

# Perspectives on Addressing Global Climate Change Issues: Case of U.S. and China<sup>1</sup>

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Rising carbon dioxide levels and the implications for global climate change are increasingly prominent issues confronting scientists and policy makers. Rapid increases in Green House Gases (GHG) in the last 20 years, primarily from burning fossil fuels, accompanied by a trend of rising global temperatures are creating an increased worldwide awareness and an urgency to take steps toward reducing emissions.

As reported by EIA, strong long-term economic growth in developing nations, world energy consumption is expected to rise by 44%, with a corresponding 39% jump in energy-related carbon dioxide (CO<sub>2</sub>) emissions by 2030, according to projections by the U.S. Energy Information Administration (EIA). [IEO2009 report](#), [EIA web site](#).

Because GHG emissions are a global issue, a multi-lateral approach will be required to seriously address the problem. The 1997 Kyoto Protocol represented a multi-national approach to reducing GHG, although the effort languished due to non participation by the US. A new UN Global Warming Summit scheduled for Copenhagen in December 2009 will attempt to broaden consensus for GHG emission reductions by engaging rapidly developing countries like China and India in CO<sub>2</sub> reducing strategies.

In order for GHG reduction policies to be effective, they need to be based on more than political goals or recommendations. Effective policies need to consider appropriate economic incentives and not be developed in isolation.

The purpose of this paper is to identify and compare the approaches to limiting and reducing GHG currently in place in China and US and discuss how GHG emission reduction might be impacted by the policies of the respective countries. After reviewing scientific data on GHG emissions and global climate change, we review current policies and strategies being pursued by US and China in the effort to reduce GHG emissions. We assess the potential effectiveness of these efforts.

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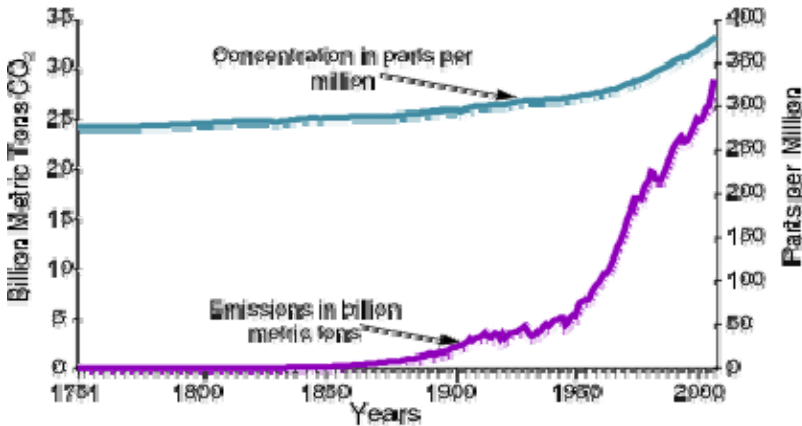
## GHG emission trends and climate change

Although the earth has been going through periods of global warming and cooling for hundreds of thousands of years, temperature data over the last 160 years indicate that annual average temperature varied greatly year to year. A 5-year moving average shows several periods of relatively stable temperatures, but steady temperature increases since 1980.

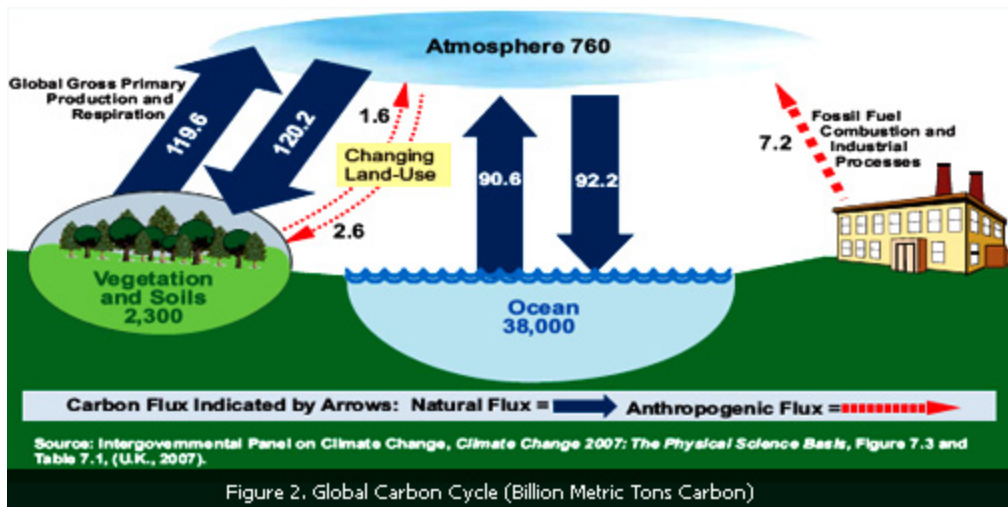
Historic data also allow scientists to track historic concentration of two greenhouse gases, in the atmosphere—carbon dioxide and methane. Concentration levels of these two gases track vary closely with the changes in temperatures.

