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China's Carbon-Intensity Target

Climate Actors and Policy Developments

Iselin Stensdal

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iss@fni.no

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Authors
Iselin Stensdal

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Abstract

China has become the largest GHG emitting country, and announced in 2009 its first policy objective measured in carbon emissions. The carbon-intensity target is to reduce the carbon intensity by 40-45 % by 2020 compared to 200 levels. Since then there has been further policy developments in order to attain the reduction carbon intensity and steer China towards a low-carbon development. The 12th 5-year plan (2011-2015) is strong on incentives for reducing China's carbon intensity such as energy conservation measures and the establishment of new market-based mechanisms. While the central government forms the policies, the implementation is dependent on a range of actors. In addition to the climate change bureaucracy, the positive forces and actors on GHG mitigation is presented. All in all, there are promising developments in China for the years to come.

Key Words

China, climate change, governance, mitigation policies, carbon intensity, non-state actors

Orders to:

Fridtjof Nansen Institute
Postboks 326
N-1326 Lysaker, Norway.

Tel: (47) 6711 1900
Fax: (47) 6711 1910
Email: post@fni.no
Internet: www.fni.no

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Abbreviations

ADB – Asian Development Bank

CAS – China Academy of Sciences

CASS – Chinese Academy of Social Sciences

CDB – China Development Bank

CDM – clean development mechanism

CMA – China Meteorological Administration

CYCAN – China Youth Climate Action Network

ENGO – environmental non-governmental organization

ERI – Energy Research Institute

GDP – gross domestic product

GHG – greenhouse gas

NACCC – National Advisory Committee on Climate Change

NDRC – National Development and Reform Commission

NEA – National Energy Administration

NEC – National Energy Commission

NLWGACC – National Leading Working Group on Addressing Climate Change

SDC – Swiss Agency for Development and Cooperation

SSTC – State Science and Technology Commission

UNDP – United Nations Development Programme

UNFCCC – United Nations Framework Convention on Climate Change

Introduction[1]

> *We will work hard to develop low-carbon technologies; promote application of highly efficient, energy-conserving technologies; develop new and renewable energies; and intensify development of smart power grids. We will accelerate afforestation… We will participate in international cooperation to address climate change and work for further progress in the global fight against climate change.*
>
> Premier Wen Jiabao, 5 March 2010, in a report of the work of the government, delivered at the 3rd session of the 11th National People's Congress

A mere two weeks before the 15th Conference of Parties to the UNFCCC in Copenhagen in 2009, Chinese media reported that the State Council had decided upon a target of reducing the country's carbon intensity by 40–45% by the year 2020, in relation to 2005 levels. This was the first time China announced goals directly targeting carbon emissions. In 2011, the 12th 5-year plan entered into effect, and it is clear that the carbon-intensity target will strongly influence the direction of socio-economic development for the next five years. Also, the government has embarked on setting up a carbon trading market in that timeframe. From the mid-2000s, CDM projects gained in prominence; the National Climate Change Programme in 2007 put climate change on the national political agenda, re-labelling earlier energy efficiency improvements as 'emissions-reducing activities'. However, the carbon-intensity target was the first carbon-specific objective, and hence arguably the first purely carbon-abating measure; with this target, China got a measurement for its progress in reducing emissions.

This report has two purposes. One: it traces the latest policy developments in connection with the carbon-intensity target. Second, it presents the various climate-change actors in China, as the government cannot achieve its goal without the cooperation of non-governmental actors. Here I focus mainly on work undertaken to mitigate China's greenhouse gas (GHG) emissions. Considerable work has been undertaken in other climate-related fields such as adaptation and capacity-building, but these efforts are not covered here.

The carbon-intensity target

The State Council proclaimed on 26 November 2009 that it had decided that by the year 2020 China would reduce its carbon intensity per unit of GDP by 40 – 45% compared to the 2005 level. 'Carbon intensity' refers to emitted tonnes of carbon per unit of GDP (Reuters 2009). Among the factors that influence the carbon-intensity value is the GDP. This refers to the total production of the economy, so by extension the target is dependent on the future growth rate of the Chinese economy. And, since the GDP is expected to increase in the future, as long as total emissions

[1] I would like to thank Steinar Andresen, FNI, and Gørild Heggelund, FNI, for their helpful comments on this report. All errors and shortcomings are exclusively my own.

increase less than the GDP does, China's carbon intensity will still decrease.

The Chinese economy is not independent of movements in the world economy: this became evident during the recent global financial crisis, under which China experienced lower demand for exported goods and slower growth in GDP (Yu 2010). To counter the country's dependence on export, the 12th 5-year plan establishes the expansion of domestic consumer demand and the gradual evolution of China's domestic market to become the world's largest (12th 5-Year Plan, ch.1,4). Also China's total GHG emissions will continue to rise in the foreseeable future. The amount of energy consumed will impact on the carbon-intensity value: the more energy consumed, the higher the emissions. Also the energy mix will be of importance: coal consumption leads to greater GHG emissions than, say hydropower. At a press conference in connection with the announced targets, Xie Zhenhua, Vice-Chairman of the National Development and Reform Commission (NDRC), expounded on which areas are important for the carbon intensity. He stated: '… if we take one step further to strengthen the efforts of energy conservation, emission reductions, development of renewable energies and reforestation... the [emissions] peak will be smaller…. We will increase our efforts at energy saving, improve energy efficiency and forest sequestration, and greatly reduce our carbon intensity' (State Council Information Office 2009, author's translation). Although not internationally binding, the target has been called 'domestically binding' (State Council Information Office 2009; *China Daily* 2009). David Cohen-Tanugi (2010:6) points out that targets which are labelled 'domestically binding' have a status equal to formal law.

In short, the carbon-intensity target can have a constricting effect on China's emissions, while simultaneously letting the economy continue to grow. Reducing its carbon intensity will make China's economy more carbon-productive, as fewer carbon emissions will be required per unit of GDP produced. There has been some controversy as to the true reduction contribution of the target, with some arguing that it is not very different from what would have happened anyway on the basis previous policies and trends (see for example Levi 2009; Carraro & Tavoni 2010), and others have expressed more positive evaluations, while also noting there could be room for a more ambitious target (see for example Cohen-Tanugi 2010; Zhang 2010). The UNDP development report for 2010 found that whereas the current target is attainable for China, cuts beyond 45% in 2020 compared to the 2005 level will require expensive technologies and high incremental investment costs (UNDP 2010:63).

The aim of the present report is to offer a status-quo picture of China's climate-change policies, together with a presentation of important domestic actors. Too often, only the big picture is presented, reproduced with figures or with focus on failures to achieve targets. Yes, you will find the big picture here. But in addition, I hope also to shed some light on the finer and more hidden details of the picture, showing that even in a regime type as in China decisions are not always straightforward – but thereby all the more interesting. The data are drawn from a range of primary and secondary sources, such as documents and decrees issued by

relevant governmental agencies and online Chinese media, but also semi-structured interviews conducted in September 2011 in Beijing. For convenience, key Chinese names and expressions are listed at the very end of this report. In the text these words are marked in italics the first time they appear.

This report is structured as follows: First, China's GHG emissions and its energy situation are explained. Then the next section presents recent developments in climate-change policy. The main climate actors are accounted for, starting with the government and moving into the non-state and external actors. Finally, the report touches upon the motives of the central leadership for steering China towards a low-carbon development, and notes a few of the future challenges on the low-carbon route. I conclude that, through the 12th 5-year plan, measures aimed at lowering China's carbon intensity have become increasingly integrated into national policies in the course of 2011.

China's Carbon Emissions

China is today the world's largest GHG emitter in total terms, and is expected to remain among the top also in the foreseeable future. It is only in recent years that China surpassed the United States as the country with highest annual emissions. Emissions can be measured in several ways, however, and the various measurements portray China's emissions differently.[2] Looking at cumulative CO_2 emissions from 1850 until 2007, China's share of global emissions amounted to only 8.98%, whereas the United States and the European Union were responsible for 28.75% and 26.25% respectively (WRI-CAIT database). Another way to measure GHG emissions is emissions per inhabitant. By this measuring stick, China's emissions were previously lower than the world average, and are today around the world average. In international negotiations, China has favoured the per capita measuring method (Beuermann 1997:222; Harris & Yu 2005:55; *China News* 2011).

[2] Data may vary slightly from source to source. Take for example figures for China's share of world emissions in 2007: according to the World Bank Database (by the author's calculation) China was responsible for 21.3% of the world's CO_2 emissions; according to the World Research Institute's Climate Analysis Indicator's Tool, the figure was 22.7%, measured in CO_2 equivalents. Per capita emission figures can also vary according to how GDP is calculated. See IEA (2010) pp. 89–94 for examples

Table 1. CO_2 Emissions

Year	China, total emissions, Kt*	Increase from previous stated year, % †	World, total emissions, Kt*	China's share of world emissions, % †
1980	1 465 992	-	19 477 824	7.5
1990	2 458 731	68.8	22 529 936	10.9
2000	3 402 310	38.4	24 688 032	13.8
2008	7 031 916	106.7	32 082 583	21.9

Source: World Bank Databank, http://data.worldbank.org/indicator/EN.ATM.CO2E.KT/countries/1W-CN?display=graph Last accessed 12.01.12. *Kt = thousand tonnes, †=author's calculations

There is also variation in GHG emissions among the regions of China, with the more carbon-intensive areas tending to be the most economically developed as well (UNPD 2010:26). Moreover, a considerable share of China's emissions comes from the production of goods for export. Christopher Weber et al. (2008:3574) found that, in 2005, 33% of China's CO_2 emissions came from the export industry. By contrast, in 1987 its share had been 12%, so we can note the growth in exports. Emissions from different sectors also vary, with heat and electricity generation at the top. Also within the same sector there can be variations, due largely to differences in modernization (UNPD 2010:24–25). Directly targeting this problem, the government shut down numerous small and low-efficiency power plants between 2005 and 2010, thereby improving the power sector's record (CPI 2011:2).

