include software and hardware designed to assist in the overall plan of advancing sustainable development. (Note 33)

Provisions on technology transfer can be found in a variety of treaties addressing international environmental protection. (Note 34) The few successes achieved by these documents are, however, dwarfed by the unsatisfactory enforcement and implementation mechanisms. The technology transfer provisions of these treaties are often given little attention which harms the effectiveness of the treaties. The implementation of JI and CDM in the Protocol depends on the efforts and will of each country and its industries. Although these mechanisms have not yet become legally enforceable, there have been some novel attempts at new forms of technology transfer. There are several provisions in the Protocol on definite emission goals, (Note 35) requirements on technology transfer and cooperation (Note 36), as well as some flexible mechanisms for transfer. (Note 37) The emission reduction technology provisions mainly address two methods for achieving reductions: the

development of new technology and the transfer and application of existing technology. The latter is more important because the potential value of many existing technologies has not been realized due to excessive protection of intellectual property. It should be possible to accelerate the transfer of environmentally sound technologies even with the use of existing technologies. Accelerated technology transfer would break the deadlock of the current malaise of technology transfer and improve the Protocol's effectiveness. The expansion of existing technologies to different fields could hasten the prospects for drafting a comprehensive treaty on technology transfer.

The increased effectiveness of the Protocol would provide a breakthrough for the institution of the mechanisms of technology transfer. Innovation in the realm of technology transfer and application holds the promise of assisting developing countries while reducing GHG emissions and playing a positive role in protecting the environment and climate.

If the Protocol is to be effective, there will have to be a reconsideration of the relationship between the protection of intellectual property and promoting environmentally sound technology transfer. Is it possible to use different means to protect patents in the area of environmental technology? The related stipulations in the Protocol are legally binding and the ones in the Agenda 21 of the Earth Summit in Rio (Note 38) and the relevant environmental protection declarations (Note 39) are often regarded as legally binding provisions. But compared with the TRIPS Agreement (Note 40) under the WTO, the Protocol's language, however, reads more like "soft law" without specified penalties for failure to meet the requirements or any effective method to ensure compliance. This considerably weakens the Protocol's effectiveness. Technology transfer impacts upon the interests of various parties including those with intellectual property rights. Under the current legal regime, the protection of intellectual property rights may well prevail over "soft law" requirements to transfer technology. The economic benefits to the intellectual property owner are individualized and immediately realizable while the benefit of a clean environment is universalized, diverse and not immediately tangible. The property owner is not likely to surrender the immediate benefit of ownership unless required to do so by a new legal regime.

There are two kinds of governmental intervention in technology transfer: governmental control over technology imports and exports and regulation of the contract regime applicable to an enterprise's technology imports and exports. Governmental intervention in technology transfer contracts is almost indispensable in developing countries because of their enterprises' weak negotiating capacity and the absence of a robust anti-trust regime. Indeed, weak negotiating capacity and lack of anti-trust laws have often been cited by developed countries as reasons for refusing technology transfer. What is needed in order to ensure that technology benefits humans as broadly as possible is some adaptation of the TRIPS Agreement recognizing that environmentally sound technology will be protected but in a different way from other forms of intellectual property. A system of compulsory licensing should be imposed under which the proprietor is paid appropriate consideration but is compelled to allow the use of the technological ideas under a regulated licensure system.

3.3 The Establishment of the Legal Institutions of International Technology Transfer Subsequent to the Protocol's Entry into Force

3.3.1 Introduction

The Doha Ministerial Conference, held in 2001, listed development as the core theme of the Doha Round negotiations. Consequently, technology transfer, as the key to development, has become the talisman. Pure commercial methods are often unsuitable for emission reduction technologies. Developing countries cannot be expected to acquire and apply these technologies by paying "fair" market prices. Although theoretically speaking, environmentally sound technologies can be spread through regular commercial transactions there are obstacles and risks accompanying such transfers owing to insufficient legal protection, inadequate regulations and the lack of a robust institutional framework. Governments should work to cultivate favourable circumstances for the transfer of technology, using both private and public entities, through their economic policies and legislation concentrating on transparency and stability. Joint-venture companies and commercial industries should be encouraged to promote environmentally sound technologies by favourable legislative conditions.

