NOTA DI LAVORO

49.2011

Breaking the Impasse in International Climate Negotiations: A New Direction for Currently Flawed Negotiations and a Roadmap for China to 2050

By **ZhongXiang Zhang,** Research Program, East-West Center

Climate Change and Sustainable Development Series
Editor: Carlo Carraro

Breaking the Impasse in International Climate Negotiations: A New Direction for Currently Flawed Negotiations and a Roadmap for China to 2050

By ZhongXiang Zhang, Research Program, East-West Center

Summary

China's unilateral pledge to cut its carbon intensity by 40-45 percent by 2020 relative to its 2005 levels raises both the stringency issue, and given that China's pledge is in the form of carbon intensity, reliability issues concerning China's statistics on energy and GDP. Moreover, as long as China's commitments differ in form from those of other major greenhouse gas emitters, China is constantly confronted with both criticism on its carbon intensity commitment being less stringent and the threats of trade measures. In response to these concerns and to put China in a positive position, this paper will map out a realistic roadmap for China's specific climate commitments towards 2050, with its main distinguishing features including China taking on absolute emission caps around 2030 and the three transitional periods of increasing climate obligations before that. With current international climate negotiations flawed with a focus on commitments on the targeted date of 2020 that does not accommodate well the world's two largest greenhouse gas emitters, the paper suggests a new direction to break the current impasse in international climate negotiations.

Keywords: Carbon Intensity, Post-Copenhagen Climate Change Negotiations, Climate Commitments, China

JEL Classification: Q42, Q43, Q48, Q52, Q53, Q54, Q58

Address for correspondence:

ZhongXiang Zhang
Research Program
East-West Center
1601 East-West Road
Honolulu, HI 96848-1601
United States
Phone: +1 808 944 7265
Fax: +1 808 944 7298
E-mail: ZhangZ@EastWestCenter.org

Breaking the impasse in international climate negotiations: A new direction for currently flawed negotiations and a roadmap for China to 2050[1]

ZhongXiang Zhang, *Ph.D in Economics*
张中祥 美国东西方中心研究部资深研究员、经济学博士
Senior Fellow
Research Program
East-West Center
1601 East-West Road
Honolulu, HI 96848-1601
United States
Tel: +1-808-944 7265
Fax: +1-808-944 7298
Email: ZhangZ@EastWestCenter.org

Abstract
China's unilateral pledge to cut its carbon intensity by 40-45 percent by 2020 relative to its 2005 levels raises both the stringency issue, and given that China's pledge is in the form of carbon intensity, reliability issues concerning China's statistics on energy and GDP. Moreover, as long as China's commitments differ in form from that of other major greenhouse gas emitters, China is constantly confronted with both criticism on its carbon intensity commitment being less stringent and the threats of trade measures. In response to these concerns and to put China in a positive position, this paper will map out a realistic roadmap for China's specific climate commitments towards 2050, with its main distinguishing features including China taking on absolute emission caps around 2030 and the three transitional periods of increasing climate obligations before that. With current international climate negotiations flawed with a focus on commitments on the targeted date of 2020 that does not accommodate well the world's two largest greenhouse gas emitters, the paper suggests a new direction to break the current impasse in international climate negotiations.

Keywords: Carbon intensity; Post-Copenhagen climate change negotiations; Climate commitments; China

JEL classification: Q42; Q43; Q48; Q52; Q53; Q54; Q58

[1] Invited presentation at the International Conference on China's Role in Global and Regional Governance, 10-11 March 2011, Singapore.

1. Introduction

Concerned about a range of environmental problems and health risks from burning fossil fuels and steeply rising oil imports (Ho and Nielsen, 2007; World Bank, 2007; Zhang, 2010a,c), China had incorporated for the first time in its five-year economic plan an input indicator as a constraint – requiring that energy use per unit of GDP be cut by 20 percent during the 11th five-year period running from 2006 to 2010. This five-year plan also incorporated the goal of reducing SO_2 emissions and chemical oxygen demand discharge by 10 percent by 2010, relative to their 2005 levels. This is widely considered an important step towards building a "harmonious society" through "scientific development". Given that China is already the world's largest carbon emitter (IEA, 2007; MNP, 2007; EIA, 2009), and its emissions continue to rise rapidly in line with its industrialization and urbanization, China is seen to have greater capacity, capability and responsibility for taking on climate commitments. Combined with great pressure both inside and outside international climate negotiations to be more ambitious in limiting its greenhouse gas emissions, just prior to the Copenhagen Climate Change Summit in December 2009, China pledged to cut its carbon intensity by 40-45 percent by 2020 relative to its 2005 levels to help to reach an international climate change agreement at Copenhagen or beyond.

While this is consistent with China's longstanding opposition to hard emission caps on the ground that such limits will restrict its economic growth, this marks a point of departure from its longstanding position on its own climate actions. The unilateral commitments clearly indicate China's determination to further decouple its energy use and carbon emissions from economic growth. This is a welcome step towards helping to reach an international climate change agreement.

China's unilateral commitments raise the issue of whether such a pledge is ambitious or just represents business as usual. Moreover, as long as China's commitments differ in form from that of the U.S. and other major greenhouse gas emitters, China is constantly confronted with both criticism on its carbon intensity commitment being less stringent and the threats of trade measures whenever the U.S. Senate is shaping its climate bill, given that the inclusion of border measures is widely considered the "price" for passing any U.S. legislation capping its greenhouse gas emissions. Moreover, the U.S. Senate can always use China as an excuse for its own failure to pass a long-awaited bill to cap U.S. greenhouse gas emissions.

