

**Assessing China's Carbon Intensity
Pledge for 2020: Stringency and Credibility
Issues and their Implications**

ZhongXiang Zhang 张中祥

Senior Fellow, Ph.D in Economics

East-West Center, Honolulu, HI 96848, USA

Tel: +1 808 944 7265; Fax: +1 808 944 7298

Email: ZhangZ@EastWestCenter.org

4th Annual Conference on China's Economic
Development and U.S.-China Economic Relations
George Washington University, 23 September 2011

Outlines

- Energy conservation makes a difference: the position of China in international climate debate could be very different from what it is today
- China's proposed carbon intensity target in 2020: ambitious or business as usual?
- Meeting China's carbon intensity: reliability issues of China's energy and GDP statistics
- Climate commitments for China: A roadmap to 2050
- Concluding remarks on China's proposed carbon intensity target in 2020, flaws in current international climate negotiations and a way forward

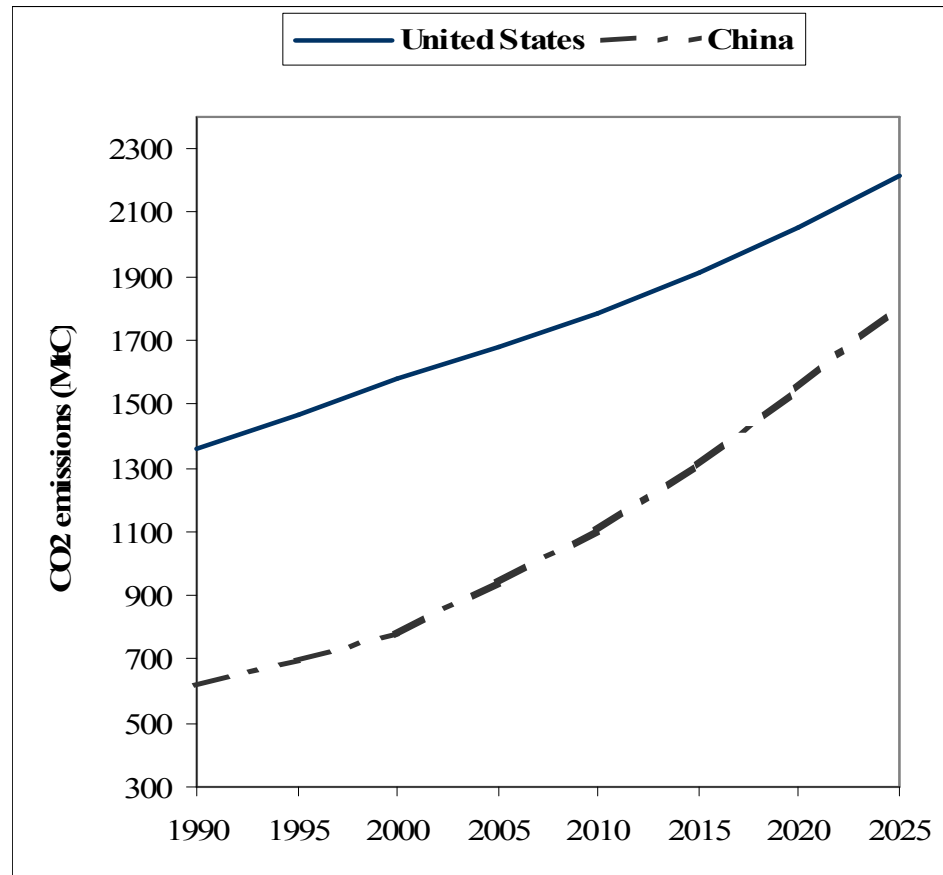
Acknowledgements: this talk based on the following two publications

- Zhang, Z.X. (2011), In What Format and under What Timeframe Would China Take on Climate Commitments? A Roadmap to 2050, *International Environmental Agreements: Politics, Law and Economics*, Vol. 11, No. 3, A Special Issue (Edited by Carlo Carraro and Emanuele Massetti) on Reconciling Domestic Energy Needs and Global Climate Policy, pp. 245-259
- Zhang, Z.X. (2011), Assessing China's Carbon Intensity Pledge for 2020: Stringency and Credibility Issues and their Implications, *Environmental Economics and Policy Studies*, Vol. 13, No. 3, pp. 219-235.