3.3.2 A Technology Transfer Agreement

The effort to harmonize the inter-relationship between the environment, trade and sustainable development should also be pursued under the Protocol, together with developing a uniform technology transfer agreement (TT Agreement) under the WTO with a focus on promoting environmentally sound technology. Such an agreement should take the form of a multi-lateral agreement negotiated by parties to the WTO at its Ministerial Conferences and adopted as part of the WTO rules. The TT Agreement would then be associated with the general institutions of international trade. Other WTO mechanisms could then be used, especially the dispute

settlement mechanism, (Note 41) thus making the regulations on environmental protection more enforceable. If parties to the Convention fail to observe their treaty obligations, compulsory enforcement is also available. Because technology transfer is often related to foreign investment, cargo shipment and service trade, an overall TT Agreement would likely result in better coordination of these aspects of technology transfer. The idea of developed countries transferring technology to developing countries without charge is unrealistic. Developed countries and their corporations will only cooperate in the transfer of technology if they are guaranteed a fair return. The operation of technology transfer under UNFCCC, to date, confirms the realists' predictions.

3.3.3 Technology Transfer Agreement and Intellectual Property Rights

Any TT Agreement must coordinate technology transfer with the intellectual property protection system. Some sort of balance needs to be worked out to reward the creator of the technology while at the same time making it affordable enough to be useful in the overall goal of environmentally responsible development.

The TRIPS Agreement is the core of the intellectual property system. TRIPS agreement emphasizes demarcating and protecting intellectual property rights while neglecting specific provisions on technology transfer and the benefits that can accrue from the broad availability of technology. Although TRIPS agreement does contain a few regulations on balancing intellectual property rights and the availability of technology transfer, (Note 42) these provisions are phrased so vaguely as to ensure weak implementation. Perhaps the most specific TRIPs provision on this topic can be found in article 66, paragraph 2. (Note 43) This clause, however, only aims at regulating technology transfer from industrialized countries to the least developed countries (LDCs). It does not address technology flow among two or more developing countries, or between two or more developed countries, or between developed and developing countries who are not among the LDCs. As a result, an agreement needs to be drafted and adopted outside the framework of the TRIPS Agreement.

Despite the importance of technology transfer to the development of trade, such transfer has never been given priority in the international negotiations taking place over the last fifty years. (Note 44) A significant step forward was indicated, however, by paragraph 37 in the Doha Declaration of 2001. (Note 45) That paragraph created a horizontal working group under the auspices of the General Council of WTO known as the Working Group on Trade and Transfer of Technology (WGTTT). The purpose of the WGTTT is to study, examine and analyze the relationship between trade and transfer of technology and to bring forward any possible recommendations on steps that might be taken within the mandate of the WTO to increase flows of technology to developing countries. (Note 46) WGTTT will focus on trade and technology transfer from developed to developing countries in order to examine ways of enhancing technology flow to the latter. WGTTT will report on its progress to the General Council who will then report to the Sessions of the Ministerial Conference. (Note 47) WGTTT was established to address the urgent need for technology to flow from developed to developing countries. The WTO agreements have hardly any specific measures designed to accelerate the pace of technology transfer or to promote such transfers. Technology transfers specifically focusing on environmental protection will obviously be included in WGTTT's work.

The Marrakesh Declaration adopted at the 7th Session of UNFCCC established an Expert Group on Technology Transfer (Note 48) (EGTT) for enhancing technology transfer to promote worldwide environmental protection. The EGTT and WGTTT should cooperate to create integrated technology transfer mechanisms within the framework of the WTO paying attention to relevant provisions of the TRIPS Agreement. Shaping a relatively integrated technology transfer system, by a multi-lateral agreement with both general principles and more detailed provisions, is foundational and will make technology transfer more effective in all areas.