This paper will first examine these issues and concerns. On this basis, the paper will lay out a realistic roadmap for China to 2050, with its main distinguishing features including China taking on absolute emission caps around 2030 and the three transitional periods of increasing climate obligations before that. With current international climate negotiations flawed with a focus on commitments on the targeted date of 2020 that does not accommodate well the world's two largest greenhouse gas emitters, namely the U.S. and China, the paper concludes with a suggestion that international climate change negotiations need to focus on 2030 as the targeted date to cap the greenhouse gas emissions of the world's two largest emitters in a legally binding global agreement.

2. China's Carbon Intensity Pledge for 2020: Stringency and Implications

2.1 Stringency Issues

Zhang (2000a,b) envision that China could make a voluntary commitment to total greenhouse gas emissions per unit of GDP at some point around 2020.[2] However, it is not until just prior to the Copenhagen Climate Chang Summit that China pledged to cut its carbon intensity by 40-45 percent by 2020 relative to its 2005 levels. Wen Jiabao, China's Prime Minister, made it clear at Copenhagen that China's pledges "are unconditional and they are not dependent on the reduction targets of other nations" (Watts, 2009).

While some question China's willing action, real discussion has since focused on whether such a pledge is ambitious or just represents business as usual (e.g., Qiu, 2009; Carraro and Tavoni, 2010). While China considers it very ambitious, some Western scholars (e.g., Levi, 2009) view it just business as usual based largely on the long-term historical trend of China's energy intensity.

There are several ways to evaluate how challenging this proposed carbon intensity target is. One way is to see whether the proposed carbon intensity goal for 2020 is as challenging as the energy-saving goals set in the 11th five-year economic blueprint. This involves two issues. One is rational for using energy intensity reduction as a reference. Given the fixed CO_2 emissions coefficients of fossil fuels, which convert consumption of fossil fuels into CO_2 emissions, and given that China's energy mix is coal-dominated, cutting China's carbon intensity is in fact cutting its energy intensity, as clearly indicated in Figure 1. So we can use measurable and reported data on energy use in the recent years to infer the stringency of China's proposed carbon intensity target for 2020. Another issue requires the establishment of why the 20 percent energy-saving goal for 2010 is considered very challenging. China had met its aforementioned pollution-cutting goals ahead of the schedule. However, as discussed in Zhang (2010a,e and 2011), China had faced great difficulty meeting its energy-saving goal.

In July 2010, China released its energy intensity number for 2009, and its final energy intensity numbers for the years 2005, 2006, 2007 and 2008, which are revised based on the second nationwide economic census. Based on these revised numbers, China's energy intensity fell by 15.61 percent from 2006-2009 (NBS et al., 2010). The country would meet its energy-saving goal if it could cut its energy intensity by 4.39 percent in 2010. However, China's energy use rose faster than its economic growth in the first half of 2010, with seven provinces becoming even more energy intensive during this period. This suggests that the country as a whole needs to accomplish the goal set for the whole year only within a half year, with some provinces required to fill even big remaining gaps during this period. Given the annual energy-saving rate of 5.25 percent

[2] Zhang (2000b) is the expanded version of China country paper that I initially prepared for the United Nations Development Programme project on Promoting Development while Slowing Greenhouse Gas Emissions Growth. When the draft of that China country paper was released, the Washington DC-based Resources for the Future made a press release "Is China Taking Actions to Limit Its Greenhouse Gas Emissions?", 15 September 1998.

during the period 1980-2000 in which China achieved a quadrupling of its GDP while cutting its energy intensity by about three quarters (Zhang, 2003), achieving such high energy-saving rate within a half year poses a significant challenge for the country as well as for those provinces that lagged behind schedule.

To achieve the goal, it was widely reported that several provinces issued a strict rotation of rolling blackouts for thousands of factories that required them to shut down five days for every nine they operate in the second half of 2010 (Sina Net, 2010). Clearly, the local blackouts were not what the central government intended. While they were not consistent with the national policy and were not rational, it seemed that local governments had little choice but to take such irrational measures in such a very short period of time. Even if it had taken such unprecedented measures, China in the end failed to meet that energy-saving goal (People Net, 2011).

Moreover, as further discussed below, these reductions in China's energy intensity have already factored in the revisions of China's official GDP data from the second nationwide economic census, part of the government's continuing efforts to improve the quality of its statistics, whose accuracy has been questioned by both the general public inside of China and many analysts both inside and outside of China. Such revisions show that China's economy grew faster and shifted more towards services than the previously estimated, thus benefiting the energy intensity indicator. Even so, it was still not easy for China to achieve its own set energy-saving goal. If there were no upward revisions of GDP data, there would be an even big gap between the target and the actual performance.

All this clearly indicates that even having picked low-hanging fruit by closing 60.06 gigawatts (GW) of small, inefficient coal-fired power plants in the past four years, ahead of the national schedule to decommission 50 GW of smaller and older units in the five years through 2010, helped China to get to where it currently stands (Zhang, 2010a,c). However, those low-hanging fruit opportunities can only be captured once. The new carbon intensity target set for 2020 requires an additional 20-25 percent on top of the existing target. Achieving this will clearly be even more challenging and costly for China.

