

**THE GRIFFITH – LOWY INSTITUTE PROJECT ON  
THE FUTURE OF CHINA**

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**VICTIM OF SUCCESS: CHINA'S GROWTH AND  
ENVIRONMENTAL CONSEQUENCES**

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**D E C E M B E R 2 0 0 9**

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**The Griffith – Lowy Institute Project** was established with the firm belief that the future of Australia and the world will be significantly shaped by the future of China and that a deeper understanding of what is happening within China will be essential to many of the key policy decisions Australian governments and businesses will need to make in the first half of the 21<sup>st</sup> century. The project will produce a stream of practically-focused, policy-relevant research on the future of China and be designed for a general audience with the aim of helping to shape broad debate about these issues in Australia and internationally. The project will focus its resources on two particular issues, China’s domestic reform challenges and the changing nature of China-Australia relations.

The views expressed in this paper are entirely the author’s own and not those of the Lowy Institute for International Policy or the Griffith Asia Institute.

## **Executive summary**

Until quite recently, researchers evaluating China's future have focussed mainly on uncertainties in economics, politics and international relations. But in the twenty-first century a major new area of uncertainty has emerged: China's accelerating resource consumption and its environmental consequences. These connected issues will have grave implications for resource security and for the world's efforts to control carbon emissions, curb climate change, and move to sustainable growth.

On a positive note, it now seems evident that China's leaders and their advisors understand the huge threat to its future posed by resource scarcity and a changing climate, and they are introducing strong and determined counter-measures. An historic opportunity has emerged for the developed world to partner with China in a new international collaborative effort that holds the promise of breaking China's mutually-disadvantageous negotiating stalemate with the United States and reversing the global growth of carbon emissions.

Seizing this opportunity will depend on whether China can maintain sufficient momentum in developing and applying clean energy technologies to offset the impact of continuing runaway resource usage, and on whether key developed countries (especially the United States, but notably also Australia) can overcome domestic opposition to their own emissions reduction efforts.

If China fails it will be held accountable by international opinion. If major developed nations fail, China will be justified in blaming them for not reducing their emissions sufficiently and sabotaging progress in the fight against climate change.

China's actions to reduce its emissions will be more important than those of any other country, simply due to the scale of the projected growth of its emissions. But it cannot lead an international transition to a low-carbon economy alone.



## **Victim of success: China's growth and environmental consequences**

**Roger Irvine**

### **Introduction**

Speculation about the major drivers of China's future direction has tended until recent years to focus mainly on uncertainties about its economic and political prospects, and on whether its international role is likely to be constructive or disruptive. This paper addresses an additional major area of uncertainty in China's future outlook that now looms large and may increasingly overshadow these more traditional concerns. It documents the dramatic scope of the challenge faced by China that arises from its massive appetite for resources and from the disturbing environmental consequences. China's sustained high level of economic growth is exacerbating these problems and causing it to become increasingly a victim of its own success, and as the world's fastest growing source of greenhouse gas (GHG) emissions its success is also having increasingly serious global consequences.

Whether China can surmount the difficulties involved in addressing this daunting resource security and environmental challenge is still an open question. But the paper argues that recognition needs to be given to the new-found seriousness of China's intent and the growing scope of its countermeasures. It also seeks to reinforce the message that, if global climate change issues are to be tackled successfully, developed nations like the United States and Australia will need to collaborate effectively with China and provide leadership by aggressively curbing their own emissions. Such collaboration will be important for its own sake, but if effective it could also provide a viable foundation for engaging China constructively in other aspects of the international agenda.

### **Resource pressures**

Emerging major uncertainty about resource issues in China is highlighted by recent, well-supported analysis that shows a dramatic shift, from the beginning of this current decade, in China's resource consumption patterns.<sup>1</sup> During the previous two decades, after the commencement of China's resurgence in 1978 until 2000, China's GDP grew at about nine per cent per year; leading naturally to escalating resource consumption. China deserves enormous credit, however, for containing the growth in energy demand during this period to only about four per cent, less than half the growth in the overall economy. This was achieved as a consequence both of deliberate energy conservation policy and of effective policy implementation, assisted by the continued authority of the central government.

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<sup>1</sup> D.H. Rosen and T. Houser, *China energy: a guide for the perplexed*. China Balance Sheet Project. Washington, DC, CSIS and Peterson Institute for International Economics, May 2007, pp 6-16.

From 2001, however, growth in energy usage surged – within an increasingly market-driven economy – to greater than ten per cent, peaking in 2006 at around 16 per cent. In other words, energy consumption during those years equalled or considerably exceeded the rate of growth of GDP, following a pattern more typical of other countries during their industrialisation phase. The primary reason for this striking deterioration in the energy intensity of China's economy was the booming heavy industry sector which has fed the astonishing growth of infrastructure. The statistics are arresting. China now produces about half of the world's cement and flat glass, over one third of its steel, and over one quarter of its aluminium. It is also now a major exporter of these products. Industry accounts for two thirds of China's energy consumption, which is 'high by either developed- or developing-country standards'.<sup>2</sup>

This unexpected reversal in energy intensity shocked international observers and also caused great concern within China. All previous forecasts had assumed that energy consumption would continue to be held to about half the growth level of GDP. Taking into account the new higher consumption trend, the International Energy Agency (in its 2007 World Energy Outlook) almost doubled its forecast of China's energy demand in 2030 from 2.1 billion tons of oil equivalent to 3.8 billions tons. As a consequence of this much higher consumption, China's share of global energy demand has been forecast to increase from ten per cent in 2000 to 22 per cent in 2030, 'easily surpassing the United States as the world's largest energy consumer.'<sup>3</sup> In the same period, China's share of the world's population is expected to decline from about 22 per cent to 20 per cent.