What will be the relationship between a new TT Agreement and the TRIPS Agreement? In our opinions, TRIPS Agreement will serve as the basic law for the creation of the TT Agreement. The preamble and articles 7 and 8 of the TRIPS Agreement provide the legal principles and basis for the framework of the TT Agreement. Articles 31, 40, 67 and article 66, paragraph 2, constitute the key contents for the blueprint of the TT Agreement. These provisions can be made more explicit and detailed in the TT Agreement specifically facilitating and encouraging technology transfer by developed countries on the basis of the currently accumulated experiences. (Note 49) For example, a Monitoring Mechanism (MM) should be established to ensure the implementation of article 66 paragraph 2 of TRIPS and provisions in TT agreement in order to give effective incentives to enterprises and institutions that promote and carry out technology transfer to LDCs and developing countries. Within the overall framework of the WTO, the TT Agreement should have a similar status to GATT, GATS and TRIPS.

4. The Influence of China's Accession to the Kyoto Protocol on Its Domestic Technology Transfer System

The Protocol presents a major challenge to China which suffers from insufficient power to meet surging demand, large levels of GHGs and severe environmental pollution. (Note 50) The implementation of the Protocol will

have a profound influence on China's energy industry and those industries that require large amounts of energy. Moreover, it will inevitably both increase pressures on, and provide incentives for, domestic scientific research, technology development and technology transfer, environmental protection and enterprise management.

Under the terms of the Protocol, China is not required to reduce GHG emissions until 2013, which may appear favourable in the short term. In the long term, however, the reverse is true. For example, currently Chinese companies have little knowledge of, and seldom care about, the relationship between environmental change and self-management. Industry pays scant attention to the Chinese government's participation in international negotiations on the environment protection and has limited knowledge of the obligation assumed under relevant treaties. Such ignorance may persuade companies to develop in ways that are not permissible under the treaties and such development may generate a negative impact on the environment. As a nation, China needs to make effective use of the two year transition period by pursuing the principle of "common but differentiated responsibilities" to ensure that enterprises are well equipped to engage in sustainable development through sound scientific means. This will benefit not only the enterprises themselves but the entire country.

The specific measures related to technology transfer that will be useful to China are the ones that take advantage of the flexible mechanisms in the Protocol to enable domestic enterprises to cooperate with those from other countries by using CDM (Note 51) and promoting self-reliant research and development. At the same time, the legal system necessary for regulating domestic environmental technology needs to be established with the aim of transforming it to achieve scientific innovation, technology transfer and actual productivity. A technology trade institution together with regulating agencies must be created to use technology to the greatest possible advantage. Although China now has a rudimentary domestic legal system to regulate technology transfer, (Note 52) it is far from ideal. Efforts have been made to pass legislation prohibiting piracy and infringement of technology property rights (Note 53) and enforcement has been increased. However, both the legislation and the enforcement on technology transfer needs greater attention. For example, further development is needed in defining and overseeing foreign-investment high-tech companies. Unfair clauses in technology transfer contracts should be eliminated. Broad prohibitions forbidding the use of technologies that pollute the environment and/or increase energy consumption should be enacted.

Currently in China, it is cheaper to break environmental laws that to abide by them (Note 54) which provides a strong incentive for domestic and foreign enterprises to violate China's laws on environmental protection. The government should take an active role in supervising international technology transfer and encouraging domestic enterprises to take a long-term perspective rather than simply concentrating on rapid development regardless of environmental costs. At the same time, the government should help facilitate the process whereby enterprises acquire environmentally sound technologies from foreign entities and develop smokeless industries with the ultimate goal of introducing foreign investment which will serve national interests. The domestic economy must be developed in a stable, sustainable and beneficial manner, rejecting short-sighted goals that so often lead to environmental degradation. It is of the utmost importance for China to concentrate its efforts on creating and enforcing a comprehensive legal framework to ensure the transfer of environmentally sound technology.

In summary, China should pursue sustainable development through resource preservation and sound economics to promote scientific development and a just and harmonious society. Through international economic cooperation, China can establish a balanced, healthy and sustainable course for development where all parties are benefited. This is the moment when China needs to move forward to take advantage of the promise of the Protocol to raise the level of technology transfer, to build the capacity to develop core environmentally sound technology and to accelerate the pace of transforming the fruits of pure research into realistic productivity. This can be achieved by improving China's legal system on technology transfer and actively introducing advanced technology through careful technology absorption, use and further innovation.