Table 2. CO_2 emissions per capita, in metric tonnes

Year	China, per capita emissions	Increase from previous stated year, % †	World, per capita emissions	Difference, China from world per capita emissions †
1980	1.49	-	4.38	-2.89
1990	2.17	45.6	4.27	-2.10
2000	2.65	22.1	4.06	-1.41
2008	5.31	100.4	4.80	+0.51

Source: World Bank Databank, http://data.worldbank.org/indicator/EN.ATM.CO2E.PC/countries/1W-CN?display=graph Last accessed 12.01.12. †=author's calculations

Greenhouse gas emissions are inseparably linked to energy production and consumption. Given modern life and production methods, energy conservation is an all-embracing task. Efforts to raise energy efficiency and energy conservation will demand a re-structuring of the economic

development direction. The next paragraphs present China's current energy circumstances.

China's Energy Situation

China not only is the world's most populous country and the biggest GHG emitter: it is also the largest energy producer and the second-largest energy consumer, after the United States. China is the world's second-largest oil consumer, and ranks fifth among the oil-producing nations (REEEP 2010). It also has considerable domestic energy resources – most notably coal, but there is also a great potential for hitherto unexploited sources of renewable energy.

Capacity in energy production has increased considerably since 1980, along with economic development (National Bureau of Statistics of China 2010:53). Energy consumption has grown considerably, almost doubling between 2000 and 2007 (Zhang 2010:99) China's energy consumption is expected to keeping rising until at least 2050 (UNDP 2010:55).

Table 3. Primary energy production, China

Year	Total production, Mtce†	Coal, crude oil, natural gas (% share in)	Total fossil fuels, %	Total other energy sources (hydro, nuclear, etc.) %
1980	637.35	69.4 + 23.8 + 3.0	96.2	3.8
1990	1039.22	74.2 + 19.0 + 2.0	95.2	4.8
2000	1350.48	73.2 + 17.2 + 2.7	93.1	6.9
2009	2746.18	77.3 + 9.9 + 4.1	91.3	8.7

Source: China Energy Yearbook 2009 p 34, China Yearbook 2010 http://www.stats.gov.cn/tjsj/ndsj/2010/indexeh.htm Last accessed 01.12.11.
†Mtce = Million tonnes of coal equivalent

Fossil fuels are the main component of China's energy consumption, and a reduction of that share will be beneficial to reaching the carbon-intensity target. A great deal had already been done before the target was announced in November 2009. For example, renewable energy sources were addressed in the Renewable Energy Law from 2005 (revised in 2009), and then in the Mid- and Long-Term Plan for Renewable Energies in 2007.[3] In June 2011, the NDRC indicated that in addition to increasing the share of non-fossil sources to 15% of national energy consumption by 2020,China aims for a 20% share by 2030 and one-third by 2050 (*China Daily* 2011c). In 2009, 15% of China's primary energy consumption corresponded to the total primary energy consumption of Canada (BP 2010:40). In other words, it might not be a large percentage of China's total energy mix, but due to the sheer size of China it will still be an

[3] For a comprehensive list of relevant renewable energy laws, regulations and plans, see Zhao et al. (2010:26).

important contribution. The reason for setting a goal of non-fossil fuels rather than a target of renewable energy sources is that China plans to develop nuclear power further. Nuclear power is a non-fossil alternative, but is not counted as renewable energy. Currently hydropower is the greatest component of China's non-fossil energy sources as can be seen in Figure 1, with figures for 2009. Taken together, however, non-fossil energy sources made up only 8.7% of *total* energy production that year (see Table 4).

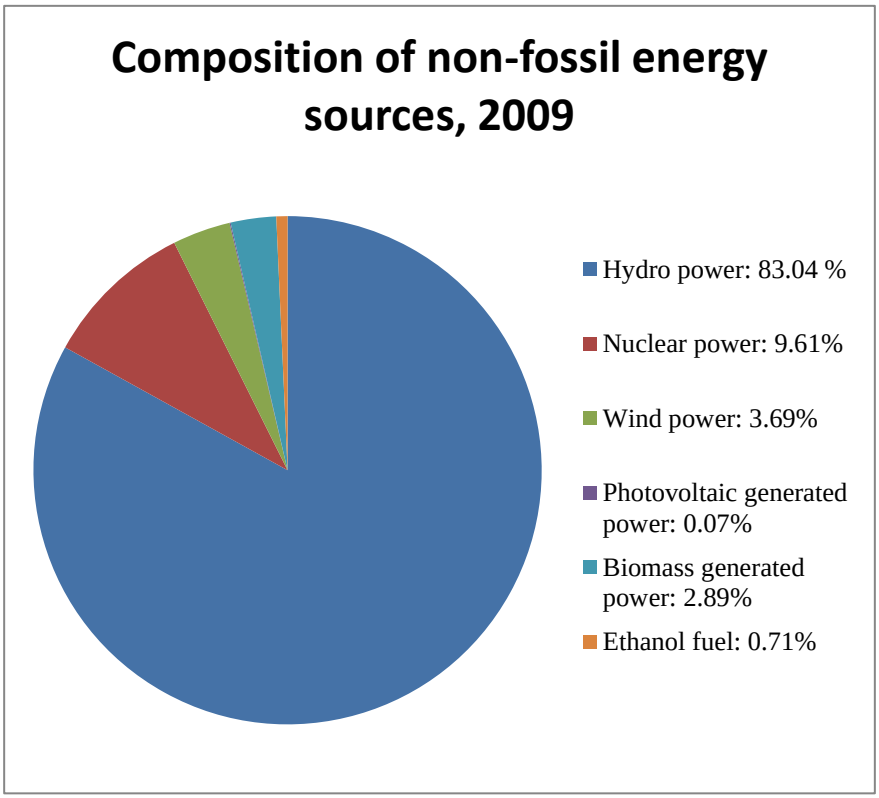

Figure 1. Composition of China's non-fossil energy sources in 2009. The total amount from non-fossil energy sources was equivalent to 224 million tons of standard coal. Source: NDRC (2010a)

The share of non-fossil energy sources has increased, in production and in consumption, but at a modest rate up till today (see Tables 3 & 4). China has considerable potential for developing more renewable energy, especially wind and solar power. China's efforts in wind power are impressive. Between 2005 and 2009 the country more than doubled its wind power capacity each year, achieving its target of 30 GW installed capacity by 2020 already in 2010 (NDRC 2010a). China has a great potential for further development of its wind power, which could become an important component in its future energy mix (Li et al. 2010:12-14). In June 2010 the first operating offshore wind farm outside Europe, Shanghai's East Sea Bridge, was put into operation. The National Energy Administration (NEA) signalled in June 2011 that it plans to expand offshore wind power in the coming years (*China Daily* 2011b). However, the development of wind power on land faces several challenges. One is connecting the installed capacity to the national transmission grid (Eisen

2011:35-36); another is that areas with ample wind, such as in the north, have a low demand for electricity, whereas regions with high demand for electricity, such as the coastal areas, have relatively little wind (Li et al. 2010:13). Each type of energy source poses its own set of challenges. Although taking necessary precautions, China does not seem inclined to diverge from its energy plans. Case-in-point: After the March 2011 earthquake and tsunami that caused damage to the nuclear plant in Fukushima, Japan, countries around the world set about reviewing their own nuclear situations. China was no different, and suspended approvals of new plants shortly after the incident. Then a security review of its nuclear plants, operative or planned, was instigated. After the review was completed in August 2011, a safety plan was issued, and approvals of new nuclear plants continued (NDRC Climate Change Department 2011a).

Table 4. Primary energy consumption, China

Year	Total consumption, Mtce[†]	Coal, crude oil, natural gas (% share of consumption)	Total fossil fuels, %	Total other energy sources (hydro, nuclear, etc.) (% share of consumption)
1980	602.75	72.2 + 20.7 + 3.1	96.0	4.0
1990	987.03	76.2 + 16.6 + 2.1	95.5	4.5
2000	1455.31	69.2 + 22.2 + 2.2	93.6	6.4
2009	3066.47	70.4 + 17.9 + 3.9	92.2	7.8
2020	-	-	85*	15*
2030	-	-	80**	20**
2050	-	-	67**	33**

Source: China Energy Yearbook 2009 p 53, China Yearbook 2010 http://www.stats.gov.cn/tjsj/ndsj/2010/indexeh.htm Last accessed 01.12.11.
*[†]Mtce = Million tonnes of coal equivalent. *Approximate figures reported under the Copenhagen Accord and Cancun Agreement ** Reported from the Energy Research Centre at the NDRC in June 2011 (China Daily 2011c).*

Energy imports

From 1993 onwards China consumed more energy than it produced (National Bureau of Statistics of China 2010:34). Given the abundance of its coal reserves, it might come as a surprise to learn that China became a net importer of coal in 2009, importing nearly 15% of all the coal traded on the world market. The main reason for importing coal is not that China is experiencing a coal deficit: it is more a question of logistics. In 2009, 69% of China's coal reserves and half of the production were located in the northern and western provinces of Shanxi, Shaanxi, and Inner Mongolia. Overland transport of coal to south-eastern China is costly. For these areas, it can be cheaper to import coal that arrives by sea, for example from Australia and Indonesia (Morse & He 2010:1–4). Also, from the end of 2008, there was an

increase in the closure of small and inefficient coal mines in Shanxi Province in order to re-structure and improve the coal production. In addition, China has removed its tariff on coal imports, thereby providing incentives to import rather than buy domestically (US Energy Information Administration 2010:68).

