1. Introduction

Since launching its open-door policy and economic reforms in late 1978, China has experienced spectacular economic growth, and hundreds of millions of the Chinese people have been raised out of poverty. In this course, China has been heavily dependent on dirty-burning coal to fuel its rapidly growing economy. Moreover, until recently, China had valued economic growth above environmental protection. A combination of these factors has given rise to unprecedented environmental pollution and health risks across the country.

Burning coal contributes to the overwhelming majority of the national total sulfur dioxide (SO\textsubscript{2}) emissions, the national total dust, nitrogen oxide (NO\textsubscript{x}) emissions and carbon dioxide (CO\textsubscript{2}) emissions. As a result, until 2009 urban air quality across the country still did not meet the air quality standards for more than one-third of a year (MEP, 2010a, 2010b), and one-third of China’s land is affected by acid rain. The deterioration of the environment has led to frequent pollution disputes across the country. In 2009, serious environmental risks had resulted in 171 sudden environmental incidents, one incident every other day (MEP, 2010d). Along with corruption, income inequalities and soaring house prices, the environment is considered to be one of the leading causes of social unrest within the Chinese society.

The rising environmental degradation associated with China’s rapid economic growth has led to significant economic costs. Existing estimates for such costs vary, depending on the comprehensiveness of the assessments. China’s first official estimate for the economic costs of environmental pollution in 2004 (figures released in September 2006) put the figure at US$ 64 billion, or 3.05 percent of gross domestic product (GDP) (SEPA and NBS, 2006). This is a very conservative estimate; other estimates put the figure much higher. The World Bank (2007a), for example, has estimated that the total cost of air and water pollution in China is about 5.8 percent of GDP.

While being confronted with rampant conventional environmental pollution problems, China became the world’s largest carbon emitter in 2007. The number one position put China in the spotlight, just at the time when the world’s community started negotiating a post-Kyoto climate
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regime under the Bali roadmap. There were renewed interests and debates on China’s role in combating global climate change. Given the fact that China has since 2007 been the world’s largest carbon emitter and its emissions have continued to rise rapidly in line with its industrialization and urbanization on the one hand, and the fact that China overtook Japan as the world’s second largest economy on the other hand, China is seen to have greater capacity, capability and responsibility for taking on climate commitments. The country is facing great pressure both inside and outside international climate negotiations to be more ambitious in combating global climate change.

Clearly, China’s rampant environmental pollution problems and rising greenhouse gas emissions and the resulting climate change are undermining its long-term economic growth. China, from its own perspective cannot afford to and, from an international perspective, is not meant to continue on the conventional path of encouraging economic growth at the expense of the environment. Instead, concerns about a range of environmental stresses and energy security as a result of steeply rising oil imports have sparked China’s determination to improve energy efficiency and cut pollutants, and to increase the use of clean energy in order to help its transition to a low-carbon economy.

To that end, China has 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 SO₂ emissions and chemical oxygen demand (COD) 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’. Just prior to the Copenhagen Climate Change Summit, China further pledged to cut its carbon intensity by 40–45 percent by 2020 relative to its 2005 levels in order to help reach an international climate change agreement at Copenhagen or beyond, and reaffirmed its plan to have alternative energy sources to meet 15 percent of the nation’s energy requirements by 2020. Wen Jiabao, China’s Prime Minister, made it clear at Copenhagen that China will honor its commitments regardless of the outcome of international negotiations. China is working on its 12th five-year economic plan for the period 2011–15, and the carbon intensity target is expected to be incorporated as a domestic commitment for the first time in China’s five-year economic plan. These unilateral commitments clearly indicate China’s determination to further decouple its energy use and carbon emissions from economic growth.

Since 2002 China has experienced faster energy consumption growth than economic growth. The country also failed to meet the target of
stabilizing its SO₂ emissions in 2005 at its 2000 levels. These targets and pledges clearly do not represent business as usual. The question then is: is China really able to achieve its targets? After all setting the targets and enacting the corresponding policies and measures to meet those goals just signal the goodwill and determination of China’s leaders. To actually achieve the desired outcomes requires strict implementation and coordination of these policies and measures.

However, China has faced great difficulty ensuring that local governments act in accordance with centrally directed policies. As a common practice, the central government of China sets a national energy intensity goal. This national goal is then decomposed at each province or equivalent. Each province or equivalent further decomposes its energy-saving goals at prefecture and county levels. The ability of, and incentives for, lower-level governments to effectively implement energy-saving and pollution-cutting policies are therefore critical, particularly since the past three decades of economic reforms have witnessed a shift in the control over resources and decisionmaking to local governments. This devolution of decisionmaking to local governments has placed environmental stewardship in the hands of local officials and polluting enterprises who are more concerned with economic growth and profits than the environment. Therefore, this has huge implications not only for meeting China’s energy-saving goal in 2010, but also for meeting its proposed carbon intensity target in 2020 and whatever climate commitments beyond 2020 that China may make.

Given its paramount importance and relevance to the topics addressed in remaining chapters, Chapter 2 deals with effective environmental protection in the context of government decentralization. This chapter first discusses a variety of tactics that the Chinese central government has been using to incentivize local governments. The chapter next examines those objective and subjective factors that lead to the lack of cooperation by local official’s on environmental issues. It then discusses a number of market-based instruments, supporting economic policies, environmental performance ratings and disclosure, and cooperation with financial institutions to promote long-lasting, improved corporate energy-saving and environmental performance.