This sharply altered trend has already had a very negative impact on China's resource self-sufficiency and resource security, and it raises further concerns about future resource availability and effects on the volatility of supply and pricing in international energy and commodity markets. In 2000, China met almost all of its energy demands from domestic sources. Now it is increasingly dependent on international supplies of oil, natural gas and even coal. The World Bank has noted that oil import dependence and electricity shortages have created 'an increasing sense of insecurity' and risk serious economic disruption. Domestic oil production will peak at about 200 million tons in 2015, but demand by 2020 is projected to reach between 450 million tons (in a demand reduction scenario) and 610 million tons (in a business-as-usual scenario). Between half and two-thirds of oil demand would therefore depend on imports, and in circumstances where there is likely to be considerable uncertainty about future oil price levels.<sup>4</sup> Similarly, China's appetite for minerals and other commodities has grown apace, to meet the demands of industry and of accelerated development in the residential, commercial and transport sectors. Commodity prices fell dramatically with the global economic crisis, but are now stabilising as both emerging and developed economies (especially China itself) begin to recover momentum.

Another crucial trend driving China's surge in resource consumption is the spectacular pace and scale of its urbanisation. Given China's immense population, its contemporary urbanisation is a phenomenon of unprecedented scale. A recent major study by McKinsey Global Institute notes that as recently as 1990 China's urban population was only 20 per cent, by 2000 it had reached 36 per cent, and by 2007 it was 46 per cent. The study forecasts this will increase to 64 per cent

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<sup>2</sup> C. F. Bergsten, C. Freeman, N. Lardy and D. Mitchell, *China's rise: challenges and opportunities*. Washington, DC, Peterson Institute for International Economics, 2008, p 141.

<sup>3</sup> Ibid.

<sup>4</sup> N. Berrah, F. Feng, R. Priddle and L.P. Wang, *Sustainable energy in China: the closing window of opportunity*. World Bank, March 2007, p xxxiii.

in 2025. Between 2008 and 2025, 350 million people will be added to China's urban population. By 2025, 221 Chinese cities will have over one million residents. By 2030, one billion people will probably live in China's cities. This will require, by 2025, an additional 40 billion square meters of floor space in five million new buildings, which may include 50,000 new skyscrapers (equivalent to ten New York cities).

Development on this scale will consume vast quantities of materials, and McKinsey projects that between 2005 and 2025 urban China 'will account for around 20 per cent of global energy consumption and up to one-quarter of growth in oil demand'. Urban China's energy and water usage will double over the next two decades, while over 15 per cent of arable land could be lost.<sup>5</sup> Much of China's urban development is decentralised, unplanned and land-intensive, resulting in unrestrained urban sprawl that threatens to engulf huge areas of the intercity landscape in north, south, east and central China.<sup>6</sup>

China's transport revolution is also contributing massively to resource consumption. Road, rail, air and urban transit networks have expanded at a similar rate to urban construction. Forecasts by China's Development Research Centre and its Energy Research Institute suggest that China's fleet of transportation vehicles may soar between 2000 and 2020 (under a business-as-usual scenario) from 16 million to nearly 94 million vehicles, and transportation fuel demand would more than triple. China has recently overtaken the United States to become the world's largest car manufacturer. Freight trucks are expected to contribute 60 per cent of China's total projected transportation consumption in 2020.<sup>7</sup>

Another source of escalating consumption is expected to be the dramatic growth of China's middle class, mostly concentrated in the cities but with significant growth also in rural areas. A 2007 World Bank report indicated that in 2000 only 13.5 per cent of the global middle class were Chinese, but by 2030 this would rise to 38 per cent, and 'in fact half of the total 740 million new entrants to the global middle class will be Chinese nationals'.<sup>8</sup> China appears to be on track to realise the government's target of quadrupling per capita GDP between 2000 and 2020. This rising affluence will continue to drive resource consumption in areas such as housing, heating and cooling, vehicles, appliances, electronics, food, travel, luxuries, etc. By 2025, McKinsey forecasts that China will be the world's second-largest consumer market.<sup>9</sup>

All these areas of resource consumption are of course only a logical consequence of the widely-expected continued high growth rate of China's overall economy. It requires some imagination to picture the level of resource pressure if the economy continues to double and redouble about every seven to ten years in coming decades. Using an 8.5 per cent annual urban GDP growth estimate, McKinsey has projected that between 2005 and 2025 China's urban GDP will increase fivefold. This increase would be larger than Japan's total current GDP.<sup>10</sup>

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<sup>5</sup> J. Woetzel, L. Mendonca, J. Devan, S. Negri, Y.M. Hu, L. Jordan, X.J. Li, A. Massry, G. Tsen, F. Yu and D. Farrell, *Preparing for China's urban billion*. McKinsey Global Institute, March 2009, pp 100-127.

<sup>6</sup> N. Mars and A. Hornsby, *The Chinese dream: a society under construction*. 010 Publishers, 2008.

<sup>7</sup> Berrah, Feng, Priddle and Wang, *Sustainable energy in China: the closing window of opportunity*, pp 53-55.

<sup>8</sup> M. Bussolo, R.E. De Hoyos, D. Medvedev and D. van der Mensbrugghe, *Global growth and distribution: are China and India reshaping the world?*. World Bank, November 2007, p 20.

<sup>9</sup> Woetzel, Mendonca, Devan, Negri, Hu, Jordan, Li, Massry, Tsen, Yu and Farrell, *Preparing for China's urban billion*, p 104.

<sup>10</sup> *Ibid.*, p 103.