Levels of several important greenhouse gases have increased by about 25 percent since large-scale industrialization began around 150 years ago (Figure 1). During the past 20 years, about three-quarters of anthropogenic (human-caused) emissions came from the burning of fossil fuels. Concentrations of carbon dioxide in the atmosphere are naturally regulated by numerous processes collectively known as the “carbon cycle” (Figure 2)

Figure 1. Greenhouse gas emission rates and atmospheric concentration levels



Source: Oak Ridge National Laboratory, Carbon Dioxide Information Analysis Center.



In computer-based models, rising concentrations of greenhouse gases produce an increase in the average surface temperature of the Earth over time. Rising temperatures may, in turn, produce climate changes such as changed precipitation patterns, storm severity, and sea level.

Assessments by the Intergovernmental Panel on Climate Change (IPCC) suggest that the Earth's climate has warmed between 0.6 and 0.9 degrees Celsius over the past century and that human activity affecting the atmosphere is "very likely" an important driving factor. The IPCC's Fourth Assessment Report (Summary for Policymakers) states, "Most of the observed increase in globally averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic (human-caused) greenhouse gas concentrations." It goes on to state, "The observed widespread warming of the atmosphere and ocean, together with ice mass loss, support the conclusion that it is extremely unlikely that global climate change of the past 50 years can be explained without external forcing, and very likely that it is not due to known natural causes alone.

## US Policies toward GHG emission reductions

This link between rising CO<sub>2</sub> levels and global temperature increases is motivating efforts to limit further growth of GHG emissions. The Obama administration has set goals to address global GHG emissions. The domestic goals are being pursued in conjunction with preparations for the United Nations Framework Convention on Climate Change (UNFCCC) to be held in Copenhagen Denmark in December 2009.

The climate bill currently working its way through the US Congress is sponsored by Reps. Henry A. Waxman (D. California) and Edward J. Markey, (D. Massachusetts). This Waxman-Markey bill, (aka the American Clean Energy and Security Act), aims to significantly reduce greenhouse gas emissions. At its core is a greenhouse gas cap-and-trade program that gives away about 85 percent of the carbon permits to utilities, heavy industry, refiners, among others, and includes provisions to shield consumers from rising

energy prices.

Among the key provisions in the bill:

- Require electric utilities to meet 20% of their electricity demand through renewable energy sources and energy efficiency by 2020.
- Invest in new clean energy technologies and energy efficiency, including energy efficiency and renewable energy (\$90 billion in new investments by 2025), carbon capture and sequestration (\$60 billion), electric and other advanced technology vehicles (\$20 billion), and basic scientific research and development (\$20 billion).
- Mandate new energy-saving standards for buildings and appliances, and promote energy efficiency in industry.
- Reduce carbon emissions from major U.S. sources by 17% by 2020 and over 80% by 2050 compared to 2005 levels. Complementary measures in the legislation, such as investments in preventing tropical deforestation, will achieve significant additional reductions in carbon emissions.
- Protect consumers from energy price increases. The Congressional Budget Office (CBO) calculates that the legislation will cost the average household less than 50 cents per day. The U.S. Environmental Protection Agency estimates the bill in its current form would cost American households between \$80 and \$111 per year, which equals 22 cents to 30 cents per day. A separate analysis from the Congressional Budget Office projected an annual cost of \$175 for U.S. households by 2020

While many economists argue that a carbon tax mechanism would be more efficient in achieving a targeted reduction in CO<sub>2</sub> emission levels, the main policy instrument being used to impose a limit on GHG emissions in Waxman-Markey is a cap and trade system. A cap and trade system essentially sets a limit on emissions (cap) and then allots permits in accordance with desired levels of emission reductions. Firms can emit as long as they have a permit for each ton of emission. Firms who are more efficient at reducing emissions can do so and then sell their additional permits to firms who are less efficient, as long as total emissions are capped. Firms that find it too expensive to reduce emissions can buy permits and continue to emit. A cap and trade system was used to successfully address Sulfur Dioxide (SO<sub>2</sub>) emission under the Clean Air Act of 1997. While SO<sub>2</sub> was a more inter-regional issue dealt with in a national market, CO<sub>2</sub> presents a global challenge.