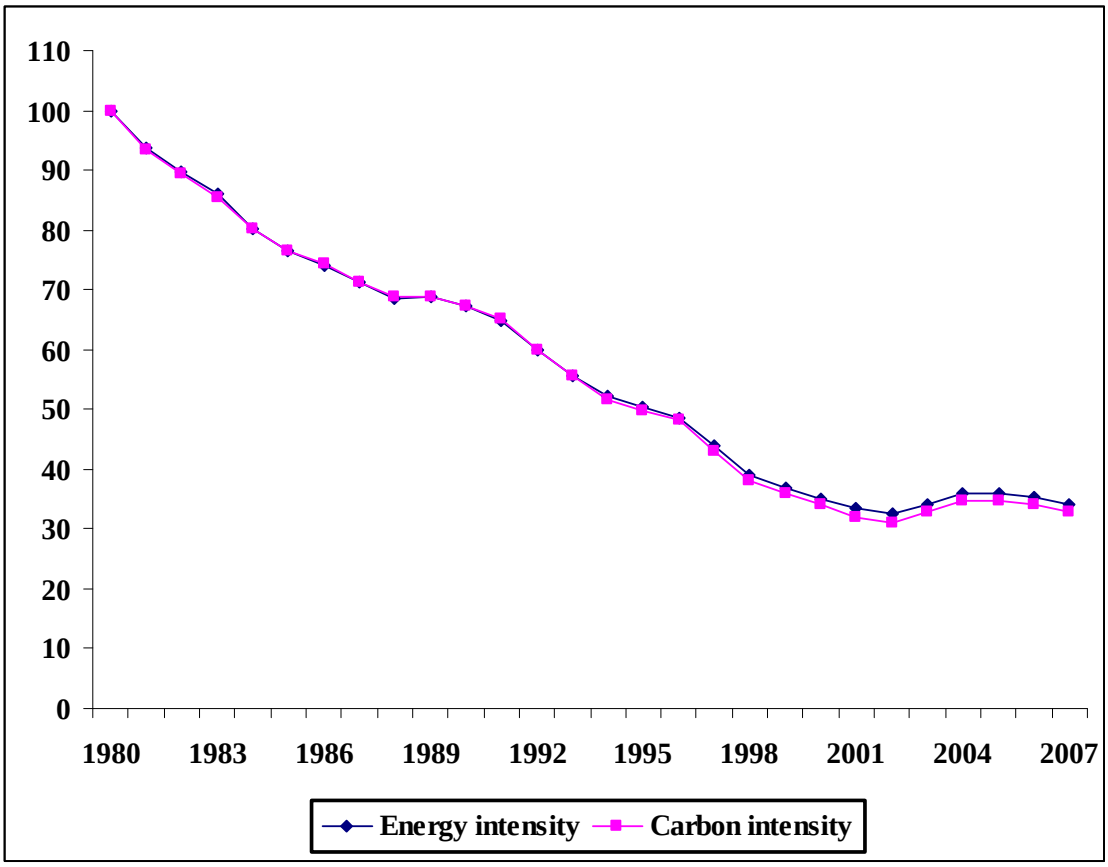

Figure 1 China's Energy Intensity Index and Carbon Intensity Index (1980=100), 1980-2007
Sources: Drawn based on *China Statistical Yearbook*, various years, and Zhang (1997).

Another way is to assess how substantially this carbon intensity target drives China's emissions below its projected baseline levels, and whether China does its part as required in order to fulfill a coordinated global commitment to stabilize the concentration of greenhouse gas emissions in the atmosphere at the desirable level. The World Energy Outlook (WEO) 2009 (IEA, 2009) has incorporated many policies into the baseline projection that were not incorporated in the WEO 2007 (IEA, 2007). This projection puts China's baseline carbon emissions at 9.6 gigatons of carbon dioxide ($GtCO_2$) in 2020. Under the ambitious 450 parts per million (ppm) of CO_2 equivalent scenario, China's CO_2 emissions are projected to be 8.4 $GtCO_2$ by 2020, 1.2 $GtCO_2$ less than that in the baseline (IEA, 2009). Now let us put China's proposed carbon intensity target into perspective. The calculations of the paper show that cutting the carbon intensity by 40-45% over the period 2006-2020 would bring reductions of 0.46-1.2 $GtCO_2$ in 2020, which are equivalent to a deviation of 4.8-12.7 percent below the WEO 2009 baseline set for China in 2020.

Two key points need to be made. First, even the lower end of that range does not represent business as usual, because it represents a deviation of 4.8 percent below the

WEO 2009 baseline levels. Second, if China would be able to meet its own proposed 45 percent carbon intensity cut, the country would cut emissions of 1.2 $GtCO_2$ in 2020 from its baseline levels as is required under the ambitious 450 ppm scenario. That is equivalent to 31.6 percent of what the world would need to do in 2020 under the 450 ppm scenario, a share higher than China's share of the world's total CO_2 emissions (28 percent in 2020). Clearly, the high end of China's target, if met, aligns with the specified obligation that China needs to fulfill under the 450 ppm scenario.

The previous two points clearly show that the proposed carbon intensity target does not just represent business as usual as some Western scholars have argued.

2.2 Implications of China's Carbon Intensity Pledge

At Copenhagen, China eventually compromised to agree to open its emissions data to international consultation and analysis. The EU has identified building a robust and transparent emissions and performance accounting framework as a key element of implementing the Copenhagen Accord (European Commission, 2010). How all this will be worked out remains to be seen. China has not agreed to opening its GDP figures to international consultation and analysis. But as long as China's commitments are in the form of carbon intensity, establishing a robust and transparent emissions and performance accounting framework is helpful, but not enough to remove international concern about the reliability of China's commitments. As discussed in Zhang (2010e and 2011), the revisions of China's GDP figures and energy consumption in recent years show that GDP figures are even more crucial to the impacts on the energy or carbon intensity than are energy consumption and emissions data. As shown in Table 1, such revisions lead to a differential between preliminary and final values as large as 123 percent for the energy intensity in 2006. The aforementioned revisions of China's GDP figures reflect part of the government's continuing efforts to improve the accuracy and reliability of China's statistics on economic activity. While they are certainly not being calculated to make the energy intensity indicator look good to the government's advantage, such revisions have huge implications for meeting China's energy-saving goal in 2010 and its proposed carbon intensity target in 2020.