## Environmental impacts

If China's resource consumption trajectory is staggering, the environmental impacts that have accompanied its headlong pursuit of economic growth are equally confronting. Prolonged high growth rates, insufficient priority for pollution control and inadequate implementation of environmental regulations have led to very high levels of atmospheric, water and soil pollution, to very extensive deforestation and desertification, to serious consequences for public health, and to the spread of China's pollution to other countries. For example, according to the State Environmental Protection Agency, in 2006, 60 per cent of China's rivers suffered from pollution to such an extent that they could not be used for drinking water. Determined efforts are now being made to implement new controls on pollution. A recent World Bank report indicates for example that the share of the urban population served by municipal water supply utilities has increased from 50 per cent in 1990 to 88 per cent in 2005, while over the same period wastewater treatment capacity has tripled.<sup>11</sup> But implementation of pollution controls is still patchy and in many areas it seems inevitable that pollution levels will continue to grow.

China's pollution challenge is exacerbated by its very high dependence on coal, which provides about 70 per cent of primary energy compared to the global average of about 25 per cent. Coal use brings major environmental problems due to harmful emissions; including particulates, sulphur dioxide, and nitrous oxide. Moreover, most of China's domestic coal production is of relatively low quality. In 2007 China mined 2.5 billion tonnes of coal, almost half of global hard coal production. Reliance on coal for energy is likely to continue to increase in future because China has plentiful supplies (enough to last over 70 years at the current rate of production), whereas future supplies of oil and natural gas will need to rely increasingly on imports. Even in a scenario where China is successful in lowering its energy intensity, coal use may climb to 2.8 billion tonnes in 2010 and 3.2 billion tonnes in 2020 – and substantially more if energy intensity is not reduced.<sup>12</sup> The World Bank assesses that with coal usage on this scale, by 2020 the environmental consequences are likely to reach 'crisis proportions' with pollutant levels in China exceeding sustainable limits.<sup>13</sup>

China's energy and environmental trends have been the subject of serious and steadily growing concern for research agencies and governments both in China and internationally. A 2007 report presented by a joint team from the World Bank and the Development Research Centre of China's State Council asserted that China had reached a 'strategic crossroads' where 'a business-as-usual future appears unsustainable'. If China's energy demands 'continue to march in lockstep with economic growth, doubling every decade' it would be 'impossible' to meet future energy needs. This could also affect China's long-term competitiveness. The report noted that if energy intensity was not improved, China's energy consumption might increase by 2020 to more than 5 billion tons of coal equivalent, compared to previous forecasts of 3.3 billion. It added that energy use 'on this gigantic scale' might pose problems technically, especially given the large distances China's coal must be transported. Coal already accounts for 70 per cent of total rail transport.<sup>14</sup> There is also uncertainty about China's ability to sustain

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<sup>11</sup> G.J. Browder, *Improving the performance of China's water utilities*. World Bank, 2007, p xvii.

<sup>12</sup> *Cleaner coal in China*. International Energy Agency, 20 April 2009.

<sup>13</sup> Berrah, Feng, Priddle and Wang, *Sustainable energy in China: the closing window of opportunity*, p xxxiii.

<sup>14</sup> Y.C. Xu, *China's struggle for power*. Griffith-Lowy Institute Project on the Future of China, Lowy Institute for International Policy, August 2008, p 5.

larger coal outputs and to source sufficient oil imports. China's 'already enormous' energy needs might grow to a level that would be 'difficult to satisfy.'<sup>15</sup>

Even 'more alarming', the authors of the World Bank report emphasised that although the technology is available for China to once again control its energy intensity, the 'window of opportunity' to do so was 'closing rapidly' because of the 'huge current growth of investments in existing rather than new and advanced energy technologies'. As the report noted, currently in China 'millions of investors and consumers are all the time making (decentralised) decisions on capital stocks that will determine the future energy intensity of the economy. Those decisions will create the bulk of the energy-transforming and energy-using equipment that will exist in the national inventory of 2020: power stations, oil refineries, chemical plants, smelters, manufacturing operations, buildings of all kinds, domestic appliances, cars, trucks, trains, planes, and ships. One could add cities and highways.'<sup>16</sup>

Similar concerns have been expressed by McKinsey regarding the future path of China's urbanisation. If the dispersed growth pattern is maintained, the current trajectory of urban energy and water consumption, and of pollution, will also continue with the potential for 'significant setbacks and volatilities'. McKinsey argues that a more concentrated urbanisation pattern, including the encouragement of super-cities, would result in the highest growth of per capita GDP, ease congestion and pollution, and give the most efficient energy use. It would also encourage the growth of mass transit systems and reduce the loss of arable land.<sup>17</sup>

## **Climate change**

China's concerns about resource issues appear until recent years to have focussed mainly on the resource security, energy efficiency and pollution issues associated with, and detracting from, its economic rise; but there is convincing evidence that it is now also becoming increasingly concerned about the consequences of its massive resource consumption for the level of its GHG emissions and for climate change.

Along with resource consumption and pollution, China's GHG emissions have also been sharply increasing. Previous estimates suggested that China's emissions would not exceed those of the world's largest emitter, the United States, until about 2020. However, in parallel with the deterioration of energy intensity and the acceleration of overall consumption, China's GHG emissions have soared, with the result that according to some international estimates China overtook the United States as early as 2006 or 2007.<sup>18</sup> China and the United States are estimated to contribute currently about 20 per cent each to global GHG emissions. China's CO<sub>2</sub> emissions have grown from 2.5 Gt in 1992 to 7 Gt in 2009.<sup>19</sup> International Energy Agency (IEA) forecasts indicate that China could be responsible for one-quarter of the world's growth in carbon dioxide emissions between 2002 and 2020, and that by 2030 emissions may reach 12

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<sup>15</sup> Berrah, Feng, Priddle and Wang, *Sustainable energy in China: the closing window of opportunity*, pp xiii-xv, xxxii, 32.