In 2009 China's net import of crude oil amounted to 185.4 million tonnes, almost half of the 404.6 million tonnes consumed that year (BP 2010:12,20). Reliance on imported petroleum has had implications for China's foreign affairs and ties, and the energy branch of diplomacy has become important to the national developing strategy of 'going-out' (Xu 2007:4). For example, between 2009 and 2010, when funds were not readily available due to the global financial crisis, several countries benefitted from energy-backed loans from China. Loans, ranging from one billion up to 20 billion dollars, were granted to governments and businesses in Venezuela, Russia, Brazil and Ecuador from the China Development Bank (CDB). In return Chinese oil companies are guaranteed access to the countries' oil resources, and the CDB secures its loans from the revenues earned by Chinese oil companies (Downs 2011:38-39). Hong Li and Sharon Lin (2011:4626) have found several indicators that China's demand for imported oil will continue to increase, despite possible price hikes. They also found indications that China's demand is in itself driving oil prices up.

Energy intensity

Energy intensity, the 'ratio of total energy use to GDP' (UN 2001), refers to the amount of energy needed to produce one unit of GDP. Conventionally, developed countries have low energy intensities, so this measurement gives an indication of a country's development stage. China's energy intensity decreased year by year from 1980 until 2001. Then, from 2002 to 2005, China experienced an unexpected increase in its energy intensity. The sudden surge was due to, *inter alia,* the expansion of energy-intensive industries and the coal industry, along with increasing prices for energy and commodities. In order to reverse this new trend, in the 11th 5-year plan for 2005 to 2010 the Chinese government set forth a target of reducing energy intensity by 20%. In the end, China almost reached the target, reducing its energy intensity by 19.1% between 2005 and 2010. Already by 2008, energy intensity was down to the 2002 level (CPI 2011:1–3; State Council 2011). Energy intensity varies cross China's regions, and through the various sectors. Ma Hengyun et al.'s survey[4] (2009:1795) shows the north-western provinces and the transport sector to be particularly energy-intensive.

To sum up: China is today among the biggest energy-producing and -consuming countries, and it imports a considerable proportion of its energy sources. China is heavily reliant on fossil fuels, particularly coal, which is also abundant domestically. While still representing a modest share, non-fossil energy sources constitute an expanding part of the total energy mix, and non-fossil energy sources are likely to make up a bigger

[4] Using data from 2006

part of the future energy mix. Experiencing a surge in energy intensity, the Chinese government has implemented measures to improve energy efficiency. Being one of the biggest energy consumer countries also means having high CO_2 emissions. In the next section, we examine the Chinese government's effort to reduce carbon intensity.

Climate Governance and the Carbon-Intensity Target

As will become apparent through the next few pages, the Chinese government has launched a comprehensive body of work aimed at GHG mitigation, ranging from energy-saving efforts to the introduction of market mechanisms.

Although the carbon-intensity target was the first objective measured in carbon emissions in China, it was not the first move taken by the authorities that has led to reductions in carbon emissions. According to the National Climate Change Programme from 2007, published by the NDRC, China's GHG-mitigating efforts prior to 2007 have involved, *inter alia*, a re-structuring of the economy away from energy-intensive primary industries to the less energy-demanding tertiary industry. Also the primary energy mix has since 1990 been altered to contain less coal and more renewable energy sources. Already in the 1990s and the early 2000s, the development and use of renewable energy was expanded. The Medium- and Long-Term Plans for Energy Development and Energy Conservation (2004–2020) from 2004, along with the Renewable Energy Law from 2005 are examples of how the Chinese government has used regulations and policies to address climate change. Further, the Climate Programme notes that China's family planning policy has made it possible to avoid GHG emissions by preventing population increase. In addition, afforestation projects have helped to absorb CO_2 (NDRC 2007a:7–10). The year 2007 marked a clear intensification in governmental efforts to put climate change on the political agenda. In addition to issuing the National Climate Change Programme, the government established[5] the National Leading Working Group on Addressing Climate Change (NLWGACC), headed by Premier Wen Jiabao. The Law on Energy Saving was revised the same year and made energy conservation a national policy (Jiang et al. 2009:4261). Two years later, the carbon-intensity target was declared, and two years after that, in 2011, climate change was made one of the main focal areas of the 12th 5-year plan (2011–2015) (The 12th 5-Year Plan 2011:ch.1,3 – 4, ch.6,21).

In 2011, the government undertook much preparation and work to improve policies, fiscal and legal measures to handle climate change and steer development in a low-carbon direction. At lower levels, each province has now been given unique targets and focal areas (Reuters 2011). Moreover, in 2011, three important documents were prepared and discussed under the auspices of the NDRC: the 12th 5-Year Plan Comprehensive Implementation Programme for Controlling Greenhouse Gas Emissions, the National Plan for Responding to Climate Change

[5] Earlier there had been various constellations of committees and leading groups.

(2011–2020) and the Preliminary Guiding Principles for Local Response to Climate Change (NDRC Climate Change Department 2011b). A climate change law has been prepared in 2011 and is underway. Further, also as part of upholding the development of a 'circular economy'[6], Xie Zhenhua announced in August 2011 that the government was to implement the 'Ten, Hundred, Thousand' actions: establishing 10 key 'circular economy' projects, creating 100 'circular economy' model cities and towns, and educating 1000 businesses as 'circular economy' models. These projects will help mitigate GHGs *(Shenzhen Economic Daily* 2011). The above-mentioned plans and policies are supported by the recent 12th 5-year plan, a main policy document of the Chinese government. From this central document it is clear that the next five years will put the focus on greenhouse gas mitigation.

The 12th 5-Year Plan: strong on low-carbon incentives

The 12th 5-year plan describes various actions for reaching the carbon-intensity target. First and foremost China aims to reduce its carbon intensity by 17% by the year 2015, in terms of 2010 levels. That target was declared in the period of the 11th 5-year period, so earlier plans had not contained any such targets. However, there has been continuity in the line of work. Other targets not directly linked to carbon but that will reduce GHG emissions are continued from previous 5-year plans and other plans; the 12th 5-year plan sets a target of increasing the share of non-fossil energy sources in primary energy consumption to 11.4% by 2015. This is in line with the 20% target by 2020 set in the Mid- and Long-Term Plan for Renewable Energy (NDRC 2007b). Further, the 12th 5-year plan determines a further reduction of the energy intensity by 16% (12th 5-Year Plan 2011:ch.1,3). An energy-intensity target was also set in the previous plan, then with a targeted reduction of 20%. In order to achieve the 20% reduction, the Chinese government initiated a programme in which industry participated in reducing its energy use. The programme targeted the top 1000 energy-consuming businesses from the nine most energy-consuming industries, among them iron and steel manufacture, chemicals and the petrochemical industry. The main objective of the programme was to improve energy efficiency and reduce the energy consumption of these businesses (Price et al. 2010:6487). The 12th 5-year plan continues in engaging energy-intensive industries, and establishes that in this period there will be developed an action for low-carbon energy saving encompassing 10,000 businesses (The 12th 5-Year Plan 2011: ch.6,22-1).

At the time of this writing, not many details of the 10,000 programme had been announced, but the programme is likely to be similar in form to the previous 1000 businesses programme. Reportedly, energy-intensive industry business such as steel, coal, electricity, oil and petrochemicals,

[6] 'Circular economy' is a guiding principle of the Chinese government, introduced by president Hu Jintao in 2003, and made a national policy through a State Council communication in 2005 (State Council 2005).
The concept of 'circular economy' plays on the biological cycle, and refers to an economy where recycling and reducing resource consumption is encouraged, in line with the tenets of sustainable development (Baidu 2010).

chemicals, construction, textile and paper industries will be targeted (Qinghai Environmental Protection Department 2011). While the national objectives might be set, the distribution of the burdens is not. In November 2011, the Ministry of Industry and Information Technology stated that companies with the highest emissions would be given higher targets for carbon and energy-intensity reduction. With the release of the 12th 5-year plan, electricity generation, manufacturing and mining businesses had been allocated targets of 18% carbon and energy-intensity reductions by 2015, but in November this figure was adjusted up to 20%. On the day the new targets were announced, local media reported that also these figures were not final, with the NDRC reportedly wishing to set the targets as high as to 23% intensity reductions. The final decision is to be made by the State Council (*Point Carbon* 2011a).

In addition to continued policies from earlier 5-year plans, new measures were introduced in the 12th. Measures to ensure energy conservation and emission reductions named in the 5-year plan are adjusting energy resource taxes, establishing standards for energy conservation and a gradual development of a trial carbon market, to be initiated within the timeframe of the 12th 5-year plan. Statements by NDRC officials specify that there are plans for setting up regional cap-and-trade programmes for selected energy-intensive sectors by 2013. Defining the limits of emitted carbon will be a new measure for China, and will require the establishment of a system for monitoring and calculating emissions, a matter the NDRC is currently working on (*China Daily* 2011e). An energy cap of 4.1 billion tonnes of coal equivalent by 2015 was reported in 2011 to be adopted (*China Daily* 2011f). The 12th 5-year plan also sets targets for forest coverage, but, according to NDRC sources, forest sinks will not be taken into calculation in determining the carbon-intensity value in 2020 (12th 5-Year Plan 2011; Reuters 2009b).