Moreover, as long as China's commitments differ in form from that of the U.S. and other major greenhouse gas emitters, China is constantly confronted with both criticism on its carbon intensity commitment being less stringent and the threats of trade measures whenever the U.S. Senate is shaping its climate bill, given that the inclusion of border measures is widely considered the "price" for passing any U.S. legislation capping its greenhouse gas emissions (Zhang, 2009 and 2010b). The U.S. Senate can always use China as an excuse for its own failure to pass a long-awaited bill to cap U.S. greenhouse gas emissions. China is also expected to face increasing pressure from the European Union, who will find it increasingly hard to convince its citizens in general and companies in particular why the EU has taken the lead but do not see China following, because overall competitiveness concerns mean that no country is likely to step out too far in front.

Table 1 A reduction in China's energy intensity: preliminary value versus final value[a]

Year	Preliminary value (%)	Revised value (%)	Re-revised value (%)	Final value (%)	Differential between preliminary and final values (%)
2006	1.23 (March 2007)	1.33 (12 July 2007)	1.79 (14 July 2008)	2.74 (15 July 2010)	**122.8**
2007	3.27 (March 2008)	3.66 (14 July 2008)	4.04 (30 June 2009)	5.04 (15 July 2010)	**54.1**
2008	4.59 (30 June 2009)	5.20[b] (25 Dec. 2009)		5.20 (15 July 2010)	**13.3**
2009	3.98[c] (March 2010)	3.61[d] (15 July 2010)			

Notes: [a] The dates when the corresponding data were released are in parentheses.
[b] Based on China's revised 2008 GDP from the second nationwide economic census, released in December 2009, which raised the growth rate of GDP to 9.6 percent from the previously reported 9 percent for that year and the share of services in GDP.
[c] Own calculation based on the National Development and Reform Commission's reporting that China's energy intensity was cut by 14.38 percent in the first four years of the 11th five-year plan relative to its 2005 levels (Xinhua Net, 2010).
[d] Based on China's energy intensity number for 2009, and its final energy intensity numbers for the years 2005 and 2008 (NBS et al., 2010), my own calculation for this value would be 3.23 percent, instead of the official reported cut of 3.61 percent.
Sources: Zhang (2010e and 2011).

3. A Roadmap for China to 2050

Indeed, in what format and under what timeframe China would take on climate commitments is of significant relevance to China because it is facing great pressure both inside and outside international climate negotiations to exhibit greater ambition and is being confronted with the threats of trade measures. It is of significant global relevance as well because when China's emissions peak is crucial to determine when global emissions would peak and because what China is going to do in what format has significant implications for the level and ambition of commitments from other countries.

There is no question that China eventually needs to take on binding greenhouse gas emissions caps. The key challenges are to decide when that would take place and to determine the credible interim targets that would be needed during the transition period. These results will no doubt be a combination of China's own assessment of its responsibility, economic and political benefits, and climate change impacts, taking also into consideration the mounting diplomatic and international pressure and the give and take of international negotiations.

In the run up to and at the Copenhagen Climate Change Summit in December 2009, China took the initiative to ally with India and other major developing countries,

took full advantage of being the world's largest carbon emitter, and attempted to secure a deal to its advantage. It is widely reported that China walked away "happy". But that did not come without a high price tag. Whether to admit or not, China angered allies, abandoned principles that it stuck by during the two weeks of talks, and no doubt stoked anti-China sentiment in Western nations. The early appearance of this sentiment does not do China any good because it still has to evolve from a large country to a country that is truly strong in e.g., science, technology, innovation, economy, etc. Officially China was backed by allies like India and Brazil, but they admitted in private that this was mainly China's battle (Graham-Harrison, 2009).

No doubt, Copenhagen was disappointing to many, particularly given that U.S. President Obama pledge's "yes, we can" had raised high expectations for that meeting. However, the situation could be worse because the negotiations could have completely collapsed. While falling far short of the legally binding global agreement, the Copenhagen Accord reflects a political consensus on the main elements of the future framework among the major emitters and representatives of the main negotiating groups.

For the first time, China was blamed for dragging its feet on international climate negotiations, previously the accusations always targeted at the U.S.. French President Nicolas Sarkozy publicly criticized China, saying that China was impeding progress in climate talks (Watts, 2009). British Energy and Climate Change Secretary Ed Miliband (2009) wrote in *The Guardian* that "We did not get an agreement on 50 per cent reductions in global emissions by 2050 or on 80 per cent reductions by developed countries. Both were vetoed by China, despite the support of a coalition of developed and the vast majority of developing countries". A furious Angela Merkel, German Chancellor, demanded that "Why can't we even mention our own targets?". Kevin Rudd, Australian Prime Minister, was annoyed enough to bang his microphone. Brazil's representative also pointed out how illogical China's position was (Lynas, 2009). Being asked in the early hours of 19 December 2009 why a pledge that applied only to rich nations and to which all those nations seemed to agree could have vanished from the final document, the spokesperson for the Swedish government that was serving the EU Presidency at that time gave the flat reply after the seconds of what-can-I-say silence: "China didn't like numbers." (*The Economist*, 2010).

It is not so hard to understand why China rejected the aforementioned two numbers. The needing to cut both global greenhouse gas emissions by 50 percent and that of industrialized countries by 80 percent by 2050 means that emissions in developing countries are only allowed to increase by 15 percent by 2050 relative to their 1990 levels. Given their very low levels in 1990, China considers this unacceptable. There could be a misinterpretation here. Some may interpret that a 15 percent increase by 2050 would mean that the developing country's emissions are allowed to only increase by 15 percent in any specific year from now on to 2050. This is not correct. Emissions in developing countries can be much higher than the level allowed by a 15 percent increase prior to 2050 and then come down to that proposed allowable level by 2050. Indeed, under the 450 parts per million of CO_2 equivalent scenario, CO_2 emissions in China are projected to go from 2.2 $GtCO_2$ in 1990 and 6.1 $GtCO_2$ in 2007 to 8.4 $GtCO_2$ in 2020, while the corresponding figures for India are estimated to go from 0.6 $GtCO_2$ in 1990 and 1.3 $GtCO_2$ in 2007 to 1.9 $GtCO_2$ in 2020 (IEA, 2009). Relative to their levels in 1990 and 2007, CO_2 emissions in 2020 increase by 282 percent and 37 percent for China and by