<sup>16</sup> *Ibid.*, pp xx, 43.

<sup>17</sup> Woetzel, Mendonca, Devan, Negri, Hu, Jordan, Li, Massry, Tsen, Yu and Farrell, *Preparing for China's urban billion*, pp 107-147.

<sup>18</sup> M.D. Levine. Testimony before the US-China Economic Security Review Commission Hearing on China's Energy Policies and their Environmental Impacts. Washington, DC, 13 August 2008.

<sup>19</sup> T. Stern, *China and the global climate challenge*. Center for American Progress, 3 June 2009, p 3.

Gt.<sup>20</sup> The Chinese Academy of Sciences has warned that China's CO<sub>2</sub> emissions could double between 2005 and 2020.<sup>21</sup> An Australian study has concluded that, under a business-as-usual projection, China could contribute 37 per cent of global CO<sub>2</sub> emissions by 2030.<sup>22</sup>

The government of China is certainly not in denial about the consequences of global GHG emissions for climate change. It has acknowledged that global climate change and its adverse effects are 'a common concern for mankind', that it is 'human activities' (especially by developed countries) that have increased atmospheric concentrations of GHGs, and that this poses 'severe challenges to the survival and development of human society'.<sup>23</sup> It has publicised the findings of its own scientists who have reported that average temperatures at the earth's surface in China have risen 1.1 degrees Celsius over the past century and that China has experienced 21 warm winters from 1986 to 2007, of which 2007 was the warmest on record. In China's coastal zones, sea surface temperature and sea level have been observed to have risen by 0.9 degrees Celsius and 90mm respectively, over the past 30 years.<sup>24</sup>

Chinese scientists project that air temperatures will increase by 1.3 to 2.1 degrees Celsius from 2000 to 2020, and by 2.3 to 3.3 degrees Celsius from 2000 to 2050. They note that the glacier area in northwest China has shrunk by 21 per cent and that the thickness of frozen earth in the Qinghai-Tibet plateau has reduced by up to five metres over the last 50 years.<sup>25</sup> China's scientists have also projected that by 2030 overall agricultural crop productivity could decrease by five to ten per cent (if no action was taken), and that by the second half of this century climate change could cause a reduction in yield of rice, maize and wheat by up to 37 per cent. They have also estimated that by 2050 the total area of China's western glaciers could reduce further by 27.2 per cent, and that in the southern part of China, especially the Pearl River delta, sea levels could rise between 0.60 and 0.74 metres by 2100.<sup>26</sup> It is likely that China has also been influenced by reports in other countries of impending climate change. Dr Stephen Howes, at the Australian National University, noting recent projections that the Hindu Kush-Himalayan-Tibetan glacial system may reduce by 75 per cent within 50 years, observes that in developing countries 'there is no doubt that the risks of climate change are better appreciated today than they were 10 years ago'.<sup>27</sup>

There seems little reason, therefore, to be sceptical of China's assertion that it is 'fully aware of the importance and urgency of addressing climate change'.<sup>28</sup> China appears to concede that the threat of already observable climate change is sufficient that it too must play a greater role in helping to lower global GHG emissions. Apart from its own self-interest, China very probably also understands that unless it shows itself willing to contribute to curbing global emissions, it

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<sup>20</sup> Berrah, Feng, Priddle and Wang, *Sustainable energy in China: the closing window of opportunity*, p 71; Stern, *China and the global climate challenge*, p 3.

<sup>21</sup> China warns of huge increase in emissions. *New Scientist*, 22 October 2008.

<sup>22</sup> L.G. Song and W.T. Woo, eds., *China's dilemma: economic growth, the environment and climate change*. ANU E Press, 2008, p 180.

<sup>23</sup> China's policies and actions for addressing climate change. *State Council of the People's Republic of China*, October 2008.

<sup>24</sup> Ibid.

<sup>25</sup> China's national climate change programme. *National Development and Reform Council*, June 2007.

<sup>26</sup> E.D. Lin, Y.L. Xu, S. Wu, H. Ju and S.M. Ma, *Synopsis of China's national climate change assessment report (II): climate change impacts and adaptation*, 2007.

<sup>27</sup> Stephen Howes, Can China rescue the global climate change negotiations?, in *China's place in a world in crisis: economic, geopolitical and environmental dimensions*, ed. R Garnaut, L.G. Song, and W.T. Woo. Canberra, ANU, 2009, p 415.

<sup>28</sup> China's policies and actions for addressing climate change.

will (like the United States and other major emitters) come under increasing international pressure and criticism.

For example, the IEA has observed that without China it will be impossible to stabilise carbon emissions at around 450 parts per million, the minimum level prescribed by the UN's Intergovernmental Panel on Climate Change (IPCC) to forestall some of the worst effects of global warming; and that without strong action by China, especially to reduce emissions from coal that contribute more than 80 per cent of China's total emissions, these emissions 'could rise to an unsustainable level'. The World Bank emphasised in its March 2007 report that the initiatives China had taken to combat environmental concerns were 'dwarfed by the momentous challenges ahead'. It noted that crucial reforms had 'stalled', policy making was 'piecemeal and uncoordinated', and implementation was 'weak'. Given that lead times were 'likely to be long', it stressed in a tone bordering on desperation that the situation was urgent and the 'time for action has arrived'. But, it added, 'urgency is the characteristic lacking in (China's) energy and environmental policy'.<sup>29</sup>

### **Policy responses**

The quality of policy responses by China and the international community to the challenge of climate change will be critical, along with effective implementation of those responses. There is widespread agreement that technologies are available to address the problems, although in some areas (such as carbon capture and storage) the technology has not yet been proven. But the critical factor, and the main area of uncertainty, is whether the principal actors and decision-makers, in China and with international support, are willing and able to rise to the task.