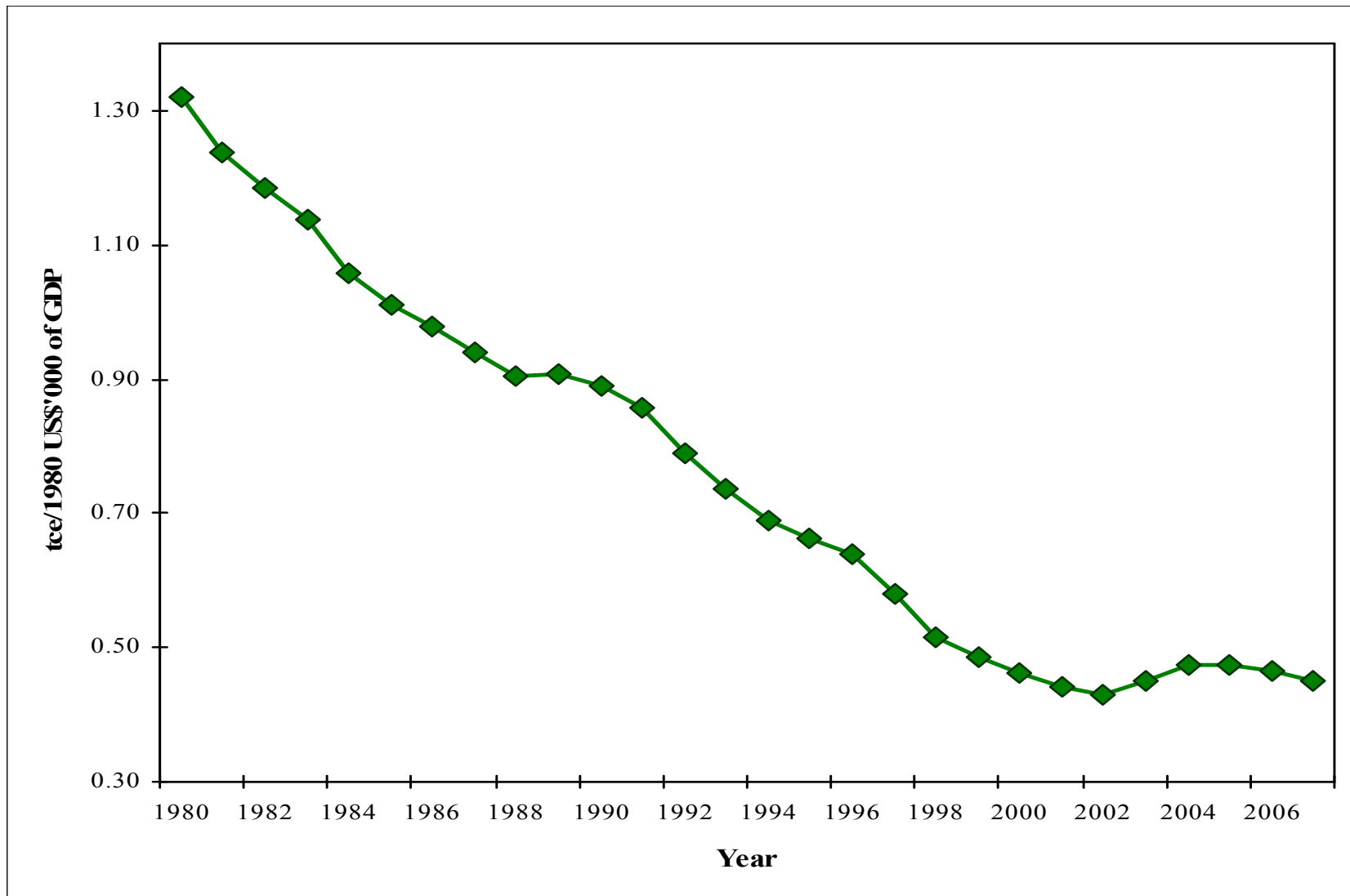
Energy conservation in China: how important?

- If China's energy use and the resulting carbon emissions had followed their trends between 1980 and 2000, rather than surged since 2002, then the position of China in international climate debate would be very different from what it is today.
- China achieved a quadrupling of its GDP with only a doubling of energy consumption between 1980 and 2000.
- On the trends of the 1980s and 1990s, U.S. EIA (2004) estimated that China's CO₂ emissions were not expected to catch up with the world's largest carbon emitter by 2030. However, China's energy use had surged since the turn of this century, almost doubling between 2000 and 2007. Despite similar rates of economic growth, the rate of growth in China's energy use during this period (9.74% per year) has been more than twice that of the previous two decades (4.25% per year).
- As a result, China became the world's no.1 carbon emitter in 2007, instead of **until 2030** as estimated as late as 2004.

CO₂ emissions in China and the United States, 1990-2025 (IEO 2004)



Energy intensity of China's GDP



Six Plausible Options in Ascending Order of Stringency for China (Zhang for UNDP, 1998; Zhang, *Energy Economics*, 2000)

- Active participation in CDM as meaningful participation
- (Undefined) Demonstrable progress between the first commitment period and 2020
- Specific policies and measures (explicitly demonstrate) between the first commitment period and 2020
- **Carbon intensity around 2020**
- Sectoral emissions cap around or beyond 2020
- Bottom line: A combination of a targeted carbon intensity level with an emissions cap on a particular sector around or beyond 2020

China's proposed carbon intensity target in 2020 [1]

- Zhang (1998 and 2000a,b) envision that China could make a voluntary commitment to total greenhouse gas emissions per unit of GDP at some point around 2020.
- Just prior to the Copenhagen climate summit, China pledged to cut its carbon intensity by 40-45% 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.
- Chinese PM Wen Jiabao made it clear that China will honor its commitments regardless of the outcome of international negotiations.