Energy conservation, the centrepiece of emission mitigation in the 12th 5-year plan

An important part of reducing China's GHG emissions involves improving the efficiency of energy utilized, but also using less energy. In a meeting of the NLWGACC in July 2011, the group agreed in principle on the 12th 5-year plan's Comprehensive Energy Conserving and Emission Reducing Work Programme. In a statement, the group emphasized that it is during the time of this plan that China will turn the direction of its economic development and economic structure, strengthening sustainable development. Six main areas were identified:

1) **Concentrate on key areas of energy conservation and emission reductions.**
   Industries will focus on eliminating backward production methods.
   The transport sector will focus on expanding public transport, and improving a range of transport methods.
   The construction sector will greatly develop green construction, intelligent buildings and focus on saving resources such as land, water and building materials.
   In people's daily lives, energy is to be saved through promoting energy-saving commodities and by fostering a way of life that is energy-saving and protects the environment.
2) **Improve the structure of industry** by developing modern structures, replacing traditional industry with new technology, and promoting tertiary industries. As part of the re-structuring, clean modern energy and energy-saving production will be promoted.
3) **Implement key projects** for energy saving and emissions reductions, projects for environmental management and circular economy projects.
4) **Spread the utilization of advanced technologies**. In this regard, select the most appropriate technologies for testing and more common use, and adopt foreign technologies.
5) **Strengthen the administration and governance of energy conservation and emissions reduction.** Improve the system for evaluating energy saving, and determine national energy-consumption standards. Encourage industries to establish systems for estimating and measuring energy conservation. Implement the necessary administration of electricity, energy-efficiency labels, state purchases and other means of administration.
6) **Improve long-term energy conservation and emissions-reducing structures**. Reform the tax system, implement preferential tax policies, and promote energy- resource taxes. Further, export tariffs should be adjusted in order to limit export of goods with energy-intensive production and high emissions.

After the main areas were explained, all departments and levels were requested to unify their policies and to swiftly start implementation (Ministry of Environmental Protection 2011).

It is clear that the government expects active participation also from outside actors – especially from energy-intensive industry enterprises, but also from other businesses and the public. The 6th main point above also indicates that the leadership wants to steer China away from being 'the world's factory' ending up with all the emissions of global consumption on China's account, while also improving the patterns of domestic resource consumption.

Having looked at the latest policy developments, I now turn to the actors that together make up China's climate 'community', starting with the central government.

Governmental Climate Actors

Central and top governing bodies

Anthropogenic, or human-induced, climate change has occurred largely because of mankind's use of fossil energy sources. Given the interconnectedness of the policy areas of energy and climate change, China's top governmental organizations of both domains are presented here. The organizational similarities are striking. The same governmental entity – the NDRC – houses both the coordinating organs for climate change and the energy sector. Climate change has been under the responsibility of the NDRC since 1998,[7] but it is an issue that falls within the domains of several political organs, and more than 20 government organs are currently involved in climate change work (Heggelund 2007:168; NDRC 2011). Likewise, energy is a policy issue which concerns several different bodies. The highest political body dealing with climate change is the National Leading Working Group on Addressing Climate Change (NLWGACC), established in 2007. The highest energy body is the National Energy Commission (NEC), introduced as a 'super ministry' when it was founded in 2010 (*China Daily* 2010). Both bodies are directly under the State Council, led by Premier Wen Jiabao. Other members are all high-ranking officials of relevant ministries and other political organs. Daily work is carried out by the NDRC Climate Department and the NDRC's NEA, respectively (National Leading Committee on Climate Change 2009; State Council 2010). The mandates of both the Climate Department and the NEA are extensive, ranging from drafting policies and plans to negotiating with international organs. In addition, each has more case-specific tasks; the NDRC climate department is for example responsible for CDM in China, and the NEA manages the energy industries (NDRC 2008; NDRC 2009). Co-locating the daily functioning of both of the highest ranking organs within the same organization does not guarantee good coordination between energy policies and climate-change policies, but it may well facilitate the flow of communication. More important for securing coordination and flow of communication, more than half of the members in the 25-member climate working group also appear in the 21-member energy working group (NDRC Climate Change Department 2009; State Council 2010). The following ministries are involved in both leading bodies: Foreign Affairs, Science and Technology, Industry and Information Technology, Finance, Land and Resources, Transport, Water Resources, and the Ministry of Environmental Protection. Additionally, some other organs are represented only in one top organ. The State Forestry Administration, China Meteorological Administration, the Ministry of Agriculture, and the Chinese Academy of Sciences are represented only in the

[7] NDRC was then called the State Development Planning Commission. It was renamed in 2003, together with a re-structuring of the bureaucracy.

NLWGACC, whereas the China Banking Regulatory Commission and State Administration of Taxation are represented only in the NEA (NDRC Climate Change Department 2009; State Council 2010). The various organs and ministries are not always in agreement as to what will be the best policy. As shown in Figure 2, the State Council is the top decision-making body, with the final say in case of disagreements or conflicts.

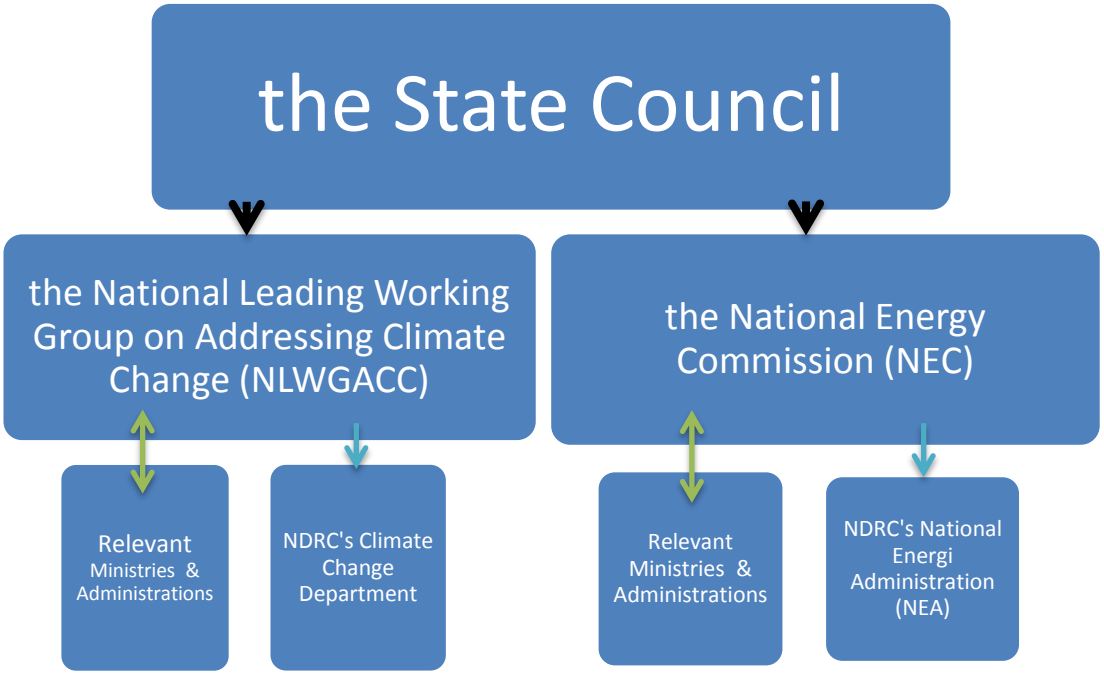

Figure 2. Hierarchical map of China's central climate change and energy governmental bodies 2011. Black arrows indicate supervision. Light-blue arrows indicate the secretariat of the level above. Two-way arrows indicate the direction of communication. Sources: NDRC Climate Change Department (2009), State Council (2010)

Provincial governments

The level below the central government is the provincial level.[8] These governments are crucial for the implementation of energy and climate policies. As regards mitigation, even a single province can be important. Sichuan province, for example, had 89 million inhabitants in 2010 (Sichuan Development and Reform Commission 2011:2) – a population larger than that of many countries. Therefore, reducing emissions in a single province can have a large impact. Province-level governing structures mimic the arrangements of the central government. The provinces have, corresponding to NDRC, Provincial Development and Reform Bureaus, and from 2007 onwards the provinces have established their own leading groups on climate change (Qi et al. 2008:383). China's

[8] On this hierarchical level there are provinces such as Guangdong, autonomous regions such as Inner Mongolia, municipalities directly under the central government such Chongqing, and also special administrative regions such as Hong Kong. The latter have their own climate policies and are not bound by mainland climate targets.

various provinces are in different stages of economic development and have diverse energy circumstances. Hence, despite a unification of policies, requirements for each province will be unique, as with the targets connected to the 12th 5-year plan. Even within a province there will be differences; draft plans show a proposed classification of areas into five ranks, with reduction target of energy intensity ranging from 10% to 18% (*China Daily* 2011d). Observers note that whereas earlier rounds of delegating targets have been more of a matter of negotiations, for this 12th 5-year period the central government made an effort to undertake independent examinations (Reuters 2011). Yet, the national targets sometimes clash with the provinces' own targets. The national GDP growth target of 7% per year in the 12th 5-year plan's period is much lower than the provinces' targets, which are set at 10.6% on average. According to a report from Qinghua University, the difference in GDP growth anticipations will amount to 600 million tonnes of CO_2 per year, roughly equal to Australia's annual emissions (*Point Carbon* 2011b). This shows that there is a discrepancy in interests on the central and provincial level of government. Moreover, the lines of communication do not run exclusively up and down between the central and provincial governments, but also between provincial officials. To facilitate the work of provincial governments, the city of Harbin in Heilongjiang province hosted a meeting in August 2011 where government representatives from 11 provinces met, under the guidance of vice-minister of the NDRC, Xie Zhenhua, to discuss how to respond to climate change (Heilongjiang Government 2011).