117 percent and 46 percent for India, respectively. More importantly, rejecting a long-standing, widely reported proposal without putting forward alternatives cast China in a very bad light. It led to the impression that rich countries should not even announce their unilateral cut, which was at least reported by the Western media.[3]

In response to these concerns and to put China in a positive position, I propose that at current international climate negotiations China should negotiate a requirement that greenhouse gas emissions in industrialized countries be cut at least by 80 percent by 2050 relative to their 1990 levels and that per capita emissions for all major countries by 2050 should be no more than the world's average at that time. Moreover, it would be in China's own best interest if, at the right time (e.g., at a time when the U.S. Senate is going to debate and ratify any global deal that would emerge from current international climate negotiations), China signals well ahead that it will take on binding absolute emission caps around the year 2030.[4] While this date is later than the time frame that the U.S. and other industrialized countries would like to see, it would probably still be too soon from China's perspective.

However, it is hard to imagine how China could apply the brakes so sharply as to switch from rapid emissions growth to immediate emissions cuts, without passing through several intermediate phases. After all, China is still a developing country, no matter how rapidly it is expected to grow in the future. Taking the commitment period of five years that the Kyoto Protocol has adopted, I envision that China needs the following three transitional periods of increasing climate obligations, before taking on absolute emissions caps.

Further credible energy conservation commitments starting 2013

China has already committed itself to quantified targets on energy conservation and the use of clean energy. It needs to extend its level of ambition, further making credible quantified domestic commitments in these areas for the second commitment period and aiming for a 46-50 percent cut in its carbon intensity by 2020 (Zhang, 2010c,e).

Voluntary "no lose" emission targets starting 2018

During this transition period, China could commit to adopting voluntary emission reduction targets. Emissions reductions achieved beyond these "no lose" targets would then be eligible for sale through carbon trading at the same world market price as those of developed countries whose emissions are capped, relative to the lower prices that China currently receives for carbon credits generated from clean development mechanism projects, meaning that China would suffer no net economic loss by adhering to the targets.

Binding carbon intensity targets starting 2023, leading to emissions caps around 2030

[3] Some of China's stance and reactions at Copenhagen are generally well rooted because of realities at home. Some reactions could have been handled more effectively for a better image of China, provided that there were good preparations and deliberations. See Zhang (2010d) for further discussion on China's stance and reactions at Copenhagen.

[4] See Zhang (2010b,f and 2011) for detailed discussion on why around 2030 is considered the timing for China to take on absolute greenhouse gas emissions caps.

While it is expected to incorporate the carbon intensity target as a domestic commitment for the first time in its 12th five-year plan period starting 2011, China adopting binding carbon intensity targets in 2023 as its international commitment would be a significant step towards committing to absolute emissions caps during the subsequent commitment period. At that juncture, having been granted three transition periods, China could then be expected to take on binding emissions caps, starting around 2030 and to aim for the global convergence of per capita emissions by 2050.

Overall, this proposal is a balanced reflection of respecting China's rights to grow and recognizing China's growing responsibility for increasing greenhouse gas emissions as the standards of living increase over time. The commitments envisioned for China are basic principles. They leave ample flexibility for China to work out the details, as international climate change negotiations move onward. The value of this proposal lies in the format and timeframe under which China would be included in a post-2012 climate change regime, not in the numerical details. It should not be taken for granted that China can take on such increasingly stringent commitments, because that would entail significant efforts to cut China's projected emissions below its baselines. Political reality may limit the ability of the U.S. to take on significant emissions cuts by 2020 that developing countries called for, but as a tradeoff, the U.S. should significantly scale up its technology transfer and deployment, financing and capacity building to enable China to do that. This is at the least what the U.S. could and should do, and by example can encourage other developed counties to do the same. As Winston Churchill said, "[you] can always count on the Americans to do the right thing – after exhausting every other alternative." After what is viewed as eight years of lost time under U.S. President Bush, the whole world bets that U.S. will not disappoint us this time. Only history will tell us whether that will be the case.

In the meantime, commitments by China would send a signal well in advance that China is seriously committed to addressing climate change issues. They will also alleviate, if not completely remove, U.S. and other industrialized country's concerns about when China will join them, an indication that the world has long awaited from China, and help U.S. to take on long-expected emissions commitments, thus paving the way for reaching a post-2012 international climate change agreement.

4. A New Direction of Future International Climate Negotiations

However, current international climate negotiations have been focused on commitments on the targeted date of 2020. With the commitment period only up to 2020, there is very little room left for the U.S. and China, although for reasons very different from each other.

The Intergovernmental Panel on Climate Change (IPCC) calls for cutting global greenhouse gas emissions at least in half by 2050. To achieve that goal, the IPCC fourth assessment report recommends that global greenhouse gas emissions should peak by 2020 at the latest and then turn downward in order to avoid dangerous climate change consequences, calling for developed countries to cut their greenhouse gas emissions by 25-40 percent by 2020 relative to their 1990 levels (IPCC, 2007). This recommendation was incorporated into the Bali Roadmap at the United Nations Climate Summit in 2007. This seems a logical choice. Once the long-term goal (namely the target for 2050) is set,

one needs a mid-term goal to help facilitate the long-term one. From then, the negotiations on industrialized countries' commitments have been on what emissions reduction targets would be in 2020.