International observers recognise that China's leadership is very aware of the environmental challenge it faces and willing to take strong measures. The World Bank's China Country Director noted that: 'Happily, there is a high level of environmental awareness on the part of China's decision makers ... combined with an obvious preparedness to act in the area of energy law and institutions'. Although China faces 'a daunting challenge', he concluded it was 'certainly not beyond China's capabilities'. The World Bank speaks optimistically of China's ability to transform itself 'from a laggard to a global leader, leapfrogging some stages of development to boldly deploy (new) technologies'. It acknowledges, somewhat generously, that China has 'a comprehensive strategy' and that it has adopted 'to some degree' most of the necessary measures for achieving sustainability.<sup>30</sup>

China's energy efficiency and environmental measures include a very ambitious target to achieve by 2010 a 20 per cent reduction in energy intensity compared to 2005, aptly described as 'one of the most significant carbon mitigation initiatives in the world'.<sup>31</sup> Progress towards this goal has been substantial, although by 2008 China was less than halfway to the target with only two years to go.<sup>32</sup> Another program aims to slash consumption in its 1000 largest energy-using enterprises that together accounted in 2004 for 33% of national and 47% of industrial

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<sup>29</sup> Berrah, Feng, Priddle and Wang, *Sustainable energy in China: the closing window of opportunity*, pp xxxiv-xxxv, 30.

<sup>30</sup> *Ibid.*, pp xv-xvi, xxxiv, xxxix.

<sup>31</sup> J.J. Tu, Future prospects of China's policy on climate change. *China Brief* 9 (1) 2009.

<sup>32</sup> Howes, Can China rescue the global climate change negotiations?, p 420.

energy usage.<sup>33</sup> China also aims to raise the proportion of renewable energy (including hydro) in primary energy supply to ten per cent by 2010, and to 15 per cent by 2015.<sup>34</sup> Recent reporting indicates that China's nuclear power capacity is set to expand rapidly (although not as a proportion of total capacity), and that coal-fired power generation may begin to plateau.<sup>35</sup> China's reforestation efforts have also been commendable, with total forested area reportedly increasing from 12 per cent of total land area in the early 1980s to over 18 per cent by 2008.<sup>36</sup>

As pointed out to the US Congress in testimony by Mark Levine from Lawrence Berkeley National Laboratory, there has been a 'failure to recognize that China has in the past (1980-2000) and is again putting tremendous effort into reducing growth of energy-related CO<sub>2</sub> emissions through the design and implementation of aggressive and innovative energy efficiency policies'. In a comment that the Chinese leadership's past record in some other areas of reform appears to justify, he notes that 'one does not wish to underestimate the ability of the government to achieve large goals'.<sup>37</sup>

As each new month goes by there is further evidence of China's serious intent to tackle environmental and climate change issues; something that cannot be said for all developed countries, most of whom have yet to fulfil their emissions reduction undertakings under the current Kyoto Protocol and the Bali Roadmap. China's declaratory policy has also been encouraging. Vice-Chairman of China's National Development and Reform Commission Xie Zhenhua, described as China's chief climate negotiator, asserted during a recent visit to the United States that China would 'definitely not repeat the traditional high-pollution, high-emission development path of developed countries', but guided by sustainable development strategies it would 'work aggressively and actively to reduce greenhouse emissions'. He emphasised that while the world was currently preoccupied with the financial crisis, climate change was 'an even more serious and long-term challenge'. He noted Premier Wen Jiabao's plea that Western nations not use the financial crisis as an excuse to relax their commitments on climate change.<sup>38</sup>

Unfortunately, and despite China's apparent commitment, very important questions remain about whether the scale and momentum of China's growth will nevertheless substantially offset its best efforts to promote sustainable development and to slow its GHG emissions. The anxieties expressed by the World Bank in its 2007 report remain valid. The issue still hangs in the balance; necessarily so, in view of considerations such as the huge scale of the problem, the seemingly unstoppable momentum beyond China's surging development, the extent of powerful vested interests, and limitations on the ability of the central government to impose its will.

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<sup>33</sup> Lin, Xu, Wu, Ju and Ma, *Synopsis of China's national climate change assessment report (II): climate change impacts and adaptation*.

<sup>34</sup> J. Wong and A. Light, *China begins its transition to a clean-energy economy*. Center for American Progress, 4 June 2009, pp 2-4. *US-China climate change cooperation*. Carnegie Endowment for International Peace, 18 March 2009.

<sup>35</sup> R. Callick, China set to double its nuclear reactors. *The Australian*, 26 May 2009.

<sup>36</sup> China's policies and actions for addressing climate change.

<sup>37</sup> Levine. Testimony before the US-China Economic Security Review Commission Hearing on China's Energy Policies and their Environmental Impacts; M.D. Levine and N.T. Aden, *Global carbon emissions in the coming decades: the case of China*. Lawrence Berkeley National Laboratory, 2008, p 29.

<sup>38</sup> *US-China climate change cooperation*, p 6.