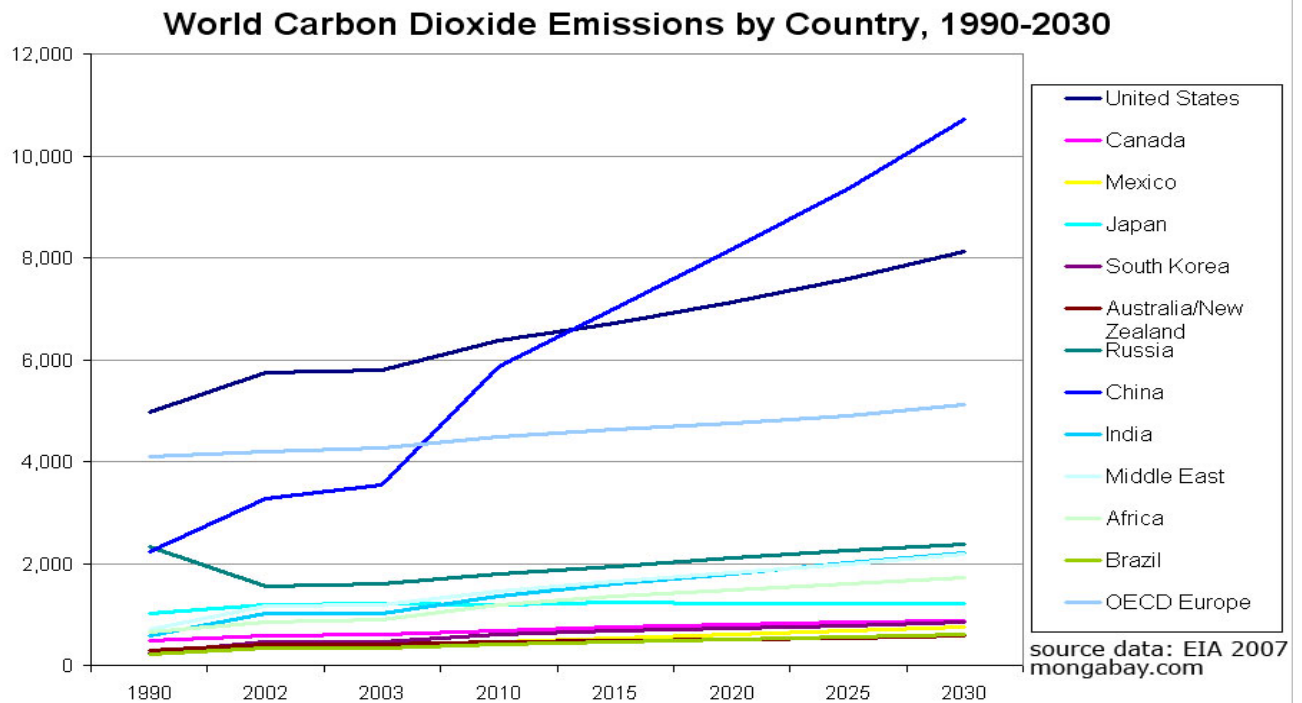
While the language of the bill calls for a modest emissions reduction by 2020 of 17 % of the level in 2005, several analyses have suggested that actual reductions under Waxman-Markey will be fairly minimal because many of the emission allowances would be allocated for free during the transition phase and major emitter, such as coal burning utilities would be allowed to purchase offsets.

On a more global scale, these projected reductions in US emissions appear even more modest because GHG emissions are a worldwide problem. Other rapidly developing countries such as China and India are fueling their economic growth with carbon-based fossil energy sources. As a result global GHG emissions are also increasing rapidly.

Figure 3 illustrates recent trends and projected GHG emissions in total and for blocs of countries. GHG emissions by China are projected to exceed those of the US by 2012. Other reports suggest that China is already exceeding the levels of the US.