However, 2020 is just around the corner. More importantly, this date does not accommodate well the world's two largest greenhouse gas emitters, namely the U.S. and China. Because the U.S. withdrew from the Kyoto Protocol, it has not made any substantial preparations to cut emissions as other Kyoto-constrained industrialized countries have done over the past decade. Whether you like it or not, this is a political reality. It is very hard for an unprepared country like the U.S. to take on a substantial emissions cut in 2020 as developing countries have demanded, although it should on a moral ground.

In the meantime, China overtook the U.S. to become the world's largest greenhouse gas emitter in 2007, at least twenty years earlier than what was estimated by the U.S. EIA (2004) as late as 2004. The IEA (2009) estimates that about half of the growth of global energy-related CO_2 emissions until 2030 will come from China. Combined with huge trade deficit with China, the U.S. has pushed for China to take on emissions caps as early as 2020. Otherwise, the goods exported from China to U.S. markets might be subject to carbon tariffs (Zhang, 2010b and 2011). However, as argued in Zhang (2010b,f and 2011), the year 2020 is not a realistic date for China to take on the absolute emissions cap, because its carbon emissions would be still on the climbing trajectories beyond 2030, even if some energy saving policies and measures have been factored into such projections. Meanwhile, taking on commitments for 2050 seems too far away for politicians.

If the commitment period is extended to 2030, it would really open the possibility for the U.S. and China to make the commitments that each wants from the other in the same form, although the scale of reductions would differ from each other. By 2030, the U.S. will be able to commit to much deeper emission cuts that China and developing countries have demanded, while, as argued in Zhang (2010b,f and 2011), China would have approached the threshold to take on the absolute emission cap that the U.S. and other industrialized countries have long asked for.

Being aware of his proposed provisional target in 2020 well below what is internationally expected from the U.S., President Obama announced a provisional target of a 42 percent reduction below 2005 levels in 2030 to demonstrate the U.S. continuing commitments and leadership to find a global solution to the threat of climate change. While the U.S. proposed level of emission reductions for 2030 is still not ambitious enough, President Obama inadvertently points to the right direction of international climate negotiations. Namely, international climate negotiations need to look at the targeted date of 2030. If international negotiations could lead to much deeper emission cuts for developed countries as well as the absolute emission caps for major developing countries in 2030, that would significantly reduce the legitimacy of the U.S. proposed carbon tariffs and, if implemented, their prospect for withstanding a challenge before World Trade Organization. That will also alleviate concern about when China's greenhouse gas emissions will peak and what China is going to do in what format. More importantly, it really opens the possibility to cap the greenhouse gas emissions of the world's two largest emitters in a legally binding global agreement.

References

Carraro, C and Tavoni M (2010) Looking ahead from Copenhagen: how challenging is the Chinese carbon intensity target?. VOX, http://www.voxeu.org/index.php?q=node/4449.

EIA (2004), *International Energy Outlook 2004*, U.S. Energy Information Administration (EIA), Washington, DC.

EIA (2009), *International Energy Outlook 2009*, DOE/EIA-0484(2009), U.S. Energy Information Administration (EIA), Washington, DC, 27 May.

European Commission (2010) International climate policy post-Copenhagen: acting now to reinvigorate global action on climate change. COM(2010) 86 final, Brussels, 9 March, http://ec.europa.eu/environment/climat/pdf/com_2010_86.pdf.

Graham-Harrison, E (2009) Snap analysis: China happy with climate deal, image dented. *Reuters*, 18 December, http://www.reuters.com/article/idUSTRE5BI0DH20091219.

Ho, M. and C. Nielsen (2007), *Clearing the Air: The Health and Economic Damages of Air Pollution in China*, Cambridge, Massachusetts: MIT Press.

IEA (2007), *World Energy Outlook 2007*, International Energy Agency (IEA), Paris.

IEA (2009), *World Energy Outlook 2009*, International Energy Agency (IEA), Paris.

Intergovernmental Panel on Climate Change (IPCC, 2007), *Climate Change 2007: Mitigation of Climate Change*, Working Group III Contribution to the Fourth Assessment Report, Cambridge University Press, Cambridge.

Levi, M (2009) Assessing China's carbon cutting proposal. Council on Foreign Relations, New York, 30 November.

Lynas, M. (2009), 'How do I know China wrecked the Copenhagen deal? I was in the room', *The Guardian*, 23 December, http://www.guardian.co.uk/environment/2009/dec/22/copenhagen-climate-change-mark-lynas.

Miliband, E. (2009), The road from Copenhagen, *The Guardian*, 20 December, http://www.guardian.co.uk/commentisfree/2009/dec/20/copenhagen-climate-change-accord.

National Bureau of Statistic (NBS), National Development and Reform Commission and National Energy Administration (2010) Bulletin on energy use per unit of GDP and other indicators by region. Beijing, 3 August, http://www.stats.gov.cn/tjgb/qttjgb/qgqttjgb/t20100803_402662765.htm.

Netherlands Environmental Assessment Agency (MNP, 2007), China Now No. 1 in CO_2 Emissions; USA in Second Position, 19 June.

People Net (2011), Energy consumption per unit of GDP expected to fall by 19.06% during the 11th five-year period, 11 February, http://env.people.com.cn/GB/13892587.html.

Qiu, J (2009) China's climate target: is it achievable?. Nature 462: 550-551.

Sina Net (2010) Special topic on a last-minute rush for meeting pollution-cutting goals: restrictions on production and electricity use across the country. http://finance.sina.com.cn/focus/jpxcxd/index.shtml.

The Economist (2010), 'Climate change after Copenhagen: China's thing about numbers', 2 January, pp. 43-44.

Watts, J (2009) China 'will honour commitments' regardless of Copenhagen outcome. The Guardian, 18 December, http://www.guardian.co.uk/environment/2009/dec/18/china-wen-jiabao-copenhagen.