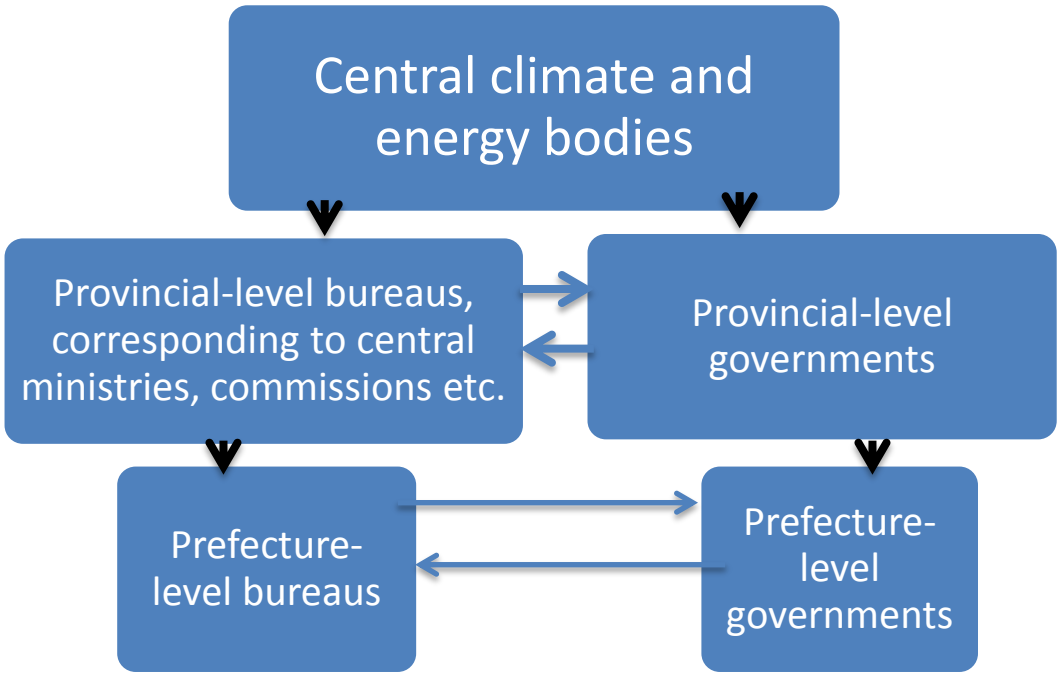

Figure 3. Hierarchical map of climate governmental bodies. Black arrows indicate supervision, blue arrows indicate influence. Sources: Benewick & Donald (2009:64–65), NDRC Climate Change Department (2009), State Council (2010).

In the same manner as the provincial governments receive and possibly negotiate goals and targets, the provinces' prefectural and city governments are delegated goals and targets from their respective provincial governments. How much climate-related work is undertaken at this level varies considerably. Promoting economic development is generally the most important goal for local-level governments (Qi et al. 2008:380). This becomes apparent in that two great challenges in achieving the national targets are ensuring implementation locally, and dealing with the lack of local-level capacity (Qian 2008:24; Corfee-Morlot et al. 2009:51–52). Also, as pointed out by vice-director of NDRC-Energy Research Institute (ERI), Li Junfeng, there is a lack of coordination among the local governments. Unless an appropriate mechanism for local-to-local government communication can be established, there will be many problems in the future, not least as regards reforming energy prices (International Energy Net 2011).

Low-carbon pilots and local government initiatives

In 2010, the Chinese government designated five provinces and eight cites as low-carbon pilots.[9] In addition, there has been a wave of initiatives under the 'low-carbon' label, where more sub-national governments than the government-appointed bodies have taken action. Wuxi, Chengdu and Jilin are not designated as pilot cities, but have nevertheless joined the ranks of China's low-carbon cities (Climate Group 2010:2,7). Local governments vary in their approaches to low-carbon development, finding solutions that best suit local conditions. Consequently there is no single definition or standard for a 'low-carbon city' or province; the term encompasses a range of means for lowering carbon emissions. However, there are some common denominators for actions and measurements. With all of them, the work is comprehensive. It is not unusual for the local government, in collaboration with the local Reform and Development Bureau and scientific capacities, to formulate an action plan or similar document. The low-carbon approach often involves targeting energy use. Dezhou city, in the northwest, is focusing on attracting solar power companies to the city and has also set up projects where solar power is used for heating water (Climate Group 2010:13). Dunhuang city, in the northeast, will switch to and develop wind and solar power, two resources both in abundance there (NDRC Climate Change Department 2011c). When targets are set, they are often more ambitious than the national targets. Nanchang city, in the southeast, has set as targets a reduction of the city's carbon intensity of 38% by 2015, and further of 45–48% by 2020. The city of Xiamen, a south-eastern coastal city, aims by 2020 to have limited its CO_2 emissions to within 68.64 million tonnes, with emission caps allocated for the public transport, industry and construction sectors (Climate Group 2010:12). Baoding, Dezhou, Jianchuan, Kunming, Meishan, Yinchuan city governments and Dongcheng District in Beijing Municipality have, in collaboration with the Swiss Agency for Development and Cooperation (SDC) established

[9]The cities are Tianjin, Chongqing, Shenzhen, Xiamen, Hangzhou, Nanchang, Guiyang and Baoding; the five low-carbon provinces are Liaoning, Hubei, Shaanxi, Guangdong and Yunnan (NDRC 2010b).

the Low-Carbon City China Alliance (LCCC Alliance 2011). In October 2010, Baoding city government, in the northwest, signed a 3-year low-carbon collaboration agreement with Denmark's Sønderborg, under which the two cities will cooperate on challenges involved in becoming low-carbon cities. For Baoding it is a chance to get information from a city more experienced with wind power than itself. The collaboration is facilitated by WWF Denmark and WWF China (WWF China 2010; WWF Denmark 2010). In October 2011, the NDRC, the Ministry of Environmental Protection and the China Green Carbon Fund with American Environmental Defense Fund initiated a campaign called *Cool China*. The campaign toured the chosen low-carbon pilot areas, engaging businesses and the public and encouraging them to help reduce emissions in their daily lives. As part of the campaign, more than 500 schools participated in 2011 *(Shaanxi Daily* 2011).

The government is at all levels engaged in various policies aimed at helping China achieve its carbon-intensity goal. They are not alone, however. Also a great many non-state actors are actively working on reducing China's carbon emissions. Some of the key actors are presented below.

Non-State Climate Actors

It was not until 2007 that climate change became a national policy issue, but outside the policy sphere Chinese scientists had been working with climate change-related questions since the late 1980s. In recent years, many different types of actors have become involved in climate-change action. The presentation below comes with a caveat: it focuses on the positive forces, those who are working to mitigate emissions, strengthen capacity-building, and so on. There are also relevant actors whose activities contribute to a high-carbon development, such as companies that have energy- and emission-intensive production but do not perceive it as being in their interest to shift from the status quo. As such this is not the whole picture, but a digest of actors promoting low-carbon growth.

Scientists, universities and think-tanks: the government's advisors

The scientific climate-change community has grown considerably since the then State Science and Technology Commission (SSTC) organized the first research on climate change in the late 1980s (Beuermann 1997:225). From then on, the government has received counsel from a wide range of scholars and scientists when deciding on targets and which measures to implement. Currently, the NLWGACC's Scientific Assessment Working Group is chaired jointly by the China Meteorological Administration (CMA) and the China Academy of Sciences (CAS) (Liu 2011:91), giving the scientists of those two organizations a direct channel to the highest decision-making body. Further, the NLWGACC receives information from the National Advisory Committee on Climate Change (NACCC), set up in 2007 chaired by the CMA, and with members from the natural and social sciences. The purpose of this

committee is to provide advice based on a combination of scientific disciplines (Wübbeke 2010:28–29). Further, the ERI, Chinese Academy of Social Sciences (CASS) and Qinghua University have close connections to the NDRC. Advice from these institutions is generally heeded by the central government. In fact, a carbon-intensity target was shaped by the Low Carbon Laboratory at Qinghua University. Subsequently, the target was put forward by the NACCC to the NLWGACC (Wübbeke 2010:31). Other important research institutions are the Chinese Academy of Forestry, the Chinese Academy of Agricultural Science, the National Climate Centre and the China Institute of International Studies. While not directly part of the government, all of the above-mentioned institutes have a government body as their higher authority. Moreover, universities such as Peking, Renmin and Fudan University contribute to the climate policy-making bodies (Liu 2011:94–95).

While the scientists may have a backing function once a goal has been decided on centrally, there are also reports of divergence among scholars. The 2011 reported energy cap of 4.1 billion tonnes of coal equivalent by 2015 was not unanimously supported. In the discussions leading up to the cap-figure, some scholars advocated a lower cap of 3.6 billion (*China Daily* 2011f). Scientists and experts do not provide information solely to the government, however. On many occasions, scientists also work together with environmental NGOs (ENGOs).

ENGOs: progress through cooperation

According to a survey conducted by the All China Environmental Federation in October 2008, there were 3,539 ENGOs in China *(People's Daily* 2008). Not all ENGOs work on climate change, but those that do focus on a range of different aspects, from threats and damages from climate change, mitigation actions, climate research, forests, to food security, agriculture and health. Chinese ENGOs actively engaged in work on climate change include the China Youth Climate Action Network (CYCAN), Friends of Nature, Green Earth Volunteers, and the Global Environmental Institute. International ENGOs working in China with climate change are Conservation International, Greenpeace, WWF, the Climate Group, Action Aid, Oxfam and the Nature Conservancy, to name a few. One strong feature of ENGOs in China is collaboration; more than just running a project on their own, many ENGO projects are collaborative ventures with other ENGOs, scientists and local governmental agencies , with one or two ENGOs acting as facilitators (Stensdal 2010:53–57).

The work these ENGOs conduct is extensive. One project is presented as an example: the Climate Group's 'China Redesign' project runs from 2011 to 2013, will concentrate on five cities and bring together the political, scientific and business sides in order to help China meet its carbon-intensity target. It focuses on enhancing the capacities of key political decision-makers, as well as mapping out the best possibilities for each city's urban planning, and emissions-reduction potential. As part of the project, four expert groups – on transport, urban planning, construc-

tion and lighting systems – have been established. The experts are drawn mostly from relevant Chinese university departments, with some coming from governmental bureaus and from businesses. The project is part of HSBC's global climate programme, and is partnering up with GE, Philips, CISCO, EN+ and New Cities Foundation (Climate Group 2011a).

Executing climate programmes is indeed positive – but it is equally important to spread information. The next type of actor is doing exactly that.