This trend implies that effective GHG reductions will require multi-lateral participation. To accomplish global GHG emission reductions, it is important to understand the incentives and policies in place and how they might affect that goal. The participation of the United States and China — the two largest emitters of greenhouse gases, collectively responsible for some 40 percent of the world’s emissions, will be critical to the effectiveness of the effort.

Figure 3.



Currently, in the lead up to Copenhagen, these two countries appear to have widely divergent views. The United States has indicated a willingness to take a declining cap on its emissions but also wants China to do the same. China thinks the U.S. cap is too small

and too slow to effectively reduce emissions and opposes a cap for itself. China also wants developed countries to help fund its low-carbon technological transformation

From the US perspective, the Copenhagen global climate deal may be as much about financing as it is about targets. Financing can provide a critical incentive developing countries need to participate in the agreement because from their perspective, they did not cause the climate problem and restrictions on carbon emissions will impede their development progress. However, as time goes on and their emissions continue to grow, they also know that international pressure will increase for them to curb emissions.

As issues of economic self-interests while limiting GHG emissions begin entering the discussion, several policy options also enter the debate. Policy tools being discussed include: carbon tariffs, international offsets, and financing technology transfers to developing countries to promote green and efficient development.

## **Carbon Tariffs**

If countries like China choose not to participate in an emission cap, the economic playing field can be leveled by imposing a carbon tariff on their imports. The amount of the tariff would be related to the greenhouse gas emissions embedded in the imports and the price of carbon allowances (in the case of cap and trade) or the cost of carbon emissions (in the case of a carbon tax).

This approach would have some effect, given the size of the combined economies of the United States and the European Union. The adoption of a carbon tariff by all these countries could have the effect of forcing hypothetically cap-less countries to adopt a virtual cap or abandon their international trade aspirations.

However, a carbon tariff involves potential complications. For one, there are issues relating to trade agreements. It is not clear that carbon tariffs would even be legal under the World Trade Organization (WTO), and if not, changes to the WTO would have to be made. Any retaliatory response would raise the possibility of a trade war.

There is also the problem of “secondary imports” wherein products from a cap-less country may contain materials originating from the United States. For a tariff to be imposed appropriately, the composition of imported products and their provenance would have to be established. The administrative or transactions costs to deal with these details could be significant. The Obama administration has indicated that trade sanctions are not intended.

## **International Offsets**

A provision in the American Clean Energy and Security Act (H.R. 2454 or "ACES"), allows firms in the U.S. to finance emissions reductions overseas in lieu of reducing their own global warming pollution and may allow American emissions to continue to rise for up to twenty years. The provision allows power plants, oil refiners, and other emitters regulated under the bill's cap and trade program to use up to one billion tons of

international emissions reductions, or "offsets," to be used instead of reducing their own emissions each year. The bill also allows up to one billion tons of additional offsets each year, sourced from sectors of the U.S. economy that do not fall under the pollution cap, such as forestry and agriculture. If a suitable supply of domestic emissions offsets is unavailable, the limit on the use of international offsets may be raised to 1.5 billion tons annually at the discretion of the Administrator of the U.S. Environmental Protection Agency (EPA).

The extensive use of these international and domestic offsets would effectively allow U.S. firms in capped sectors to continue emitting carbon at levels well above the reductions supposedly driven by the emissions cap. Analysis from the Breakthrough Institute reveals that if fully utilized, the offset provisions in the ACES bill would allow continued business as usual growth in U.S. greenhouse gas emissions until 2030. Emissions in sectors of the economy supposedly "capped" by ACES could continue to grow at BAU rates until as late as 2037.

Developing countries may be looking to these revenues as a source for financing new technologies. A funding source could be set aside to aid the energy sector of these developing countries.

Another concern from the US perspective is certifying and regulating Clean Development Mechanism (CDMs) in other countries as part of offsets. The U.S. Government Accountability Office (GAO) has also analyzed the CDM and raises several concerns about them:

1. The CDM may be less cost-effective than a program of direct investments in emissions reduction.
2. Ineffective offsets may undermine the integrity of the U.S. cap and trade system by giving polluters an "easy out."
3. Although proposed reforms may improve the CDM, it will remain hobbled by its requirement that offsets be measured against counterfactual, business-as-usual scenarios that can never be verified.