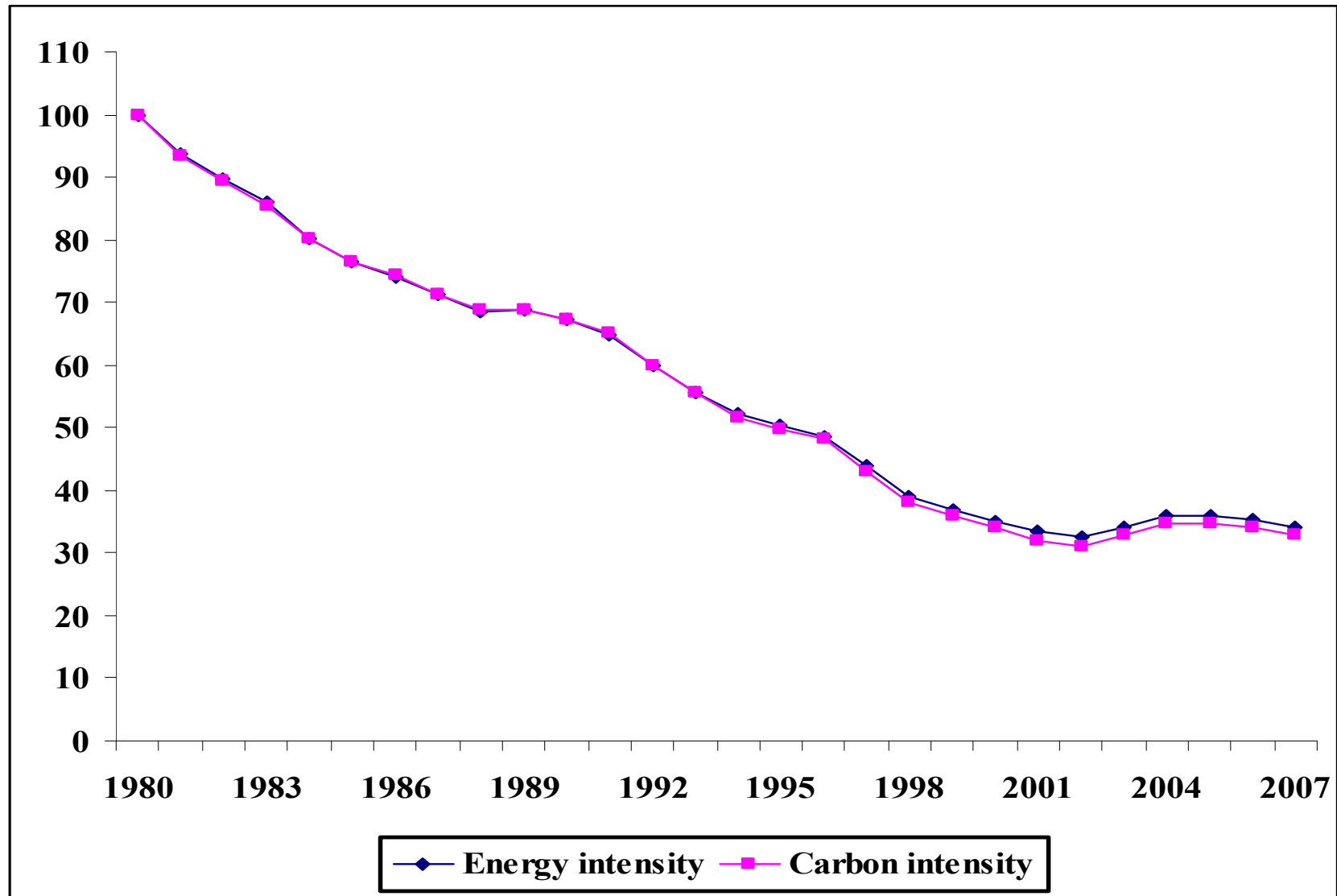
China's proposed carbon intensity target in 2020 [2]

- 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.
 - China considers it very ambitious
 - Western scholars (e.g., Levi, 2009) view it just business as usual
- The issues then:
 - does the proposed target just represent BAU as some Western scholars argue?
 - is the proposed target quite as ambitious as China argues?
- Several ways to evaluate how challenging this target is

China's proposed carbon intensity target in 2020 [3]

- To see whether this 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.
 - Another issue requires establishing why the 20% energy-saving goal is considered very challenging.

China's Energy Intensity Index and Carbon Intensity Index (1980=100), 1980-2007



China's proposed carbon intensity target in 2020 [4]

- Another issue requires establishing why the 20% energy-saving goal is considered very challenging.
 - China had faced great difficulty meeting its energy-saving goal. Despite significant efforts, China's energy intensity was cut by 15.61% from 2006-9 (NBS et al., 2010). The country eventually failed to meet its energy-saving goal, even having taken unprecedented measures including a last-minute shutdown operation of factories and restrictions on energy use across the country.
 - The revisions of China's official GDP data from the second nationwide economic census, benefiting the energy intensity indicator, have already been factored in these reductions in China's energy intensity.
 - Has already picked low-hanging fruit. However, those LHF opportunities can only be captured once. The new carbon intensity target set for 2020 requires an additional 20-25% on top of the existing target.

China's proposed carbon intensity target in 2020 [5]

- 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.
 - China's CO₂ emissions under the ambitious 450 ppm scenario are projected to be 8.4 GtCO₂ by 2020, 1.2 GtCO₂ less than the WEO 2009 baseline 9.6 GtCO₂ (IEA, 2009).
 - Cutting the carbon intensity by 40-45% would bring reductions of 0.46-1.2 GtCO₂ in 2020, equivalent to a deviation of 4.8-12.7% below the WEO 2009 baseline set for China in 2020.
 - Even the lower end of that range does not represent business as usual, while the high end of China's target, if met, aligns with the specified obligation that China needs to fulfill under the WEO 2009 450 ppm scenario.

China's proposed carbon intensity target in 2020 [6]

- The previous two points clearly show that the proposed carbon intensity target does not just represent BAU as some Western scholars have argued.
- Now let's see whether the proposed target is quite as ambitious as China argues. We need to answer the two questions:
 - Is it conservative?
 - Is there room for further increase?

China's proposed carbon intensity target in 2020 [7]

- To see whether the proposed carbon intensity reduction is conservative
 - Arguably, China will claim to meet its carbon intensity target as long as it cuts its carbon intensity by 40%.
 - IEA (2009) estimates that national policies under consideration in China would bring reductions of about 1 GtCO₂ in 2020,
 - suggesting a carbon intensity reduction of 43.6% in 2020
 - implying that the low end of China's carbon intensity target is conservative.
 - Given that China is already the world's largest carbon emitter and its emissions are projected to rise to 28% of the world's total in 2020, that 3.6% difference in reductions for China will translate into an over 10% difference in reductions for the world as a whole in 2020.