Green media: spreading the message

Since the late 1990s some newspapers, among them *China Environmental News* and *China Green Times*, have served as important collaborating partners for ENGOs in spreading information (Jin 2001:7). *Southern Weekend* and *21st Century Business Herald are two more newspapers which spread green knowledge* (Economy 2005). Also in academic and specialized media, interest in climate change as a topic has surged since 2006 (Wübbeke, forthcoming). More and more media are now devoting coverage to climate change. Liu (2011:97) finds found that media coverage of climate change has increased remarkably in the course of the past few years. Most media agents see themselves as partners of the government, and are keen to report on the latest developments in both domestic climate policies and international negations.

Reports on business activities also feature in the media's environmental accounts (Richerzhagen & Scholz 2011:320). In the following climate actions of some companies are presented.

Businesses' climate engagement

Some Chinese companies have come to recognize the opportunities in low-carbon development. The renewables sector, for instance, was worth an estimated $17 billion in 2010 and employed close to a million workers (Malik 2010:i). In addition to those companies that are finding new business opportunities in reducing carbon emissions, businesses participating in the Top 1,000 Energy Consuming Businesses Programme of the 11th 5-year plan and the expanded Top 10,000 Energy Consuming Businesses Programme under the 12th are involved in reducing their energy consumption and hence their carbon emissions. Industrial associations function as links between the government and industrial businesses; indeed some sectorial associations, such as the Association of Energy Conservation, also advise the government on relevant matters (Liu 2011:95). Many businesses have also taken actions to limit their own GHG emissions. In August 2011, the NDRC and the State Council Information Office held an awards ceremony to honour the companies in China doing most to promote low-carbon development. Among the winners were the Ping'an Group (banking, investments and insurance) and the Chinese TV channel, The Travel Channel (Insurance Association of Hebei 2011; Sina Entertainment 2011). The fact that there were more than 400 nominees suggests that China's businesses are indeed paying attention to low-carbon development. Other businesses that have been

taking action within their own operations include Taobao, Broad Air Conditioning, Landsea, Suntech and China Mobile. They have all embarked on various measures intended to reduce both energy consumption and GHG emissions, in cooperation with the Climate Group. These companies have set emissions-reduction goals, and some of them have made public their emissions data (Climate Group 2008; 2009a; 2009b).

Funding is a key component of enforcing energy conservation projects. In this regard, state-owned banks are encouraged by the government to take action. State-owned banks such as the China Commercial Banking Corporation, the Agricultural Bank of China and the Bank of Communications have begun taking an environmental perspective into their investments, and 'green credits' are becoming an increasingly bigger part of the banks' lending portfolios *(Financial News* 2011). However, a 2012 Climate Group study of low-carbon development financing found that low-carbon financing within the banking sector is still limited (Climate Group 2011b:15).

Bringing China towards a low-carbon future will depend on the participation of businesses, but also on the involvement of individuals. As will be seen in the next section, as yet the general public has not been particularly actively engaged.

Engagement of citizens

Essentially, all the above-mentioned organizations are made up of individuals. The daily lives and consumption patterns of China's citizens contribute to carbon emissions. In the first four months of 2011, residential electricity demand accounted for approximately 13% of the nation's overall demand (*China Daily* 2011a), so there is a potential for reducing China's emissions also in this domain.

However, climate change may not be what preoccupies the Chinese population. In a worldwide survey involving more than 18,500 participants from 24 countries, respondents were asked to indicate their worry about 15 different environmental problems. Slightly more than 20% of the Chinese respondents answered that global warming and climate change were of concern to them – considerably lower than the global average at 34% (ENDS report 2011:68).

On the other hand, China's central government attaches great importance to spreading awareness to the public on climate change, and has launched campaigns and information distribution about climate change, such as the afore-mentioned *Cool China*. Non-state actors are also engaging the public. One example is that for the past few years, WWF has held its global Earth Hour campaign in China. It grows every year, with new businesses and local governments joining in. Members of the public are invited to participate by turning off their lights for Earth Hour, and are encouraged to hold their own Earth Hour parties. The public also encounters Earth Hour activities in stores where companies like IKEA and Wal-Mart have launched their own Earth Hour campaigns (Stensdal 2010:55). To take a more local example, the Guangdong Environmental

Partnership programme has a project called the Green Guardian Education Initiative, which has educated 400 schoolchildren to become energy-saving guides for their local communities. The children's volunteering has already reduced energy use in the residential area by 10% (DeGroot 2010:89–91). Nor is it only ENGOs that are engaging the public. As part of its Corporate Social Responsibility on climate change, the Ping'an Group has established a web site, 'Low Carbon 100',[10] aimed at the public, with information on climate change and carbon, tips on to reduce carbon emissions in daily life, and informational videos. The site features are low-carbon competitions and campaigns, to create 'buzz 'about climate change (Ping'an 2011a; 2011b). In 2010 the China Green Carbon Sequestration Fund[11] was established. This is a semi-governmental organ which encourages voluntary donations from the public, to help afforestation and thereby expand the country's forest carbon sinks (China Green Carbon Sequestration Fund 2010).

All in all, there are some climate-change programmes and campaigns aimed at the public. With the 12th 5-year plan's focus on reducing GHG emissions and the central leadership's endorsement of a low-carbon development, such activities are likely to become increasingly frequent. The 12th 5-year plan also sends a positive message to the other actor types mentioned in this section: energy conservation and reducing carbon intensity will be a key governmental priority in the coming years. The climate change activities undertaken by non-state actors are encouraged.

In responding to the challenge of climate change, the Chinese government relies not only on non-state partners, but also on partners in other states and international organizations, as the next section will show.

External Climate Actors[12]

Another group of actors involved in improving China's measures in response to climate change consists of large international organizations, such as the World Bank, and the governments of other countries. China has received funding from the World Bank, the Asian Development Bank (ADB) and the UNDP (Richerzhagen & Scholz 2011:320). In June 2011, the World Bank approved a US$150 million loan to China's Shandong Energy Efficiency Project, aimed at enhancing energy efficiency in Shandong province. The project will focus on energy-efficiency investments in the industrial sector and the operation of a biomass heat and power plant supplying commercial entities as well as private households. Monitoring capabilities will also be strengthened through the project (World Bank 2011). The ADB project Economics of Climate Change and Low Carbon Growth Strategies in Northeast Asia involves China as well as Japan, Mongolia and the Republic of Korea. The aim is to contribute to understanding the debate on mitigation, adaptation costs and climate-change economy, raise awareness and support among policymakers and

[10] http://www.pingan.com/ditan100/ Last accessed 29 September 2011
[11] http://www.thjj.org/ Last accessed 14 September 2011
[12] The classification is borrowed from Richerzhagen & Scholz (2007:320).

private-sector actors in the north-eastern regions (ADB 2008). The UNDP's has done extensive work in China on climate and energy. Two success stories are the project that has introduced hydrogen fuel cells as an alternative to fossil fuels on public buses in Beijing and Shanghai, and the project that has developed an energy-efficiency labelling system for refrigerators in China (UNDP 2011a; UNDP 2011b).

Other countries, among them Canada and Germany, have supported climate-related projects financially (Richerzhagen & Scholz 2011:320). Another form of help from abroad is partnerships. China and the USA have various arrangements, including the Ten-Year Energy & Environment Cooperation Framework from 2008, the US–China Clean Energy Research Center founded in 2009 and the US–China Energy Cooperation Programme: Public–Private Partnership ,also established in 2009 (Lewis 2010:15). The EU and China Partnership on Climate Change was launched in 2005 with two specific goals to be achieved by 2020: …'to develop and demonstrate, in China and the EU, advanced "zero-emissions" coal technology….[and] to significantly reduce the cost of key energy technologies and promote their deployment and dissemination' (European Union 2005). Through the Australia–China Climate Change Partnership with the Australian government, projects have dealt with clean coal technology, solar power, waterways and rivers and the development of a carbon accounting system (Australian Government 2008). Such collaboration with external actors is important for China's work on mitigating GHG emissions, whether it involves sharing experiences with Chinese counterparts, or the provision of project funding.

Concluding Remarks: Reasons for China's Climate Policies – and Future Prospects

This report began by looking into the 'what', 'who' and 'how' of climate policy and actors. This final section examines the 'whys'. *Why* did the top leadership decide on the carbon-intensity goal? *Why* has China opted to steer its development towards a lower-carbon future?

Choosing the carbon-intensity target over other objectives as the main national target – such as cutting emissions by so-and-so-many tonnes compared to a baseline year – has an advantage. It allows China to control carbon emissions and still continue with economic growth. China's total emissions are expected to continue to increase further, as a result of anticipated economic growth. Hence, for the immediate future, China is unlikely to manage to achieve emission cuts in absolute terms. The current intensity target applies until 2020, and when the time comes to review it and prepare the next target, the government may well decide on a different target design.

In the meantime, working to realize the carbon-intensity target will make the Chinese economy more carbon-efficient, lessening the emissions needed to produce each unit of GDP. Making the economy more carbon-independent and China a low-carbon society is good news not only for

the climate: it is also beneficial to other aspects, like energy security. As fossil sources of energy grow scarcer, becoming more fossil-energy efficient – in conjunction with transforming the energy situation by internalizing renewable energy sources to construct a strong base of non-fossil sources of energy – can act to secure future energy supply for China. Producing more out of each unit of fossil fuel is no doubt economical, but the strategic development of renewable energies and the attendant technology can provide new business opportunities. China is already the largest capital-investing country in renewables, and the challenge of shifting from fossil sources can prove to be an opportunity that supports economic development. Also the problem of local pollution levels can benefit from a switch to non-fossil energy sources. The air quality in areas reliant on combustion of heavy coal electricity would improve greatly with a switch to hydro or wind power, or even if the plants would install newer equipment with fewer emissions. Urban outdoor air pollution has been estimated to cause some 300,000 premature deaths each year in China (Zhang & Smith 2007:848). Yet another reason for lowering carbon intensity is the assessment of today's abatement costs compared to the anticipated costs of rectifying the damages of future climate change. Shi et al. (2007:381–384) have found evidence that the climate in north-western China started to change from 1987 onwards from warm-dry to warm-wet, with increasingly frequent flood disasters in the area. Moreover, the 130 million living in China's coastal areas will be affected, should sea levels rise further (World Bank 2009:6). The current costs might be considerable, but, given the likely future costs of impacts and adapting to new climate realities, acting now may be better preferable option.