## **Financing Clean Technology Transformation.**

The Waxman-Markey bill would allocate \$5 billion a year by 2020 for direct climate change assistance from the U.S. government to developing nations (\$740 million for technology, \$3.7 billion for tropical forest conservation, and \$740 million for adaptation). This financing serves dual purposes by helping to create U.S. clean energy export jobs and supporting the supplemental reductions discussed above. The bill would also mobilize an estimated additional \$3.5 to \$15 billion a year by 2020 from private companies for emissions mitigation in developing nations—depending on the actual cost and supply of international emission reductions compared to domestic action—reducing U.S. domestic costs of complying with new climate regulations. Combined, international

investments in climate change under Waxman-Markey would range from \$8.5 to \$20 billion a year in 2020. This is less than is probably required—especially in the areas of adaptation and technology transfer—but certainly a significant start. Removing these incentives would substantially weaken the U.S. negotiating position in Italy and Copenhagen.

## **China is crucial for next international agreement on greenhouse gas reduction**

One of the facts cited by former president George W. Bush when he rejected the Kyoto Protocol was that developing countries like China were not required to reduce GHG emissions. Now when nations are trying to formulate a successor for Kyoto Protocol, the world is watching what commitments, if any, the U.S. is going to make, which in turn will depend on the commitment by China and major developing economies. The Bill that passed by the U.S. House of Representatives in June 2009 explicitly contains trade penalties on countries that do not limit GHG emissions.

## **China's position on international climate change agreements**

A principle stressed by the Chinese government is that climate change needs to be addressed in the framework of sustainable development. This implies that any mitigation measures China is willing to adopt will not be at the expense of development, even though China will try to improve energy efficiency, conserve energy, and plant more trees and grasses to sequester carbon. China also emphasizes the principle of “common but differentiated responsibilities”. Basically, this means that developed countries should shoulder more of the burdens of reducing greenhouse gas emissions by directly cutting their emissions, or providing financial or technology support to developing countries to do so. China views poverty eradication and sustainable development the highest priority for developing countries.

In a news release about its position on the Copenhagen climate change conference, China reiterated this principle. It asked developed countries to reduce their GHG emissions in aggregate by at least 40% below their 1990 levels by 2020. At the same time, it clearly stated that developing countries will take nationally appropriate mitigation actions (NAMAs) in the context of sustainable development. According to the news release, NAMAs by developing countries are initiated by themselves, distinct from international legally-binding commitments of developed countries, even though NAMAs are concrete mitigation policies, actions and projects. So far, China has dismissed U.S. and Australian proposals to reduce GHGs as too little while rejecting calls for cuts in developing countries as unrealistic.<sup>3</sup>

China says "carbon tariffs" proposals breach WTO rules, *“Proposals to impose "carbon tariffs" on imported products will violate the rules of the World Trade Organization as*

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<sup>3</sup> In the bill passed in the U.S. House, the emission reduction target by 2020 is 17 percent below 2005 levels.

*well as the spirit of the Kyoto Protocol, China's Ministry of Commerce said. In a statement posted on its website, the ministry said collecting carbon duties from foreign products would enable developed countries to "protect trade in the name of protecting the environment." "This will not help strengthen confidence that the international community can cooperate to handle the (economic) crisis, it also will not help any country's endeavors during the climate change negotiations, and China is strongly opposed to it," the statement said. The statement comes amid a series of complex debates and negotiations about the impact a new global pact to reduce CO2 emissions will have on the international balance of trade. Concerned their efforts to curb greenhouse gases would put their industries at a competitive disadvantage, the United States, Canada and the European Commission have all put forward proposals to "level the playing field" by raising duties on imports from countries that are not making the same effort. The U.S. Clean Energy and Security Act, passed by the lower house of Congress on Friday last week, includes provisions allowing the government to take action against trading partners that fail to meet U.S. greenhouse gas standards and thereby gain a competitive advantage -- but not before 2025. "I think generally they're using this as a means to pressure developing countries to take stronger action on emissions," said Zhang Haibin, a professor of environmental politics at Peking University and an adviser to the Ministry of Commerce on trade and climate change policies. "But if the United States takes unilateral action without proper multilateral consultations and agreement that could spark big trade disputes, a trade war even," he said.*