China's proposed carbon intensity target in 2020 [8]

- Is there room for China to increase its own proposed carbon intensity reduction by 2020?
 - It would be hard, but not impossible.
 - Many of policies considered in the WEO 2009 that will cut emissions of 1 GtCO₂ in 2020 from its baseline levels are not particularly climate-motivated. China could accelerate the speed of, and scale up the implementation, of such policies and enact additional policies with explicit considerations of climate mitigation and adaptation. This would bring additional reductions in China's carbon intensity.
- What then is the yardstick for the energy or carbon intensity in 2020?
 - One way is to set it based on China's own medium- and long-term energy conservation plan.
 - Another way is to infer potential level based on historical trend of energy saving.

China's proposed carbon intensity target in 2020 [9]

- To set it based on China's own medium- and long-term energy conservation plan.
- Such a plan requires an annual energy saving rate of 3% between 2003-2020 (NDRC, 2004). This suggests a reduction of China's energy intensity by 42.5% in 2020, relative to 2002 levels.
 - With China's rising energy intensity between 2002-2005, to meet this energy-saving goal under the medium- and long-term energy conservation plan requires China's energy intensity to be cut by more than 42.5%, relative to its 2005 levels.
 - This energy-saving plan was set at a time when China faced much less severe environmental stress, energy security concerns and international pressure to take climate mitigation actions than it is now confronted with, suggesting that China should now aim for an even more ambitious energy-saving goal than it was envisioned under the energy-saving plan set in 2004.

China's proposed carbon intensity target in 2020 [10]

- To infer potential level based on historical trend of energy saving.
 - My back-of-the-envelope calculation suggests a 42-43% cut in China's energy intensity by 2020 relative to 2005 levels.
 - With carbon-free energy meeting 7.1% of China's total energy needs in 2005 (NBS, 2009) and that share mandated to be increased to 15%, this 42-43% cut in energy intensity is equivalent to a 50-51% cut in carbon intensity between 2006 and 2020, implying that there is a room for China to increase its own proposed carbon intensity reduction of 40-45% by 2020.
- Combined together, China should aim for a 46-50% cut in its carbon intensity over the period 2006-2020.
- This 46-50% carbon intensity reduction will lead to China's emissions reductions of 15-21% compared with its baseline levels in 2020. That will put China's absolute emissions reductions very much within the IPCC's recommended level of 15-30% below baselines.

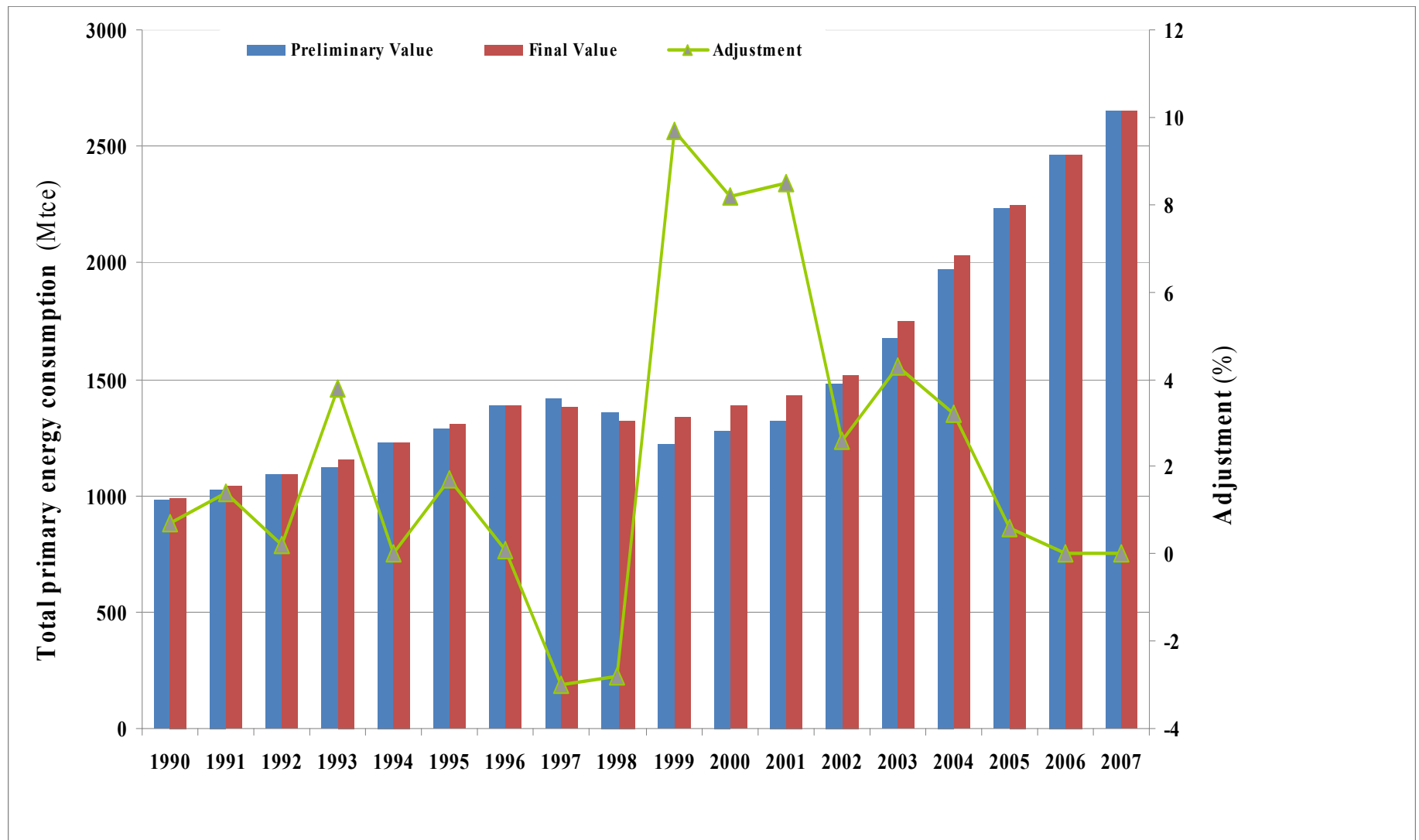
China's energy and GDP revisions: Implications for its existing energy-saving goal in 2010 and proposed carbon intensity target in 2020