Despite the many good reasons to take action, the lower-carbon route also entails challenges. One challenge is governance. China is a vast country, with diverse energy and development situations, and sub-national government agencies differ as regards the capacity for taking necessary actions, and probably also as to perceived interest in implementing climate-related measures. Further, as noted by NDRC vice-director Xie Zhenhua, the government intends to adjust resources and electricity prices (Xinhua 2011). Electricity is subsidized in China. The energy structure and pricing system need re-organization to become more effective and to support the government-encouraged energy saving, but re-structuring the energy-pricing system will not be an easy task. Yet another challenge concerns security of supply from non-fossil energy sources. The central leadership has decided that nuclear power is to comprise an increasing share of China's energy supply, but as the March 2011 incident in Fukushima, Japan, showed, nuclear power poses grave problems that must be properly addressed to ensure safety. Further, in 2011 a NDRC representative warned about possible electricity shortages for the summer of 2011 in areas usually supplied by hydropower-generated electricity, due to severe droughts earlier that year *(China Daily* 2011a). Finally, an external factor that can severely affect China's development route is the state of the world economy. It has been in turbulence since 2008, and as of this writing there were still uncertainties. In today's global economy, no country can remain unaffected by a serious blow to one of the major economies. China is no exception.

The challenges mentioned here are all important. It is necessary to bear them mind when seeking to understand the circumstances under which China's climate policies have evolved and will continue to evolve in future years.

In conclusion, there are many reasons for China to reduce its carbon intensity, and a few possible stumbling blocks on the way. In addition to reducing China's greenhouse gas contribution, energy concerns, business opportunities in the renewables sector, local pollution improvement and averting potentially devastating climate-change-related costs are all good reasons for the central leadership to initiate low-carbon measures. The year 2011 saw the deepening internalization of mitigation actions into China's national policies, with the release of the 12th 5-year plan. The plan stakes out China's main means of achieving its carbon-intensity target for the next five years. It sets an interim carbon-intensity target of a 17% reduction by 2015, and continues and intensifies previous energy-related measures, while also affirming that China intends to build a national carbon market in the coming years.

The top government structure dealing with climate change and energy has become quite complex, involving a range of relevant ministries to secure the necessary inputs. Further down the bureaucratic hierarchy, the provinces now all have climate-change bureaus, but the degree of involvement in climate change-related undertakings varies considerably on the sub-national governmental levels. Also non-state climate actors are working on various aspects of climate change, often in cooperation with each other and with governmental agencies, and external actors have been funding many climate projects in China. All in all, 2011 showed a positive development towards reaching the carbon-intensity target by 2020. And as that year draws closer, further endeavours are to be expected in China.

References

12th 5-Year Plan (2011). *国民经济和社会发展第十二个五年规划纲要(全文) (Outline of the 12th 5-Year Plan for People's Economic and Societal Development (Full text.)* Beijing: Central People's Government of the Republic of China. Available at http://www.gov.cn/2011lh/content_1825838.htm Last accessed 26.07.11

ADB (2008). 'Economics of climate change and low carbon growth strategies in Northeast Asia: regional', http://pid.adb.org/pid/TaView.htm?projNo=43421&seqNo=01&typeCd=2#timetable Last accessed 3.1.12

Australian Government (2008). *Australia and China Working Together to Tackle Climate Change*, 11 April, media release. Available online at http://www.climatechange.gov.au/~/media/Files/minister/previous%20minister/wong/2008/Media%20Releases/April/mr20080411a.pdf Last accessed 05.01.12

Baidu (2010) '循环经济 (Circular economy)', 30 Jul, http://baike.baidu.com/view/61554.htm#7 Last accessed 10.08.11

Benewick, Robert & Stephanie H. Donald (2009). *The State of China Atlas: Mapping the World's Fastest-Growing Economy*. Berkeley, CA: University of California Press

Beuermann, Christiane (1997). 'China and climate change', pp.213–234 in Gunnar Fermann (ed.). *International Politics of Climate Change*. Oslo: Scandinavian University Press.

BP (British Petroleum) (2010). *BP Statistical Review of World Energy*.

Carraro, Carlo & Massimo Tavoni (2010). 'Looking ahead from Copenhagen: How challenging is the Chinese carbon intensity target?', *VoxEU*, 5 January, http://www.voxeu.org/index.php?q=node/4449 Last accessed 04.07.11

China Daily (2009). 'Expert says China's carbon plan is binding', Sun Xiaohua , 11 December, http://www.chinadaily.com.cn/china/2009copenhagenclimate/2009-12/11/content_9159327.htm Last accessed 05.07.11

China Daily (2010). 'Wen heads "super ministry" for energy', Wan Zhihong, 28 January, http://www.chinadaily.com.cn/china/2010-01/28/content_9388039.htm Last accessed 05.12.11

China Daily (2011a). 'China's energy imports to increase', 19 June, http://www.chinadaily.com.cn/usa/epaper/2011-06/02/content_12627640.htm Last accessed 11.12.11

China Daily (2011b). 'China to boost offshore wind power' 22 June, http://www.chinadaily.com.cn/bizchina/2011-06/22/content_12754622.htm Last accessed 03.08.11

China Daily (2011c). 'Nation to build new hydroelectric power plants', 23 June, http://www.chinadaily.com.cn/cndy/2011-06/23/content_12756229.htm Last accessed 04.08.11

China Daily (2011d). 'China soon to issue full plan to reduce carbon intensity', 29 July, http://www.chinadaily.com.cn/usa/epaper/2011-07/29/content_13011208.htm Last accessed 19.08.11

China Daily (2011e). 'China to impose carbon caps', 4 August, http://www.chinadaily.com.cn/china/2011-08/04/content_13045761.htm Last accessed 19.08.11

China Daily (2011f). 'China set to cap energy use' 5 August, http://www.chinadaily.com.cn/bizchina/2011-08/05/content_13054826.htm Last accessed 03.09.11

China Green Carbon Sequestration Fund (2010). '关于我们 ー 碳汇基金 (About us – Carbon Sequestration Fund)', http://www.thjj.org/about.html Last accessed 13.09.11

China News (2011). '外交部发言人洪磊就钓鱼岛、中菲关系等问题答问 (Ministry of Foreign Affairs Spokesperson Hong Lei answers questions about the Diaoyu Islands and the Chinese–Filipino relationship)', 5 Jul, http://www.chinanews.com/gn/2011/07-05/3159361.shtml Last accessed 06.07.11

Climate Group (2008). 'Our partners: broad group', 10 December, http://www.theclimategroup.org/our-members/broad-group/ Last accessed 13.09.11

Climate Group (2009a). 'Our partners: China Mobile', 25 January, http://theclimategroup.com/our-members/china-mobile/ Last accessed 13.09.11

Climate Group (2009b). 'Our partners', 2 December, http://www.theclimategroup.org/our-members/ Last accessed 16.09.11

Climate Group (2010). *中国的清洁革命III：城市 (China's clean revolution III: Cities).* Report, Available at http://www.theclimategroup.org.cn/publications/2010-12-Chinas_Clean_Revolution3.pdf Last accessed 11.11.11

Climate Group (2011a). '中国再设计 (China redesign)', http://www.theclimategroup.org.cn/major_initiatives/china_redesign/ Last accessed 10.12.11

Climate Group (2011b). *中国的清洁革命IV：财金战略 (China's clean revolution IV: Financing strategies).* Report, Available at http://www.theclimategroup.org.cn/publications/2011-11-Chinas_Clean_Revolution4-cn.pdf Last accessed 11.12.11

CPI (Climate Policy Initiative) (2011). *Review of Low Carbon Development in China: 2010*. Report, Available at http://www.climatepolicyinitiative.org/files/attachments/4.pdf Last accessed 1.11.11

Cohen-Tanugi, David (2010). 'Putting it into perspective: China's carbon Intensity target', Natural Resources Defense Council White Paper. Available at http://nrdcchina.org/phpcms/userfiles/download/201109/27/Putting%20it%20into%20Perspective%20China%E2%80%99s%20Carbon%20Intensity%20Target%202010%20Oct.pdf Last accessed 20.12.11

Corfee-Morlot, Jan, Lamia Kamal-Chaoui, Michael G. Donovan, Ian Cochran, Alexis Robert and Pierre-Jonathan Teasdale (2009). *Cities, Climate Change and Multilevel Governance*, OECD Environmental Working Papers N° 14, 2009, Paris: OECD

DeGroot, Matthew A. (2010). 'Role models: young and old community members in China inspire local action to save energy', pp. 89–91 in Jennifer L. Turner (ed.), *China Environment Series*, 11, 2010/2011, Washington DC: Woodrow Wilson International Center for Scholars.

Downs, Erica (2011). *Inside China, Inc: China Development Bank's Cross-Border Energy Deals*, John L. Thornton China Center Monograph Series, No.3, 2001, John L. Thornton China Center at Brookings Institution, Washington DC. Available at http://www.brookings.edu/~/media/Files/rc/papers/2011/0321_china_energy_downs/0321_china_energy_downs.pdf Last accessed 14.08. 11

Economy, Elizabeth (2005). *Environmental NGOs in China: Encouraging Action and Addressing Public Grievances.* . Paper presented at the Roundtable before the Congressional-Executive Commission on China, Washington, DC, 7 Feb. Available at http://www.cecc.gov/pages/roundtables/020705/economy.php Last accessed 04.10.11

Eisen, Joel B. (2011). 'The new energy geopolitics?: China, renewable Energy and the "greentech Race"', *Chicago-Kent Law Review* 86: 9–58

ENDS report (2011). 'Pollsters reveal the world's biggest environmental worries', 438 (July 2011):68

European Union (2005). *EU and China Partnership on Climate Change*, 2 September, Press Release MEMO/05/298. Available at http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/05/298 Last accessed 05.11.11

Financial News (2011). '国有商业银行：完备体系护航,绿色信贷 (State-owned commercial banks: Completing a system to support 'green credit and loans)', 5 August, http://www.financialnews.com.cn/yh/txt/2011-08/05/content_384975.htm Last accessed 15.08. 11

Harris, Paul G. & Hongyuan Yu (2005). 'Environmental change and the Asia Pacific: China responds to global warming', *Global Change, Peace & Security* (earlier *Pacifica Review: Peace, Security & Global Change*) 17(1): 45–58.