World Bank (2007), *Cost of Pollution in China: Economic Estimates of Physical Damages*, Washington DC, http://siteresources.worldbank.org/INTEAPREGTOPENVIRONMENT/Resources/China_Cost_of_Pollution.pdf.

Xinhua Net (2010) NDRC: the 11th five-year pollution-cutting goals met ahead of the schedule. 10 March, http://news.sina.com.cn/c/2010-03-10/152019834186.shtml.

Zhang, Z.X. (1997), *The Economics of Energy Policy in China: Implications for Global Climate Change*, New Horizons in Environmental Economics Series, Edward Elgar, Cheltenham, UK and Northampton, USA.

Zhang, Z.X. (2000a), Decoupling China's Carbon Emissions Increases from Economic Growth: An Economic Analysis and Policy Implications, *World Development*, Vol. 28, No. 4, pp. 739-752.

Zhang, Z.X. (2000b), Can China Afford to Commit itself an Emissions Cap? An Economic and Political Analysis, *Energy Economics*, Vol. 22, No. 6, pp. 587-614.

Zhang, Z.X. (2003), Why Did the Energy Intensity Fall in China's Industrial Sector in the 1990s?, The Relative Importance of Structural Change and Intensity Change, *Energy Economics*, Vol. 25, No. 6, pp. 625-638.

Zhang, Z.X. (2009), Multilateral Trade Measures in a Post-2012 Climate Change Regime?: What Can Be Taken from the Montreal Protocol and the WTO?, *Energy Policy*, Vol. 37, pp. 5105-5112.

Zhang, Z.X. (2010a), Is It Fair to Treat China a Christmas Tree to Hang Everybody's Complaints? Putting its Own Energy-Saving into Perspective, *Energy Economics*, Vol. 32, pp. S47-S56.

Zhang, Z.X. (2010b), The U.S. Proposed Carbon Tariffs, WTO Scrutiny and China's Responses, *International Economics and Economic Policy*, Vol. 7, Nos. 2-3, pp. 203-225.

Zhang, Z.X. (2010c), China in the Transition to a Low-Carbon Economy, *Energy Policy*, Vol. 38, pp. 6638-6653.

Zhang, Z.X. (2010d), 'Copenhagen and beyond: reflections on China's stance and responses', in E. Cerdá and X. Labandeira (eds), *Climate Change Policies: Global Challenges and Future Prospects*, Cheltenham, UK and Northampton, MA: Edward Elgar, 239-253.

Zhang, Z.X. (2010e), Assessing China's Carbon Intensity Pledge for 2020: Stringency and Credibility Issues and their Implications, Nota di Lavoro 158.2010, Fondazione Eni Enrico Mattei, Milan, Italy; *Environmental Economics and Policy Studies*, doi:10.1007/s10018-011-0012-4.

Zhang, Z.X. (2010f), In What Format and under What Timeframe Would China Take on Climate Commitments? A Roadmap to 2050, Nota di Lavoro 112.2010, Fondazione Eni Enrico Mattei, Milan, Italy; *International Environmental Agreements: Politics, Law and Economics*, forthcoming.

Zhang, Z.X. (2011), *Energy and Environmental Policy in China: Towards a Low-Carbon Economy*, New Horizons in Environmental Economics Series, Edward Elgar, Cheltenham, UK and Northampton, USA.

NOTE DI LAVORO DELLA FONDAZIONE ENI ENRICO MATTEI

Fondazione Eni Enrico Mattei Working Paper Series

Our Note di Lavoro are available on the Internet at the following addresses:

http://www.feem.it/getpage.aspx?id=73&sez=Publications&padre=20&tab=1
http://papers.ssrn.com/sol3/JELJOUR_Results.cfm?form_name=journalbrowse&journal_id=266659
http://ideas.repec.org/s/fem/femwpa.html
http://www.econis.eu/LNG=EN/FAM?PPN=505954494
http://ageconsearch.umn.edu/handle/35978
http://www.bepress.com/feem/