- China's proposed carbon intensity target not only needs to be seen as ambitious, but more importantly it needs to be credible.
- Ascertaining this credibility needs to know whether the claimed carbon emissions reductions are real.
- As long as China's pledges are in the form of carbon intensity, the reliability of both emissions and GDP data matters.
- With the fixed CO₂ emissions coefficients, the reliability of emissions data depends very much on energy use data.
- The preliminary figures for total energy use in 1999-2001 were revised upwards by 8-10%, driven by upward revisions of 8-13% made to the coal consumption figures. In recent years, preliminary figures for energy use are almost the same as the final reported ones.
- GDP figures are even more crucial to the impacts on the energy or carbon intensity than are energy and emissions data.

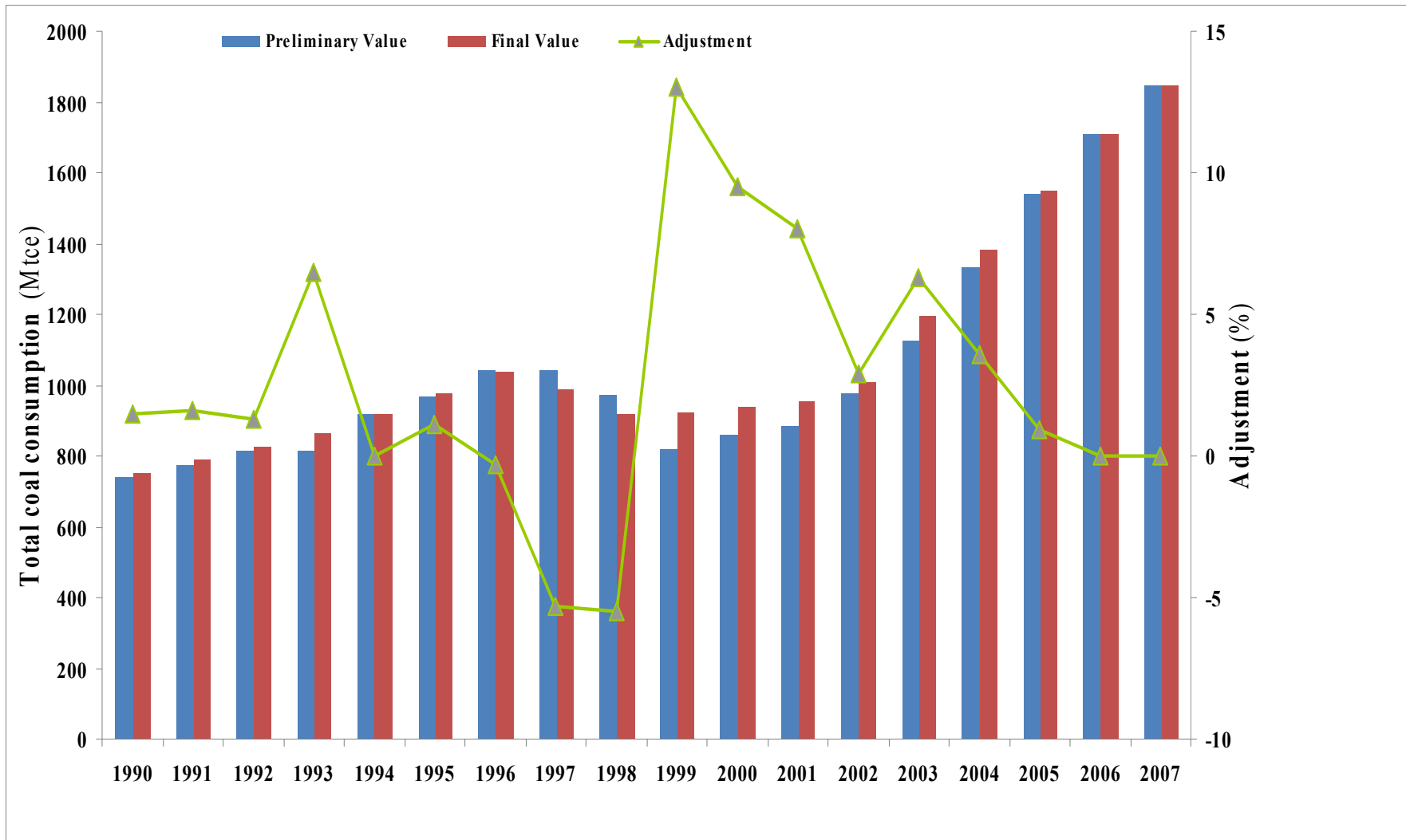
Preliminary and Final Values for Total Primary Energy Consumption and Coal Consumption in China, 1990-2008