China has undertaken, and publicised, an impressive array of initiatives to combat climate change, and these initiatives undoubtedly will help greatly to mitigate the level of its emissions. It has quantified its energy intensity and renewables targets and has implemented many other specific programs.<sup>39</sup> Despite early scepticism, it seems increasingly possible that such targets may be achieved, but at the same time China has observed that it remains committed to the ‘imperative tasks’ of developing its economy and improving people’s lives.<sup>40</sup> China has commented that ‘basic conditions’ in the country present ‘great challenges in addressing issues regarding climate change’. As Levine notes, China’s movement towards a market economy means that although there was once a time when the government could just make things happen, ‘that time is no longer’. Policies that conflict with making money ‘are particularly difficult to put into practice’.<sup>41</sup>

Most observers concede the underlying validity of China’s often-repeated official position (which it shares with many other developing countries) that its cumulative historical emissions are much less than those of the developed world; that its current and foreseeable per capita emissions are also considerably less; that its emissions include those associated with heavy industrial and manufactured goods that are then re-exported for the benefit of other economies; and that it can claim it has a moral right to continue to pursue economic growth in order to lift even more of its people out of poverty and raise living standards for most of its citizens to a tolerable level. China is correct in pointing out that the Bali Roadmap accepted the principle of ‘common but differentiated responsibilities’, under which developed countries undertook to publish their carbon reduction schemes and transfer relevant technology and financial assistance to developing countries to help them implement their own nationally initiated measures.<sup>42</sup>

But given China’s continued rapid economic growth and its still growing emissions, it must accept the inevitability that it, like the United States and other developed countries, will be expected by the international community to do much more. China’s response will need to acknowledge that even if developed countries take extreme measures to reduce their emissions, China’s continued growth (and that of other major emerging economies) may still be enough to ensure that atmospheric CO<sub>2</sub> concentrations will climb to increasingly dangerous levels. This has been underlined by another McKinsey study, which indicated that even if China met its targets for energy intensity and renewables, its carbon emissions would still more than double by 2030 if its economy continued to grow strongly.<sup>43</sup> Todd Stern, the US Special Envoy for Climate Change, commented recently that China ‘straddles the developed/developing country divide’, and that it must recognise that ‘the old principle of assuming no obligations is not sustainable’ because China and the other major developing countries are ‘on track to produce more than 80% of the growth in emissions in the next several decades’. If these emissions are not contained, he asserted, ‘the climate change problem will spin out of control’.<sup>44</sup>

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<sup>39</sup> J.I. Lewis, China’s climate change strategy. *China Brief* 7 (13) 2007.

<sup>40</sup> China’s policies and actions for addressing climate change.

<sup>41</sup> Levine and Aden, *Global carbon emissions in the coming decades: the case of China*, pp 28-29.

<sup>42</sup> *Implementation of the Bali Roadmap: China’s position on the Copenhagen Climate Change Conference*. National Development and Reform Council, 20 May 2009.

<sup>43</sup> J. Woetzel and M. Joerss, *China’s green revolution: prioritizing technologies to achieve energy and environmental sustainability*. McKinsey & Company, February, 2009.

<sup>44</sup> Stern, *China and the global climate challenge*, p 4.

## International collaboration

Nevertheless, an important theme of much international commentary on China's handling of its environmental challenge is that it should not stand alone in addressing these very demanding issues. Given the global ramifications, and their own undertakings, strong policy responses are also required by other countries, and especially by the United States. As the World Bank has noted, China should be 'engaged and assisted' in meeting these challenges, 'rather than vilified and blamed for all the energy-environmental sins of the world'.<sup>45</sup> Levine, in his remarks to Congress, observed that without international assistance China could 'triple or even quadruple' its GHG emissions over the next 20 to 25 years. But, with serious assistance, the increase 'could be cut in half'. In this case 'the world could be well on the way to cutting (total) emissions in half by 2050'.<sup>46</sup>

There has in fact already been a long history of substantial cooperation between Chinese and international (especially US and European) experts seeking to assess trends and formulate recommendations regarding environmental and climate change issues. Among the most recent examples of this cooperation is an Asia Society/Pew Center 'Initiative for US-China Cooperation on Energy and Climate' that aims to 'build on decades of US-China cooperation' in this field, and that resulted in the publication in January 2009 of a 'Roadmap for US-China Cooperation on Energy and Climate Change'. It calls for involvement at the Presidential level and a sharp upscaling of projects to underpin bilateral cooperation.<sup>47</sup> Similar publications, calling for the United States and China to break their aptly-described 'suicide pact' wherein each has refused to take the first step on climate change action, have recently been issued by other US think tanks.<sup>48</sup>

If appropriate leadership is provided by the United States, which has already commenced an active dialogue with China on these issues, there are encouraging indications that US-China cooperation on energy and climate issues may become a major aspect of their future relationship. This will be driven not only by the evident urgency for cooperation in an area that is potentially so threatening to global and national interests, but also because cooperation within this agenda is seen to have the potential – although not without some serious obstacles – to act as a vehicle to place the wider relationship between the current superpower and the emerging great power on a sounder footing. This is part of the thinking behind calls in the United States for it to foster a G2 partnership with China, to lay the foundation for what some are calling 'the most important bilateral relationship in the 21<sup>st</sup> century world'.<sup>49</sup> To the extent that China and other countries are able to collaborate effectively on resource and environmental issues, this may provide a positive context for collective management of other bilateral and international issues.

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<sup>45</sup> Berrah, Feng, Priddle and Wang, *Sustainable energy in China: the closing window of opportunity*, p xx.

<sup>46</sup> Levine. Testimony before the US-China Economic Security Review Commission Hearing on China's Energy Policies and their Environmental Impacts.

<sup>47</sup> *Common challenge, collaborative response: a roadmap for US-China cooperation on energy and climate change*. Asia Society and Pew Center, January, 2009.

<sup>48</sup> W. Chandler, *Breaking the suicide pact: US-China cooperation on climate change*. Carnegie Endowment for International Peace, May, 2008; K. Lieberthal and D. Sandalow, *Overcoming obstacles to US-China cooperation on climate change*. Thornton China Center, Brookings Institution, January 2009.