NOTE DI LAVORO PUBLISHED IN 2011

SD	1.2011	Anna Alberini, Will Gans and Daniel Velez-Lopez: Residential Consumption of Gas and Electricity in the U.S.: The Role of Prices and Income
SD	2.2011	Alexander Golub, Daiju Narita and Matthias G.W. Schmidt: Uncertainty in Integrated Assessment Models of Climate Change: Alternative Analytical Approaches
SD	3.2010	Reyer Gerlagh and Nicole A. Mathys: Energy Abundance, Trade and Industry Location
SD	4.2010	Melania Michetti and Renato Nunes Rosa: Afforestation and Timber Management Compliance Strategies in Climate Policy. A Computable General Equilibrium Analysis
SD	5.2011	Hassan Benchekroun and Amrita Ray Chaudhuri: "The Voracity Effect" and Climate Change: The Impact of Clean Technologies
IM	6.2011	Sergio Mariotti, Marco Mutinelli, Marcella Nicolini and Lucia Piscitello: Productivity Spillovers from Foreign MNEs on Domestic Manufacturing Firms: Is Co-location Always a Plus?
GC	7.2011	Marco Percoco: The Fight Against Geography: Malaria and Economic Development in Italian Regions
GC	8.2011	Bin Dong and Benno Torgler: Democracy, Property Rights, Income Equality, and Corruption
GC	9.2011	Bin Dong and Benno Torgler: Corruption and Social Interaction: Evidence from China
SD	10.2011	Elisa Lanzi, Elena Verdolini and Ivan Haščič: Efficiency Improving Fossil Fuel Technologies for Electricity Generation: Data Selection and Trends
SD	11.2011	Stergios Athanassoglou: Efficient Random Assignment under a Combination of Ordinal and Cardinal Information on Preferences
SD	12.2011	Robin Cross, Andrew J. Plantinga and Robert N. Stavins: The Value of Terroir: Hedonic Estimation of Vineyard Sale Prices
SD	13.2011	Charles F. Mason and Andrew J. Plantinga: Contracting for Impure Public Goods: Carbon Offsets and Additionality
SD	14.2011	Alain Ayong Le Kama, Aude Pommeret and Fabien Prieur: Optimal Emission Policy under the Risk of Irreversible Pollution
SD	15.2011	Philippe Quirion, Julie Rozenberg, Olivier Sassi and Adrien Vogt-Schilb: How CO2 Capture and Storage Can Mitigate Carbon Leakage
SD	16.2011	Carlo Carraro and Emanuele Massetti: Energy and Climate Change in China
SD	17.2011	ZhongXiang Zhang: Effective Environmental Protection in the Context of Government Decentralization
SD	18.2011	Stergios Athanassoglou and Anastasios Xepapadeas: Pollution Control: When, and How, to be Precautious
SD	19.2011	Jūratė Jaraitė and Corrado Di Maria: Efficiency, Productivity and Environmental Policy: A Case Study of Power Generation in the EU
SD	20.2011	Giulio Cainelli, Massimiliano Mozzanti and Sandro Montresor: Environmental Innovations, Local Networks and Internationalization
SD	21.2011	Gérard Mondello: Hazardous Activities and Civil Strict Liability: The Regulator's Dilemma
SD	22.2011	Haiyan Xu and ZhongXiang Zhang: A Trend Deduction Model of Fluctuating Oil Prices
SD	23.2011	Athanasios Lapatinas, Anastasia Litina and Eftichios S. Sartzetakis: Corruption and Environmental Policy: An Alternative Perspective
SD	24.2011	Emanuele Massetti: A Tale of Two Countries:Emissions Scenarios for China and India
SD	25.2011	Xavier Pautrel: Abatement Technology and the Environment-Growth Nexus with Education
SD	26.2011	Dionysis Latinopoulos and Eftichios Sartzetakis: Optimal Exploitation of Groundwater and the Potential for a Tradable Permit System in Irrigated Agriculture
SD	27.2011	Benno Torgler and Marco Piatti. A Century of *American Economic Review*
SD	28.2011	Stergios Athanassoglou, Glenn Sheriff, Tobias Siegfried and Woonghee Tim Huh: Optimal Mechanisms for Heterogeneous Multi-cell Aquifers
SD	29.2011	Libo Wu, Jing Li and ZhongXiang Zhang: Inflationary Effect of Oil-Price Shocks in an Imperfect Market: A Partial Transmission Input-output Analysis
SD	30.2011	Junko Mochizuki and ZhongXiang Zhang: Environmental Security and its Implications for China's Foreign Relations
SD	31.2011	Teng Fei, He Jiankun, Pan Xunzhang and Zhang Chi: How to Measure Carbon Equity: Carbon Gini Index Based on Historical Cumulative Emission Per Capita
SD	32.2011	Dirk Rübbelke and Pia Weiss: Environmental Regulations, Market Structure and Technological Progress in Renewable Energy Technology — A Panel Data Study on Wind Turbines
SD	33.2011	Nicola Doni and Giorgio Ricchiuti: Market Equilibrium in the Presence of Green Consumers and Responsible Firms: a Comparative Statics Analysis

SD	34.2011	Gérard Mondello: Civil Liability, Safety and Nuclear Parks: Is Concentrated Management Better?
SD	35.2011	Walid Marrouch and Amrita Ray Chaudhuri: International Environmental Agreements in the Presence of Adaptation
ERM	36.2011	Will Gans, Anna Alberini and Alberto Longo: Smart Meter Devices and The Effect of Feedback on Residential Electricity Consumption: Evidence from a Natural Experiment in Northern Ireland
ERM	37.2011	William K. Jaeger and Thorsten M. Egelkraut: Biofuel Economics in a Setting of Multiple Objectives & Unintended Consequences
CCSD	38.2011	Kyriaki Remoundou, Fikret Adaman, Phoebe Koundouri and Paulo A.L.D. Nunes: Are Preferences for Environmental Quality Sensitive to Financial Funding Schemes? Evidence from a Marine Restoration Programme in the Black Sea
CCSD	39.2011	Andrea Ghermanti and Paulo A.L.D. Nunes: A Global Map of Costal Recreation Values: Results From a Spatially Explicit Based Meta-Analysis
CCSD	40.2011	Andries Richter, Anne Maria Eikeset, Daan van Soest, and Nils Chr. Stenseth: Towards the Optimal Management of the Northeast Arctic Cod Fishery
CCSD	41.2011	Florian M. Biermann: A Measure to Compare Matchings in Marriage Markets
CCSD	42.2011	Timo Hiller: Alliance Formation and Coercion in Networks
CCSD	43.2011	Sunghoon Hong: Strategic Network Interdiction
CCSD	44.2011	Arnold Polanski and Emiliya A. Lazarova: Dynamic Multilateral Markets
CCSD	45.2011	Marco Mantovani, Georg Kirchsteiger, Ana Mauleon and Vincent Vannetelbosch: Myopic or Farsighted? An Experiment on Network Formation
CCSD	46.2011	Rémy Oddou: The Effect of Spillovers and Congestion on the Segregative Properties of Endogenous Jurisdiction Structure Formation
CCSD	47.2011	Emanuele Massetti and Elena Claire Ricci: Super-Grids and Concentrated Solar Power: A Scenario Analysis with the WITCH Model
ERM	48.2011	Matthias Kalkuhl, Ottmar Edenhofer and Kai Lessmann: Renewable Energy Subsidies: Second-Best Policy or Fatal Aberration for Mitigation?
CCSD	49.2011	ZhongXiang Zhang: Breaking the Impasse in International Climate Negotiations: A New Direction for Currently Flawed Negotiations and a Roadmap for China to 2050