Year	Total primary energy consumption			Total coal consumption		
	Preliminary value (Mtce)	Final value (Mtce)	Adjustment (%)	Preliminary value (Mtce)	Final value (Mtce)	Adjustment (%)
1990	980.00	987.03	0.7	740.88	752.12	1.5
1991	1023.00	1037.83	1.4	777.48	789.79	1.6
1992	1089.00	1091.70	0.2	815.66	826.42	1.3
1993	1117.68	1159.93	3.8	813.67	866.47	6.5
1994	1227.37	1227.37	0.0	920.53	920.53	0.0
1995	1290.00	1311.76	1.7	967.50	978.57	1.1
1996	1388.11	1389.48	0.1	1041.08	1037.94	-0.3
1997	1420.00	1377.98	-3.0	1043.70	988.01	-5.3
1998	1360.00	1322.14	-2.8	973.76	920.21	-5.5
1999	1220.00	1338.31	9.7	818.62	924.77	13.0
2000	1280.00	1385.53	8.2	857.60	939.39	9.5
2001	1320.00	1431.99	8.5	884.40	955.14	8.0
2002	1480.00	1517.97	2.6	978.28	1006.41	2.9
2003	1678.00	1749.90	4.3	1125.94	1196.93	6.3
2004	1970.00	2032.27	3.2	1333.69	1381.94	3.6
2005	2233.19	2246.82	0.6	1538.67	1552.55	0.9
2006	2462.70	2462.70	0.0	1709.11	1709.11	0.0
2007	2655.83	2655.83	0.0	1845.80	1845.80	0.0
2008	2850.00*			1957.95*		

Preliminary and final values for total primary energy consumption in China



Preliminary and final values for total primary coal consumption in China



A reduction in China's energy intensity: preliminary value versus final value (%) (Zhang 2010)

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 (March 2010)	3.23 (15 July 2010)	3.61 (15 July 2010)		

The dilemma China is facing

- 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.
 - The inclusion of border measures is widely considered the “price” for passing any U.S. legislation capping its greenhouse gas emissions.
 - 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.
- Even if China would meet that carbon intensity target, it still cannot remove international concern about the reliability of its commitments.

The key challenges ahead

- Given these facts, there is no question that China must eventually take on absolute greenhouse gas emissions caps.
- The key challenges
 - 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, the economic and political benefits, and the climate change impacts, taking also into consideration the mounting diplomatic and international pressure and the give and take of international negotiations.

China's stance at Copenhagen [1]

- For the first time, China was blamed for dragging its feet on international climate negotiations, previously the accusations always targeted on U.S.
 - Australian PM, British PM, French President, German Chancellor publicly criticized China
 - British Energy and Climate Change Secretary Miliband even 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”.
 - Being asked why a pledge that applied only to rich nations and to which all those nations seemed to agree would 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.”.
 - Brazil's representative pointed out how illogical China's position was.

China's stance at Copenhagen [2]

- 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% and that of industrialized countries by 80% by 2050 means that emissions in developing countries are only allowed to increase by 15% 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% increase by 2050 would mean that the developing country's emissions are allowed to only increase by 15% 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% increase prior to 2050 and then come down to that proposed allowable level by 2050.
- 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.

Climate commitments for China: A roadmap to 2050 [1]

- I propose that at current international climate talks China should negotiate a requirement that
 - greenhouse gas emissions in industrialized countries be cut at least by 80% by 2050 relative to their 1990 levels &
 - per capita emissions for all major countries by 2050 no more than the world's average at that time.
- At a 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 2030.

Why around 2030 should China take on absolute emissions caps? [1]

- The earlier China would take on emissions caps, the more likely the IPCC goal of emissions peaking by 2020 at the latest would be achieved. However, given that China is a country at low development stage and has coal-fueled, rapidly growing economy, its carbon emissions are still on the climbing trajectories beyond 2030, even if some energy saving policies and measures have been factored into such projections.
- Before legally binding commitments become applicable to Annex I (industrialized) countries, they have a grace period of 16 years starting from the Earth Summit in June 1992 when Annex I countries promised to individually or jointly stabilize greenhouse gas emissions at their 1990 levels by the end of 2000 to the beginning of the first commitment period in 2008. This precedent points to a first binding commitment period for China starting around 2028.
- Until CCS projects are developed to the point of achieving economies of scale and bringing down the costs, China will not feel confident about committing to absolute emissions caps. Thus far, CCS has not been commercialized anywhere in the world, and it is unlikely, given current trends, that this technology will find large-scale application either in China or elsewhere before 2030.