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Notes

Note 1. Kyoto Protocol to the United Nation's Framework Convention on Climate Change, Dec. 11, 1997, UN Doc FCCC/CP/1997/7/ Add. 1, was made at the third session of the Conference of the Parties of United Nations Framework Convention on Climate Change (COP 3) held in Kyoto between December 1st and 11th ,1997 and entered into force on Feb. 16, 2005, reprinted at 37 I.L.M. 22 (1998) [hereinafter Kyoto Protocol].

Note 2. Greenhouse gases are gases in an atmosphere that absorb and emit radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The main greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone.

Note 3. Levi, Michael A., Copenhagen's Inconvenient Truth, in Foreign Affairs, September/October 2009.

Note 4. Although the overall goal for the COP 15 (ministers and officials from 192 countries took part in the Copenhagen meeting and in addition there were participants from a large number of civil society organizations) was to establish an ambitious global climate agreement for the period from 2012 when the first commitment period under the Kyoto Protocol expires, the conference only achieved a "politically binding" agreement with a 13-paragraph 'political accord' for the post-Kyoto period, which was only 'noted' by the COP as there was no consensus. The accord was notable in that it referred to a collective commitment by developed countries for new and additional resources, including forestry and investments through international institutions, which will approach USD 30 billion for the period 2010 - 2012. The negotiations on extending the Kyoto Protocol had unresolved issues as did the negotiations on a framework for long-term cooperative action.

Note 5. The World Intellectual Property Organization [hereinafter WIPO], established by the WIPO Convention in 1967 with a mandate from its Member States to promote the protection of IP throughout the world through cooperation among states and in collaboration with other international organizations, is a specialized agency of the United Nations. It is dedicated to developing a balanced and accessible international intellectual property (IP) system, which rewards creativity, stimulates innovation and contributes to economic development while safeguarding the public interest. Its headquarters sits in Geneva, Switzerland. The current Director General is Francis Gurry.

Note 6. Such as United Nations Conference on Trade and Development [hereafter UNCTAD], established in 1964, which promotes the development-friendly integration of developing countries into the world economy; it has progressively evolved into an authoritative knowledge-based institution whose work aims to help shape current policy debates and thinking on development, with a particular focus on ensuring that domestic policies and international action are mutually supportive in bringing about sustainable development.

Note 7. In WTO framework, there are some stipulations concerning technology transfer in Agreement on Trade-Related Aspects of Intellectual Property Rights [hereafter TRIPS] and Agreement on Trade-Related Investment Measures [hereafter TRIMS] and other agreements.

Note 8. See Compendium of International Arrangements on Transfer of Technology: Selected Instruments---Relevant Provisions in Selected International Arrangements Pertaining to Transfer of Technology, UNCTAD/ITE/Misc.5 Overview p.5, United Nations 2001.

Note 9. The United Nation's Framework Convention on Climate Change, May 9, 1992, 1771 U.N.T.S. 107, entered into force on Mar. 21, 1994 [hereinafter UNFCCC].

Note 10. Article 2 of *United Nations Framework Convention on Climate Change*, http://unfccc.de/resource/.

Note 11. See Article10 (C) of *Kyoto Protocol* at http://unfccc.de/resource/

Note 12. See Article 6 of *Kyoto Protocol* at http://unfccc.de/resource/

Note 13. See Article12 of *Kyoto Protocol* at http://unfccc.de/resource/

Note 14. See Article 17 of *Kyoto Protocol* at http://unfccc.de/resource/

Note 15. Article 6, Paragraphs 3 & 4 of *Kyoto Protocol* at http://unfccc.de/resource/

Note 16. It was established in UNFCCC and adopted and extended in Kyoto Protocol, which means all the members of UNFCCC and Kyoto Protocol shall bear the responsibilities of reducing the GHG emission, but the developed countries shall bear more because of their activities in the past which attributed more to the current state of climate change.

Note 17. See Articles 12, paragraph 2 of *Kyoto Protocol* at http://unfccc.de/resource/

Note 18. See Articles 12, paragraph 3 of Kyoto *Protocol* at http://unfccc.de/resource/.

Note 19. See Articles 12, paragraph 10 of Kyoto *Protocol* at http://unfccc.de/resource/.