Chapter 3 discusses China’s own efforts towards energy saving and pollutants cutting, the widespread use of renewable energy, development of nuclear power and participation in clean development mechanism (CDM). It puts carbon reductions of China’s unilateral actions into perspective by examining whether the estimated greenhouse gas emissions reduction from meeting its national energy-saving goal is achieved from China’s unilateral actions (namely, actions outside the CDM projects in China) or mainly with support from the CDM projects. The calculation
indicates that CDM does not make much of a difference to China, but China is definitely making a difference to CDM. The overwhelming majority of the estimated CO₂ reduction from meeting the aforementioned 20 percent energy-saving goal in China is expected to be achieved through its own domestic actions, rather than support from the CDM projects.

To put into perspective China’s pledge to cut its carbon intensity by 40–45 percent by 2020 relative to its 2005 levels, Chapter 4 first assesses whether this proposed carbon intensity goal just represents business as usual by examining whether the goal for 2020 is as challenging as the energy-saving goals set in the 11th five-year economic blueprint, to what extent it drives China’s emissions below its projected baseline levels, and whether China will fulfill its part of a coordinated global commitment to stabilize the concentration of greenhouse gas emissions in the atmosphere at the desirable level. To assess whether the proposed target is quite as ambitious as China argues, the chapter next examines the issues of whether it is a conservative target and whether there is a room for further increase. Our balanced analysis of China’s proposed carbon intensity target challenges the views of both some Western scholars and the Chinese government regarding its ambition. No doubt, as long as China’s pledge is in the form of carbon intensity, the reliability of both emissions and GDP data matters. The chapter then addresses reliability issues concerning China’s statistics on energy and GDP. Such an analysis shows that GDP figures are even more crucial to the impacts on the energy or carbon intensity than are energy consumption and emissions data by examining the revisions of China’s GDP figures and energy consumption in recent years. Finally, the chapter concludes that China’s proposed carbon intensity target not only needs to be seen as ambitious, but more importantly it needs to be credible.

However, as long as China’s commitments differ in form from that of the US 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 US Senate is shaping its climate bill, given that the inclusion of border measures is widely considered the ‘price’ for passing any US legislation capping its greenhouse gas emissions. Moreover, the US Senate can always use China as an excuse for its own failure to pass a long-awaited bill to cap US greenhouse gas emissions. Indeed, in what format and under what time frame 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.

In response to these concerns and to put China in a positive position, Chapter 5 maps out the roadmap for China’s specific climate commitments towards 2050. Taking many factors into consideration, this chapter argues that China needs to take on absolute emissions caps around 2030. While this date is later than the time frame that the US 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. To that end, the chapter envisions that China needs the following three transitional periods of increasing climate obligations before taking on absolute emissions caps that will lead to the global convergence of per capita emissions by 2050: first, further credible energy-conservation commitments starting in 2013 and aimed at cutting China’s carbon intensity by 46–50 percent by 2020; second, voluntary ‘no lose’ emission targets starting in 2018; and third, binding carbon intensity targets as its international commitment starting in 2023. 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 China is approaching the world’s largest economy. To our knowledge, this is the first study to lay out a realistic roadmap for China to 2050, with such main distinguishing features. Moreover, the range of political arguments in mapping out such a roadmap constitutes a major contribution to the climate change debate on engaging in fast growing economies, in particular China.

To date, border adjustment measures in the form of emissions allowance requirements under the US proposed cap-and-trade regime are the most concrete unilateral trade measures put forward to level the carbon playing field, and the US emissions allowance requirements clearly target major emerging economies, such as China and India. If improperly implemented, such measures could disturb the world trade order and trigger a trade war. Because of these potentially far-reaching impacts, Chapter 6 analyzes trade policy implications of the proposed carbon tariffs in the US, as well as China’s responses. Scrutinizing the US emissions allowance requirements against World Trade Organization (WTO) provisions and case laws, this chapter recommends what is to be done on the side of the US to minimize the potential conflicts with WTO provisions in designing its border carbon adjustment measures, and provides suggestions for China on how to effectively deal them to its advantage while being
targeted by such proposed measures. The chapter has argued that there is a clear need within a climate regime to define comparable efforts towards climate mitigation and adaptation to discipline the use of unilateral trade measures at the international level, and shows that defining the comparability of climate efforts can be to China’s advantage. Given the fact that, in volume terms, energy-intensive manufacturing in China values 7–8 times that of India, and thus carbon tariffs have a greater impact on China than on India, the chapter questions whether China should hold the same stance on this issue as India as it does now, although the two largest developing countries should continue to take a common position on other key issues in international climate change negotiations.

Finally, Chapter 7 summarizes the main conclusions from the comprehensive and rigorous analysis and discussion on issues related to energy conservation and pollution control in the context of government decentralization, renewable energy, nuclear power, clean coal technologies, the carbon intensity pledge for 2020, China’s responses to potential carbon tariffs imposed from its main trading partners, and China’s specific climate commitments towards 2050.