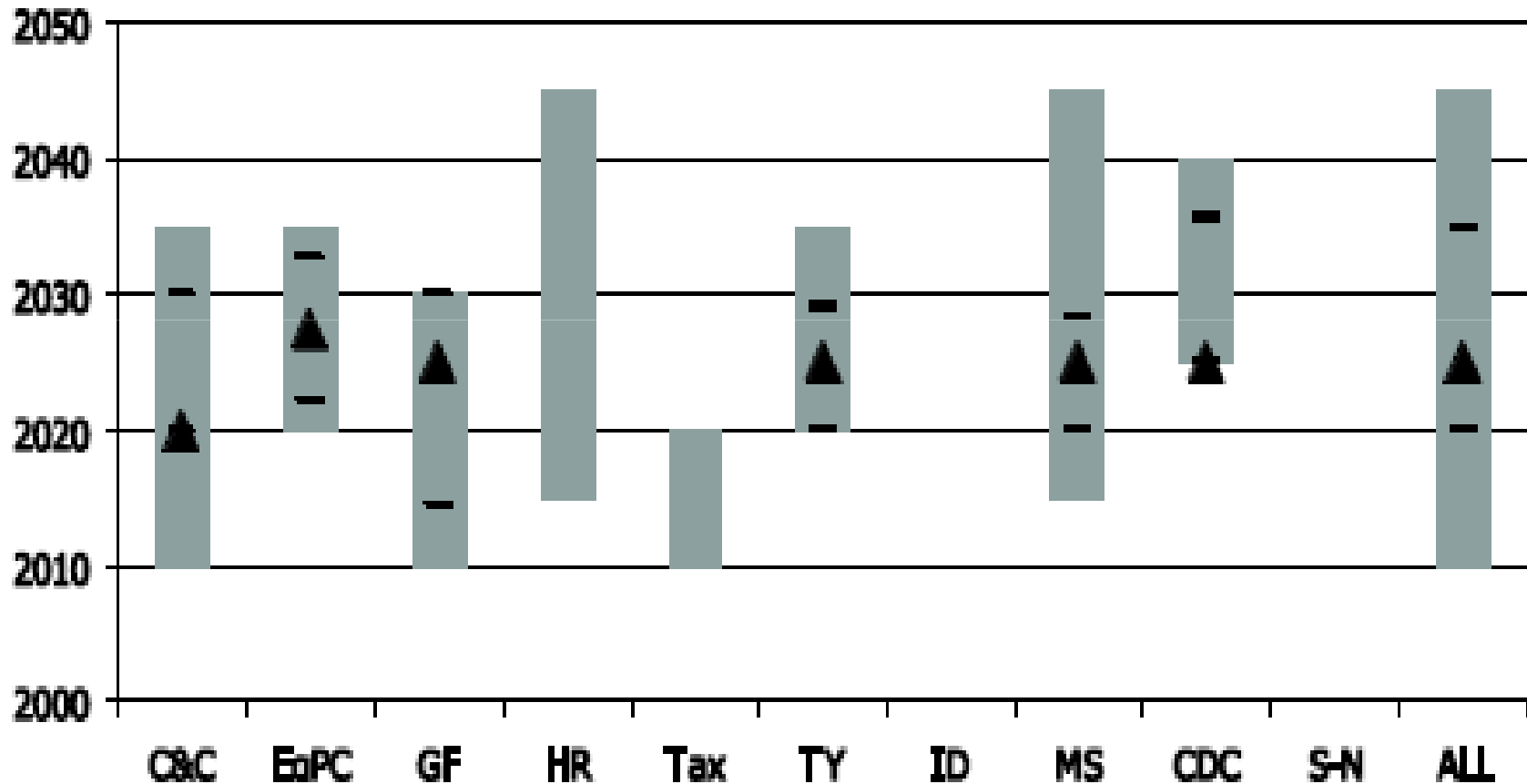
Why around 2030 should China take on absolute emissions caps? [2]

- Developing countries need a reasonable length of time to develop and operate national climate policies and measures. This is understood by knowledgeable U.S. politicians, such as Reps. Henry Waxman (D-CA) and Edward Markey (D-MA), the sponsors of the American Clean Energy and Security Act of 2009. Indeed, the original Waxman-Markey bill gives China, India and other major developing nations time to enact climate-friendly measures.
- Another timing indicator is a lag between the date that a treaty is signed and the starting date of the budget period. With the Kyoto Protocol signing in December 1997 and the first budget period starting 2008, the earliest date to expect China to introduce binding commitments would not be before 2022. The Montreal Protocol grants developing countries a grace period of 10 years. Given that the scope of economic activities affected by a climate regime is several orders of magnitude larger than those covered by the Montreal Protocol, it is arguable that developing countries should have a grace period much longer than 10 years, after mandatory emission targets for Annex I countries took effect in 2008.
- While it is not unreasonable to grant China a grace period, delaying the timing of China taking on emissions caps beyond 2030 is not acceptable.