Note 20. Shi Xueying, *New Analysis on the Legal System of International Technology Transfer*, Tianjin People's Publishing House, 2000, p247.

Note 21. See Article II, Paragraph 1(a)(iv), Article III, Paragraph 14, Article X(c) and Article XI (b) of *Kyoto Protocol* at http://unfccc.int/resource/

Note 22. Articles 10 (c) of Kyoto *Protocol* at http://unfccc.de/resource/.

Note 23. Articles 11, Paragraph 2 (a) of Kyoto *Protocol* at http://unfccc.de/resource/.

Note 24. Articles 11, Paragraph 2 (b) of Kyoto *Protocol* at http://unfccc.de/resource/.

Note 25. At the early stage of the western countries' industrialization in 18 and 19th centuries, since the forests in developing countries had not been destroyed heavily, the carbon dioxide emitted by developed countries could be absorbed in the world. However with the exploitation of the nature and intensification of forest destruction in 20th century, the conflict between the increasing GHG emissions and the decreasing capacities of the forest's absorbing CO2 has got more and more serious.

Note 26. Article 18 of Kyoto Protocol at http://unfccc.de/resource/.

Note 27. Article 18 of Kyoto Protocol at http://unfccc.de/resource/.

Note 28. See *Expert Group on Technology Transfer*, at http://unfccc.int/ttclear/jsp/EGTT.jsp.

Note 29. Zheng Shuang, *Analysis of Today's International CDM,* in *China's Natural Resource,* 6th Issue, June, 2005.

Note 30. Shi Xueying, *New Analysis on the Legal System of International Technology Transfer*, Tianjin People's Publishing House, 2000, p244.

Note 31.We can find the topics or issues on technology transfer in the respective Report of COP1-COP14 and the documents of COP15, at http://unfccc.int/meetings/archive.

Note 32. See C*arbon Dioxide Offset Investment in the Asia-Pacific Forestry Sector: Opportunities and*

Constraints ,RAP PUBLICATION: 1998/9,RWEDP Field Document No. 53, pp.1-2.

Note 33. See *Special Report from IPCC the Third Group: Compendium on the Methods of Technology Transfer and Technological Issues*, at http://www.ipcc.cma.gov.cn/Website/index.php?ChannelID=15&NewsID=15.

Note 34. See *Compendium of International Arrangements on Transfer of Technology: Selected Instrument--Relevant Provisions in Selected International Arrangements Pertaining to Transfer of Technology,* UNCTAD/ITE/Misc.5, United Nations 2001 , pp9-43.

Note 35. Articles 2, 3 and annex B of *Kyoto Protocol* at http://unfccc.de/resource/.

Note 36. See Article II, Paragraph 1(a)(iv), Article III, Paragraph 14 and Article X(c) of *Kyoto Protocol* at http://unfccc.int/resource/

Note 37. See Articles 6, 12 & 17 of Kyoto *Protocol* at http://unfccc.de/resource/.

Note 38. Agenda 21 (1992) was promulgated in the Earth Summit in Rio Janeiro (also known as the United Nations Conference on Environment and Development) held from June 3 to June 14,1992. For the specific contents on technology transfer, see paragraphs 15.7(d),16.6,16.7,16.10,16.11,16.19,16.20, 21.23, and paragraphs 34.1-38 of Agenda 21, at http://www.unep.org/Documents/Default.asp?DocumentID=52.

Note 39. Such as Rio Declaration on Environment and Development

Note 40. Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) was negotiated at the end of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) in 1994. Because ratification of TRIPS Agreement is a compulsory requirement of WTO membership, any country seeking to obtain easy access to the numerous international markets opened by the WTO must enact the strict intellectual property laws mandated by TRIPS Agreement. For this reason, TRIPS Agreement is the most important multilateral instrument for the globalization of intellectual property laws. Furthermore, unlike other agreements on intellectual property, TRIPS Agreement has a powerful enforcement mechanism. States can be disciplined through the WTO's dispute settlement mechanism. TRIPS Agreement requires member states to provide strong protection for intellectual property rights. Many of the TRIPS provisions on copyright were imported from the Berne Convention for the Protection of Literary and Artistic Works and many of its trademark and patent provisions were imported from the Paris Convention for the Protection of Industrial Property.