## **How can China reduce GHG emissions?**

China has set some general broad goals of GHG emissions reduction or carbon sequestration. While many broad strategies have been stipulated, few concrete measures have been given. For example, China has said that it will encourage the restructuring of industry towards low-carbon emissions or the switch from dirty to clean energy. However, exactly how such restructuring or shift will take places is not clear. There are few places where specific policy measures are mentioned. The Communication requires that taxes be examined as a means to encourage energy-saving and environmental friendly vehicles. However, the language is carefully chosen such that it does not say China will impose such taxes. Also, the Communication explicitly requires that a portion of revenue from CDM projects will be put into a special fund for technology development. The Chinese government charges very different tax rates for different types of CDM projects: 65% for HFC and PFC projects; 30% for N2O projects; 2% for forestation projects and projects in priority areas which are defined as energy efficiency improvement, development and utilization of new and renewable energy, and methane recovery and utilization.

The vast majority, about three-fourths, of China's emissions come from the production and consumption of coal. In addition to GHG emissions, coal is the major source of air pollution and acid rain. Thus, China is willing to cooperate in reducing coal use, which will directly benefit China in terms of reduced acid rain and improved public health. However, coal will continue to be a major source of energy in the foreseeable future because there is simply no other economical alternative to fuel its desire (or need) for fast

economy growth. Thus, major GHG mitigation projects will likely involve the switching away from coal or cleaner technology to burn coal. Under the National Climate Change Program issued in 2007, China pledged to reduce GHG emissions through restructure its economy, promoting clean technologies and improving energy efficiency.

## **Institutional infrastructure**

The prices of carbon reduction credits from Chinese companies have in general been lower than the going prices in the international market. This may be partly due to the uncertainties associated with CDM projects. From China's perspective, to improve prices, it needs to invest in tracking technologies and institutional setup that will help gain trust of reductions made in China. Pollution source monitoring and emission information management is not unique to carbon trading. There are currently emissions trading projects in SO<sub>2</sub> and water pollutants at various levels. All of these trading systems will share some common issues with carbon trading like the monitoring and measuring of pollution emissions.

China started actively exploring the use of emissions trading for pollution control in the late 1990s through collaborative efforts with U.S. government agencies and non-profit organizations. For example, in 1997, an emission trading research project was launched jointly by a research institute in Beijing and U.S. Environment Defense Fund to conduct case studies in city-level emissions trading. However, China still does not have technical guidance on emissions trading at the national level, even though there have been some successful programs at the local level (Wang et al. 2009). As emission trading systems are improved across different pollutants and at different levels, the institutional infrastructure for carbon trading will also be improved.

As far as China is concerned, there seems to be a fundamental difference between carbon trading and other pollution trading. While the government will impose a total pollution cap on other pollutants, China so far has insisted that a mandatory emission cap should not be applied to developing countries (including itself). What is more, the U.S., a key player in negotiations for a successor to Kyoto Protocol, has indicated that it would not demand China to commit to binding cuts in its greenhouse gas emissions (Guardian, 2009 June). Thus, the design of carbon trading systems and the related institutional structure could be very different from a standard trading system. For example, from the very beginning, the organizers' of China-Beijing Environment Exchange (CBEE) have envisioned the market differently from other exchanges, say the Chicago Climate Exchange (CCX). While both exchanges are intended to facilitate market transactions, the CCX acts more like a usual exchange with buyers and sellers from any background. On the other hand, the Peking market will mainly target CDM projects: register domestic CDM suppliers, make sure they comply with the regulations of the Chinese government and prioritize them based on government set preferences, and be a contact point for foreign companies in search of CDM project. In June 2009, CBEE and Bluenext, a French emissions exchange, reached an agreement that should put information about available Chinese certified emissions reductions (CERs) -- greenhouse gas offsets issued

under the Kyoto Protocol -- on traders' screens by the end of the summer of 2010. The CCX has also signed a deal to set up a Chinese emissions exchange.

### **China's current role in the international carbon trading**

Given that China does not have any obligation to make GHG cuts, carbon trading activities in China are all in the context of international market. Currently, China participates in international carbon trading mainly for CDM projects. In fact, China is a major supplier of carbon reduction credits, accounting for more than half of total credits related to CDM projects. China sees CDM markets mainly as an economic opportunity whereby it can sell carbon reduction credits and gain advanced technology. Thus, the Chinese government has set up a series of formal laws and regulations regarding CDM projects, streamlining the development of such projects.