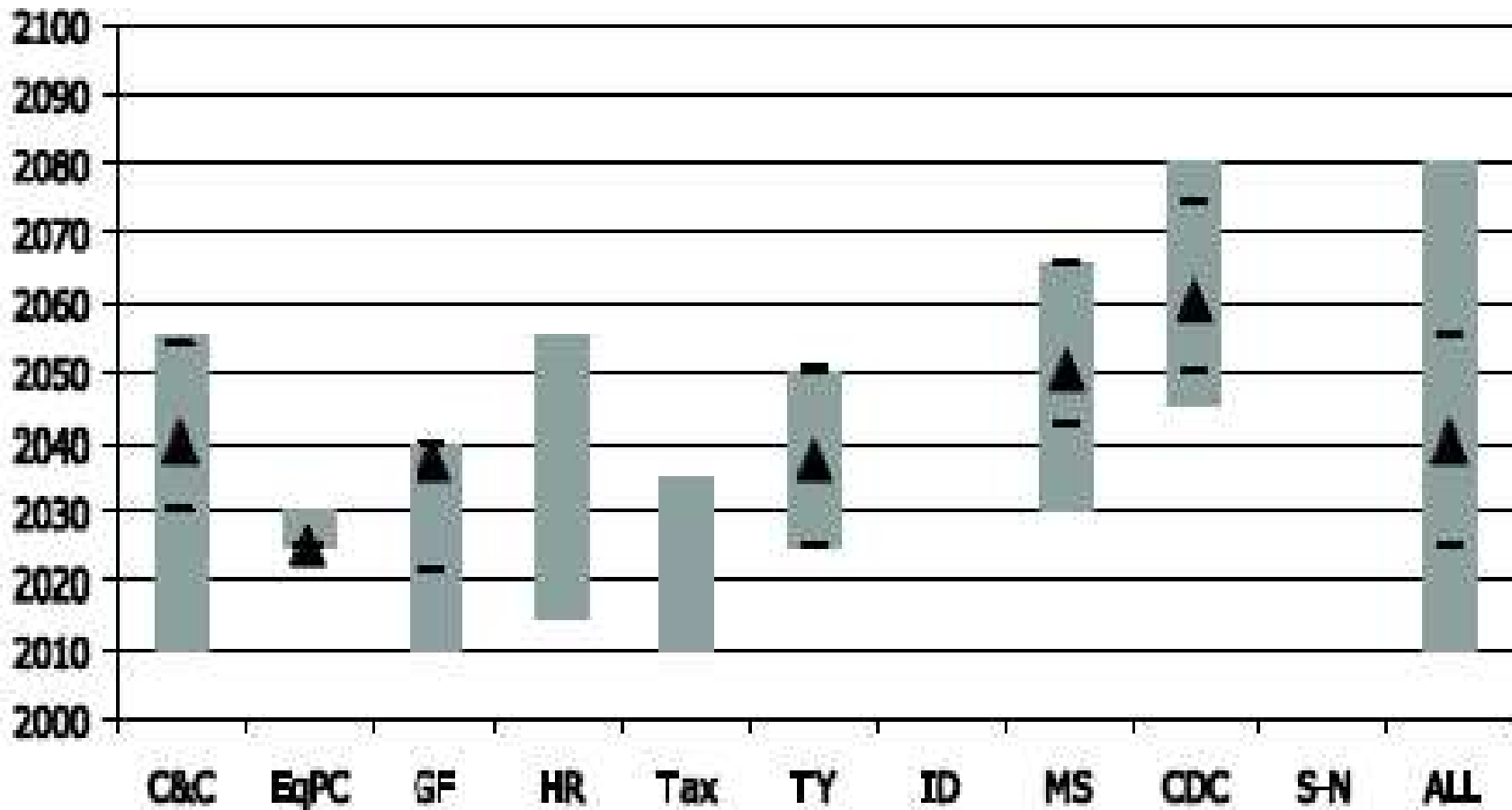
China in 2030 under BAU: relative to the second largest emitter and the world's populous country

- China's absolute emissions in 2030: 11.6 billion tCO₂ (WEO 2009)
 - Two times that of the second largest emitter (U.S.) -- 5.5 billion tCO₂ in 2030 (WEO 2009).
 - This gap with the U.S. could become even bigger, provided that the U.S. would cut its emissions to the levels proposed by the Obama administration and under the American Clean Energy and Security Act.
- Compared with India, the world's most populous country at that time (UNDESA 2009)
 - India's absolute emissions of 3.4 billion tCO₂ in 2030
 - China's per capita emissions (8 tCO₂) will be well above the world's average (4.9 tCO₂) and is projected to be about 3.4 times that of India (2.3 tCO₂) in 2030 (WEO 2009).

Allowance peaking years for China (PBL and IFW-Kiel, May 2011)



Allowance peaking years for India (PBL and IFW-Kiel, May 2011)



Climate commitments for China:

A roadmap to 2050 [2]

- 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 would need 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.

Climate commitments for China:

A roadmap to 2050 [3]

- Voluntary “no lose” emission targets starting 2018
 - One option is to take the IPCC (2007) recommendation as a reference, which suggests that developing countries as a group will need to limit their greenhouse gas emissions to 15-30% below their baselines by 2020.
 - Another option is based on China’s own set energy or carbon intensity targets, which are then translated into the amount of emissions reductions from the baselines.
 - the yardstick: a 40-43% cut in China’s energy intensity, equivalent to a 48-51% cut in China’s carbon intensity between 2006-2020
- Binding carbon intensity targets as its international commitment starting 2023
- Emissions capped starting 2028, leading to the global convergence of per capita emissions by 2050

Summary remarks

- The proposed carbon intensity target for 2020 does certainly not just represent business as usual as some Western scholars have argued. On the other hand, that target may not be quite as ambitious as China argues.
- 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 and emissions data.
- 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 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.

Flaws in current international climate negotiations

- **This dilemma is partly attributed to flaws in current international climate negotiations: focusing on commitments on the targeted date: 2020**
 - Why have negotiations been focused on 2020?
 - The commitment period only up to 2020 does not accommodate well the world's two largest greenhouse gas emitters, namely the U.S. and China, although for reasons very different from each other.

A way forward [1]

- **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 commitments 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 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.

A way forward [2]

- 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 WTO.
 - that will also alleviate concern about when China's greenhouse gas emissions 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.

EE

Energy and Environmental Policy in China

TOWARDS A LOW-CARBON ECONOMY



ZhongXiang Zhang

NEW HORIZONS IN
ENVIRONMENTAL
ECONOMICS

Series Editors
WALLACE E. OATES
HENK FOLMER

Energy and Environmental Policy in China

ZhongXiang Zhang

EE

Energy and Environmental Policy in China Towards a Low-Carbon Economy

ZhongXiang Zhang

Senior Fellow, Research Program, East–West Center, USA

NEW HORIZONS IN ENVIRONMENTAL ECONOMICS

Edward Elgar

Cheltenham, UK • Northampton, MA, USA