<sup>49</sup> *Common challenge, collaborative response: a roadmap for US-China cooperation on energy and climate change*, p 6; Stern, *China and the global climate challenge*, pp 5-6.

## New thinking in China

China, in the right circumstances, may be inclined to respond positively to international overtures for it to participate more actively in climate change mitigation efforts at Copenhagen and beyond. It has consistently been an active participant in international climate change negotiations. To date it has shown little official inclination to depart from its position that there must be strict adherence to the Bali Roadmap, which gives developed countries the chief responsibility for making emissions reductions and for providing funding and technology to assist developing countries' nationally initiated measures. But it is currently considering new energy efficiency and environmental targets for its 2011-2015 Twelfth Five Year Plan, in a context where it must be aware that a positive outcome at Copenhagen, or soon thereafter, will be vital if there is to be a reasonable prospect of moderating further devastating effects of climate change on its economy and ecology. Sir Nicholas Stern has commented that 'China knows that there will be no global deal unless it plays a very strong role'. (He notes also the huge scale of effort required for China to achieve a low carbon economy if its GDP continues to grow annually until mid-century by seven to ten per cent.)<sup>50</sup>

At a non-governmental level, there are indications from prominent mainland China commentators of potential flexibility in China's thinking on international climate change negotiations. Professor Pan Jiahua, Executive Director of the Research Centre for Sustainable Development at the Chinese Academy of Social Sciences, has noted: 'The scientific reality is that dramatic reductions in global greenhouse gas emissions are needed within two decades. The current political reality is that both [China and the United States] believe that the other should do more'. He added that China was 'making progress to protect the global climate, but cooperation and support from a country like the United States would certainly help China to go further to reduce emissions.'<sup>51</sup> More recently, Pan has emphasised that China 'is in fact ready and willing to engage with its international partners to help shape a new multilateral climate policy architecture.' In December 2008 Pan presented a Carbon Budget Proposal to the UN Climate Change Conference in Poznan. The Proposal allocates carbon emissions on a global basis according to basic human development needs and envisages a 50 per cent reduction in global emissions by 2050.<sup>52</sup>

Another outspoken commentator is Professor Hu Angang, Director of Tsinghua University's Center for China Studies and an advisor to China's leadership. He argues that, as 'one of the biggest victims of climate change', China has a responsibility to play a major role in encouraging both developed and developing countries to reach a consensus on 'a new global framework for mitigating climate change'. Given that the contribution of developed countries alone will not be adequate, he urges developing countries to 'commit to a timetable to institute emission caps and reductions in accordance with their circumstances and ability'. Hu recommends, ambitiously, that China should aim for its carbon emissions to peak by 2020, be reduced to 1990 levels by 2030, and be half of 1990 levels by 2050. He has also proposed that the current classification of nations as either developed or developing be replaced by four categories based on their Human Development Index ranking and on the level of their GHG

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<sup>50</sup> N. Stern, *A blueprint for a safer planet: how to manage climate change and create a new era of progress and prosperity*. Bodley Head, 2009, p 187.

<sup>51</sup> J.H. Pan and K.S. Gallagher, Global warming: the road to restraint, in *Power and restraint: a shared vision for the US-China relationship*, ed. R. Rosecrance and G.L. Gu. Public Affairs, 2009.

<sup>52</sup> J.H. Pan. *Toward a global climate regime*. 2008: www.chinadialogue.net.

emissions, with the top two categories bearing greatest responsibility for reductions. China would fall initially in the second-highest category and ultimately in the first.<sup>53</sup>

It would be unduly optimistic to assume that such recommendations will obtain official endorsement in the near future. However, they are suggestive that it would be premature to rule out the possibility of a significant proposal by China on international emissions reduction responsibilities at some stage of the Copenhagen negotiations and what follows from these. Other Chinese researchers, including the Development Research Centre of China's State Council, have developed detailed proposals for global emissions allocation.<sup>54</sup> At a national level also, China is showing a willingness to adopt new targets to reduce the energy intensity and emissions intensity of its economic growth. President Hu Jintao stated to the 22 September UN Summit on Climate Change that: 'We will endeavour to cut carbon dioxide emission per unit of GDP by a notable margin by 2020 from the 2005 level.' This was followed by a further announcement on 26 November that 'a binding goal' would be incorporated in China's national plans to reduce the intensity of its carbon dioxide emissions per unit of GDP in 2020 by 40 to 45 per cent compared with the level of 2005. This is a positive initiative, although it would still allow China to more than double its emissions if its economy continues to expand strongly during this period.

China is probably unlikely to commit at this stage to a more ambitious emissions intensity reduction target without similar commitments by other major emitters, especially the United States. The likelihood of a 'grand bargain' at Copenhagen has been much reduced by the absence of appropriate commitments by some key developed countries, especially the United States. China has noted that the Waxman-Markey legislation, itself in serious doubt of passage through the US Senate, would commit the United States to only a 4 per cent reduction in 2020 carbon emissions over 1990 levels. This undermines the effectiveness of stronger commitments by other major developed countries, such as EU members and Japan.

### **Future implications**

Beyond Copenhagen, further major commitments by both the United States and China will be required if there is to be any prospect of reducing atmospheric concentrations of GHGs over the coming decades. China's actions, however, will be more critical than those of any other country, simply due to the scale of the projected future growth of its emissions. China's return to strong economic growth means that it will continue to be the major contributor to growth in global GHG emissions. It therefore holds the future of the world's environment in its hands. This means that China's past emphasis on the responsibility of developed nations for the bulk of emissions since the mid-nineteenth-century Industrial Revolution, on its own developing country status, and on the 'common but differentiated responsibilities' of developed and developing countries, has become increasingly misaligned with evolving global environmental circumstances. China's economic dynamism means that it is uniquely well-placed to address both its own resource security and environmental problems, and to contribute to a global climate change solution, by transitioning as soon as feasible to a low carbon economy. In the process it has the potential both to reap the economic and environmental rewards from that transition and to demonstrate to the world the feasibility of a low carbon economy.