Many of China's CDM projects are in hydro and wind power. In particular, almost half of its estimated multi-billion CDM related revenues in the pipelines is in hydropower projects. Some of the CDM projects, including hydropower projects, have been criticized as easy and low-cost projects that would have been developed even in the absence of CDM. This violates a fundamental tenet of "additionality", according to which certified emission reduction credits are only given to project that would not have been undertaken otherwise. China defends its relatively large share of international CDM projects, saying that the larger share results from the government's effort to support CDM. In any case, the European Union (EU) is pushing to redesign CDM so that there will be projects that are more costly and have more technology content.

### **China's role in future climate change agreement and the importance of technology**

Given that China insists on no mandated reduction on its greenhouse emissions, China's role in an international carbon market will be different from countries who have committed to reduce GHG emissions. CDM, with some possible restructuring, will likely be the most important form that China participates in the international carbon market. Currently, China accounts for more than half of the international CDM markets, either in terms of number of projects registered or in terms the number of carbon emission reduction credits. Brazil, Mexico, India, and China together are the hosts of about three quarters of total registered CDM projects. This has given rise to concerns about the regional distribution of CDM projects: the least developed countries did not get the financial and technology support that they need the most.

China puts technology transfer among the principles for international climate agreement. In particular, it states that "The fulfillment of commitments by developed countries to provide financing, technology transfer and capacity building support to developing countries is a condition *sine qua non* for developing countries to effectively mitigate and adapt to climate change." China is not the only country making such a demand, India, another major GHG emitter, has also made similar demands. On the other hand, U.S. law makers consider the demand for technology transfer as essentially "stealing" of their

intellectual property right. The U.S. House of Representatives unanimously passed a bill to make it US policy to prevent the international treaties from “weakening” U.S. intellectual property rights on clean-energy related technologies. Thus, technology could turn out to be a major stumbling roadblock in international efforts to reach an agreement to cut GHG emissions.

The CDM, either in its present form or in a re-designed form, appears to have the potential of easing such tension. According to a recent report, prepared for the United Nations Framework Convention on Climate Change (UNFCCC), roughly 36 percent of the over 3000 registered or proposed projects claimed to involve technology transfer. These projects accounted for 59 percent of the annual emission reductions of all CDM projects. The report indicates that technology transfer is very heterogeneous across project types and usually has both knowledge and equipment content. In particular, projects Brazil, China, and India have significantly lower rate of technology transfer than projects in smaller economies like Bolivia, Ecuador, and Guatemala.

To address the issues of international geographical distribution and technology diffusion, alternatives have been proposed. One is technology CDM which would have common baselines be established for the same technology to be used in the same industry. The other is sectoral CDM which has been included in the position of the EU. This approach would set up baselines sector by sector. A country would be rewarded based on the reduction from the baseline. The advantages and disadvantages of these proposed changes are being intensely examined and discussed. China has also its own policies to encourage technology transfer and renewable energy as reflected by the differentiated tax rates for different CDM projects mentioned earlier.

The Waxman-Markey proposal left room for projects like CDMs. In particular, it stipulates that 2 billion tons carbon emission reductions are set aside for offsets. Carbon offsets are voluntary greenhouse gas emission reductions or sequestered carbon by uncapped or unregulated entities. Capped entities can then purchase offsets to satisfy their compliance requirements if it is more cost-effective than to make the carbon emissions themselves. Of the total set-aside offsets, half will be used for domestic offsets and half will be used for international offsets projects which include CDM projects. The international part can increase up to 1.5 billion if the supply of domestic offsets is insufficient. According to EPA analysis, the 1 billion metric ton volume limits will not restrict the supply of domestic offsets, but 1 billion ton limit for international offsets is likely to be much smaller than the potential supply. Thus, a bill like this come into effect in the United States, we can still expect that China to play a significant role in international carbon markets in post-carbon era.

The Waxman-Markey proposal also encourages technology transfers. *“Clean technology transfer: Establishes a framework for an international tech transfer fund with no explicit levels or sources of funding in the draft. Developing countries that have ratified international climate treaty and have undertaken nationally appropriate mitigation activities (in ways that are consistent with Measurement Reporting and Verification guidelines in the UNFCCC) are eligible to receive support. Secretary of State will*

*disburse funding either directly, through World Bank agreements or through UNFCCC funds. (Sec. 451, pg. 569)”*

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