Note 41. Before the Uruguay Negotiation, most states recognized that two fundamental perceived flaws of Paris Convention and Berne Convention were (a) the absence of detailed rules on the enforcement of rights before national judicial administrative authorities and (b) the absence of a binding and effective dispute mechanism (for disputes between states). (See Daniel Gervais, *The TRIPS Agreement: Drafting History and Analysis*, Sweet & Maxwell Limited, 1998, pp.9-10). Accordingly, it is inevitable to shape an agreement for making up for such flaws of the Conventions, which is one important reason for negotiating TRIPS Agreement in the Uruguay Round. For the assumed TT Agreement, if it could share the dispute settlement mechanism of WTO, the members' obligations would be performed soundly.

Note 42. See Articles 7,8,31,40,66.2 & 67 of *TRIPS Agreement.*

Note 43. It stipulates that "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."

Note 44. See *Annex II of Note On the Meeting of 11 June, 2002, Working* Group on Trade and Transfer of Technology, WT/WGTTT/M/2,20 August,2002.

Note 45. Doha Declaration was made by the WTO Ministerial Conference of 2001 in Doha in November; 2001.Its topics involved negotiations opening agricultural and manufacturing markets, as well as trade-in-services (GATS) negotiations and expanded intellectual property regulation. The intent of the Declaration, according to its proponents, was to make trade rules fairer for developing countries.

Note 46. *Working Group on Trade and Transfer of Technology* at http://www.wto.org/english/tratop_e/devel_e/dev_wkgp_trade_transfer_technology_e.htm.

Note 47. See *Doha Ministerial Declaration*, WT/MIN(01)/DEC/1.

Note 48. The Group was established according to the Decision 4/CP.7 which was made at the 7th Session of UNFCCC. See *Report of the Conference of the Parties on Its 7th Session Held at Marrakesh from 29 October to 10 November 2001*, FCCC/CP/2001/13/Add.1.

Note 49. The representative of UNCTAD said that the study showed that home country measures were often provided as part of international cooperation programmes and as strategic trade and investment initiatives. The most common measures included support for training, foreign investment, matching services, venture capital support, financing of technology transfer and encouraging partnerships with local firms. Some of the home country measures identified in the study provided examples of best practices in facilitating technology transfer. See *Note on the Meeting of 10 November 2004*, WT/WGTTT/M/10,17 February, 2005.

Note 50. The actual situation of China is that it is the country with the largest volume of GHG emissions in the world and the volume of emission per capita is respectively about 8 times and 20 times that of the United States and Japan.

Note 51. For instance, in aspect of utilizing CDM, China has established CDM Auditing Council constituted by related governmental departments and issued *Provisional Ordinance on CDM Programme Management in China* in June, 2004. At the time when the Protocol entered into force, the vice director of State Commission on Development and Reformation, Mr. Liu Jiang pointed that: "China has already adopted seven measures to cope with the climate change". For details, please see *China has already adopted seven measures to cope with the climate change*, at http://www.lznews.cn/show.aspx?id=75185&cid=18.

Note 52. The provisions concerning technology transfer are scattered in different laws and regulations, such as Patent Law of the People's Republic of China, Foreign Trade Law of the People's Republic of China, Law of the People's Republic of China on Promoting the Commercialization (Transformation) of Scientific and Technological Achievements, Regulations on Technology Import and Export Administration of the People's Republic of China, etc.

Note 53. Besides the civil and administrative measures for protecting Intellectual Property adopted in Paten Law, Copyright Law, Trademark Law and Law of the People's Republic of China for Countering Unfair Competition, Criminal Law of the People's Republic of China, its amendments and the judicial interpretation concerning criminal liabilities made by the Supreme Court also provide many stipulations to lay serious criminal liabilities on intellectual property infringers.

Note 54. That means the cost for protecting the environment by adopting the precautious measures and facilities to deal with polluted airs, waters and industrial dusts is much higher than the fines punished by the government. Some lawbreakers of the environmental protection laws or regulations may escape from punishment due to different reasons, such as regional protectionism, weak implementation force and so on.