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<sup>53</sup> A.G. Hu. *A new approach to Copenhagen*. 2009: [www.chinadialogue.net](http://www.chinadialogue.net).

<sup>54</sup> Howes, *Can China rescue the global climate change negotiations?*, p 415.

But China cannot lead this low-carbon transition alone. It is entitled to expect strong support from developed countries that have contributed the bulk of historical emissions since 1850 and that still have much higher per capita incomes. A future ‘grand bargain’ on climate change mitigation is likely to fail if developed countries do not live up to their past promises to reduce sharply their own emissions and provide financial and technological support to other countries’ mitigation efforts. Other major emerging economies such as India and Russia will also need to strengthen their commitments.

A critical obstacle to developed countries’ living up to their part of the bargain is the persistence of opposition to strong climate change legislation among significant interest groups in countries such as the United States, and notably also Australia. In both countries the elected governments appear to have the political will to commit to ambitious emissions reductions measures, but their ability to act has been curtailed. Such opposition may weaken in future, as it stands in the face of almost universal acceptance among governments and international organisations of the scientific consensus that climate change is already occurring, and is accelerating. The post-Copenhagen era therefore holds some promise that developed countries will in time implement appropriate legislation. The challenge will pass to the major emerging economies, led by China, which will contribute the bulk of future emissions growth, to show the seriousness of their intent to rein in a level of projected emissions that threatens catastrophic damage both to their own economies and to the rest of the world.

### **Implications for Australia**

The growing uncertainties for China and the world that flow from its resource consumption patterns and their environmental consequences have important policy implications for Australia. While it benefits conspicuously from China’s resource imports and from likely future growth in China’s resource-related investments, Australia must not lose sight of the fact that its future prosperity depends not only on China’s future economic growth but on the environmental sustainability of that growth. Australia should continue to leverage its influence in China as a resource provider – and as the world’s largest coal exporter and source of uranium – by seeking opportunities to ensure that the consumption in China of Australia’s resource exports occurs as efficiently and sustainably as possible.

In its bilateral relationship with China, Australia has a respectable track record of cooperation on environmental and climate change issues. Under the umbrella of a 2003 Joint Declaration on Bilateral Cooperation on Climate Change, Australia has supported numerous joint projects with China in areas such as renewable energy, energy efficiency, climate change science, carbon accounting systems, capture of coal mine methane, and agricultural emissions. A Memorandum of Understanding on bilateral Climate Change Activities was signed in April 2004. Significant funding has been provided under an Australia-China Environmental Development Program and in support of an Australia-China Joint Coordination Group on Clean Coal Technology. The first meeting of a new annual Ministerial-level dialogue was held in Canberra in November 2008. At a non-governmental level, an Australia-China Climate Change Forum was sponsored by the Australian National University in April 2009. Australia is also an active participant, with China, in the Asia-Pacific Partnership on Clean Development and Climate.

In addition, several Australian government initiatives offer a promising context for further cooperation with China on climate change issues. One of the most notable is Australia’s Global

Carbon Capture and Storage Initiative which has the potential, if formidable financial and practical obstacles can be overcome, to help reduce emissions from coal-fired electricity generation plants in both China and Australia, and elsewhere. Australia's Clean Energy Initiative, including the Solar Flagships Programs, makes a valuable contribution towards encouraging development of renewable energy. Australia's target of sourcing 20 per cent of electricity generation from renewable sources by 2020 will provide a useful stimulus, although a much higher target is probably achievable given continuing advances in renewables technologies. As one of the world's highest per capita emitters, Australia needs to set a strong example in this area. It has the opportunity to join with other countries such as China to demonstrate to the world the viability of renewable energy sources such as solar and wind to play a leading role in a low-carbon global future. Australia also needs to provide even stronger support for regional reforestation efforts.

In many respects, Australia's climate change initiatives have been laudable. But its chief shortcoming in making a responsible contribution to addressing the threat of climate change is unfortunately in the area that is most critical. Australia's revamped Carbon Pollution Reduction Scheme (CPRS), like its US counterpart the American Clean Energy and Security Act, sets woefully unambitious targets for emissions reduction. The Scheme sets emission targets at five to 15 per cent below 2000 levels by 2020 and 60 per cent below by 2050, compared with the cuts of 25 to 40 per cent below 1990 levels by 2020 and 80 per cent by 2050 advocated by many (including the IPCC) as the minimum necessary to limit excessive growth of atmospheric CO<sub>2</sub> concentrations. Many argue that the legislation, which faces a highly uncertain future in the Australian Senate, is also flawed by excessively generous concessions to polluters and other shortcomings.

This underlines the importance for Australia of being able to maintain the flexibility to adapt its climate change countermeasures to evolving national and international circumstances, including new opportunities to engage China. Climate Change Minister Senator Penny Wong has noted that the currently proposed emissions reductions are intended as only 'a first step' to 'put Australia on track to deeper cuts in the long term'.<sup>55</sup> If this is true, this would potentially allow Australia to redeem its ambition to play a constructive role in ongoing international climate change remediation efforts, including efforts to encourage China to play its necessary role in global efforts against climate change.

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<sup>55</sup> P. Wong, Minister for Climate Change. Address to the Australia-China Climate Change Forum. Canberra, 15 April 2009.

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