Heggelund, Gørild (2007). 'China's climate change policy: domestic and international developments', *Asian Perspective* 31(2): 155–191.

Heilongjiang Government (2011). '国家应对气候变化规划编制工作中部片会议在哈尔滨召开 杜家毫出席 (Meeting to draw up a national response plan to climate change held in Harbin, Du Jiahao attended)', 6 August, http://www.hlj.gov.cn/zwdt/system/2011/08/06/010214768.shtml Last accessed 08.08.11

IEA (2010). *CO_2 Emissions from Fuel Combustion Highlights*, 2010 Edition. Paris: International Energy Agency

Insurance Association of Hebei (2011). '中国平安荣膺'中国低碳榜样 (China Pingan awarded 'China low-carbon prize)', 10 August, http://www.hbia.cn/index.php?mods-actic_id-6902.html Last accessed 19.08.11

International Energy Net (2011). '未来新能源并非核电的理想替代者 (Future new energies are not the ideal substitutes for nuclear power)', 12 October, http://power.in-en.com/html/power-14181418131160477.html Last accessed 11.12.11

Jiang, Bing, Zhenqing Sun & Meiqin Liu (2009). 'China's energy development strategy under the low-carbon economy', *Energy* 35:4257–4264

Jin, Jiaman (2001). 'The growing importance of public participation in China's environmental movement', pp.5–8 in Jennifer L.Turner & Fengshi Wu (eds.) *Green NGO and Environmental Journalist Forum Report*, Washington DC: Woodrow Wilson International Center for Scholars

Kantor, Barry (ed.) (2011). *Delivering Low Carbon Growth. A Guide to China's 12th Five Year Plan*, Report, the Climate Group. Available at http://www.theclimategroup.org/_assets/files/FINAL_14Mar11_-TCG_DELIVERING-LOW-CARBON-GROWTH-V3.pdf Last accessed 11.01.12.

LCCC Alliance (2011). 'Low-carbon city China member' http://www.low-carboncity.org/index.php?option=com_flexicontent&view=category&cid=11%3Amembers-profile&Itemid=8&lang=en Last accessed 11.12.11

Levi, Michael A. (2009). 'Assessing China's carbon-cutting proposal', 30 November, http://www.cfr.org/china/assessing-chinas-carbon-cutting-proposal/p20862 Last accessed 04.07.11

Lewis, Joanna (2010). 'The state of US–China relations on climate change: examining the bilateral and multilateral relationship', pp. 7–39 in Jennifer L. Turner (ed.), *China Environment Series* 1 2010/2011, Washington, DC: Woodrow Wilson International Center for Scholars

Li, Hong & Sharon Xiaowen Lin (2011). 'Do emerging markets matter in the world oil pricing system? Evidence of imported crude by China and India' *Energy Policy* 39(8):4624-4630

Li, Junfeng, She Pengfei & Gao Hu (eds.) (2010). *China Wind Power Outlook 2010*, Brussels: Global Wind Energy Council

Liu, Liguang (2011). *Understanding China's Climate Change Mitigation Policy Development: Structures, Processes and Outcomes*, Florida International University FIU Electronic Theses and Dissertations, Paper 429

Ma, Hengyun, Les Oxley & John Gibson (2009). 'Substitution possibilities and determinants of energy intensity for China' *Energy Policy* 37:1793-1804

Malik, Khalid (2010). 'Foreword', pp.i–ii in UNDP (ed.) *China Human Development Report. 2009/10: China and a Sustainable Future: Towards a Low Carbon Economy and Society.* UNDP report

Ministry of Environmental Protection (2011). '温家宝主持召开国家应对气候变化及节能减排工作领导小组会议审议并原则同意'十二五'节能减排综合性工作方案 (Wen Jiabao led and participated in a meeting of the Leading working group for climate change and energy conservation where one deliberates and agreed on the '12th 5-year program of comprehensive energy conservation and emission reduction work)', 20 July, http://www.zhb.gov.cn/zhxx/hjyw/201107/t20110720_215153.htm Last accessed 05.08.11

Morse, Richard D. & Gang He (2010). *The World's Greatest Coal Arbitrage: China's Coal Import Behavior and Implications for the Global Coal Market.* Stanford University Program on Energy and Sustainable Development Working Paper 94, Stanford, CA: Stanford University

National Bureau of Statistics of China (2010). *China Yearbook 2010*. Beijing: China Statistics Press

NDRC (2007). *中国应对气候变化国家方案 (China's National Program for Addressing Climate Change),* Available at www.ccchina.gov.cn/WebSite/CCChina/UpFile/File189.pdf Last accessed 20.12.11

NDRC (2007b). '附：可再生能源中长期发展规划 (Attachment: The mid- and long-term plan for renewable energy), http://www.sdpc.gov.cn/zcfb/zcfbtz/2007tongzhi/W020070904607346044110.pdf Last accessed 03.08.11

NDRC (2008). 'National Energy Administration (NEA)', 18 December, http://en.ndrc.gov.cn/mfod/t20081218_252224.htm Last accessed 03.08.11

NDRC (2009). '应对气候变化司 (The Climate Change Department)', 5 February, http://qhs.ndrc.gov.cn/jgsz/default.htm Last accessed 11.08.11

NDRC (2010a). *中国应对气候变化的政策与行动 ——2010 年度报告 (China's Policies and Actions for Addressing Climate Change –2010 Yearly Report)*

NDRC (2010b). *关于开展低碳省区和低碳城市试点工作的通知(发改气候[2010]1587号) (Regarding the notification of the work on developing low-carbon provinces and low-carbon cities (NDRC climate [2010] number 1587),* http://www.sdpc.gov.cn/zcfb/zcfbtz/2010tz/t20100810_365264.htm Last accessed 16.08.11

NDRC (2011). '组织机构 (Group Structure)', http://www.ccchina.gov.cn/cn/column.asp?ColumnId=13 Last accessed 04.08.11

NDRC Climate Change Department (2009). '简 介 – 国家应对气候变化领导小组 (Short Introduction – The National Leading Group for

Climate Change)'
http://www.ccchina.gov.cn/cn/column.asp?ColumnId=12 Last accessed 12.07.11

NDRC Climate Change Department (2011a). 'New nuclear plants may get green light soon', 12 August,
http://www.ccchina.gov.cn/en/NewsInfo.asp?NewsId=29174
Last accessed 17.08.11

NDRC Climate Change Department (2011b.). '解振华副主任出席国家应对气候变化规划编制工作中部片会 (Deputy director Xie Zhenhua attended the middle part of the preparatory meeting for national handling of climate change)',
http://www.ccchina.gov.cn/cn/NewsInfo.asp?NewsId=29152
Last accessed 26.10.11

NDRC Climate Change Department (2011c). 'China's Silk Road city to develop new energy to protect environment', 1 August,
http://www.ccchina.gov.cn/en/NewsInfo.asp?NewsId=29051
Last accessed 19.08.11

People's Daily (2008). 'China has 3,539 environmental NGOs', 4 November, http://english.peopledaily.com.cn/90001/90776/6527220.html
Last accessed 12.12.11

Ping'an (2011a). '绿色金融 — 中国平安 (Green Finance – China Ping'an)', 26 April, http://www.pingan.com/green/ Last accessed 14.09.11

Ping'an (2011b). '中国平安 2011，将低碳进行到底 (China Ping'an 2011, will carry out low-carbon to the end)',
http://www.pingan.com/ditan100/ Last accessed 14.09.11

Point Carbon (2011a). 'China to up CO_2 targets for heaviest emitters', Kathy Chen & Stian Reklev, 15 November,
http://www.pointcarbon.com/news/1.1675760 Last accessed 2.12.11

Point Carbon (2011b). 'ANALYSIS: China, US eyes fixed on home, not Durban', Stian Reklev & Valerie Volcovici, 11 November,
http://www.pointcarbon.com/news/1.1660839 Last accessed 05.12.11

Price, Lynn, Xuejun Wang & Jiang Yun (2010) 'The challenge of reducing energy consumption of the top-1000 largest industrial enterprises in China', *Energy Policy*, 38:6485–6498

Qi, Ye, Li Ma, Huanbo Zhang, & Huimin Li (2008). 'Response to climate change translating a global issue into local priority: China's local government', *Journal of Environment Development, 17*(4):379–400.

Qian, Cheng (2008). *A Portrait of China's Climate Policy*, Germanwatch Discussion paper, Berlin: Germanwatch e.V.

Qinghai Environmental Protection Department (2011). '十二五' 规划确定节能环保指标体系 (The 12th 5-year' plan determined index system for energy conservation and environmental protection) 17 March,
http://www.qhepb.gov.cn/news/detail.aspx?ContentID=13644
Last accessed 08.08.11

REEEP (Renewable Energy and Energy Efficiency Partnership) (2010). 'Policy DB Details: China' http://www.reeep.org/index.php?id=9353&text=policy-database&special=viewitem&cid=149 Last Last accessed 06.06.11

Reuters (2009). Q+A-What is China's 'carbon intensity' target?, http://www.reuters.com/article/idUSPEK12370 Last accessed 11 .11. 10

Reuters (2009b) 'China says carbon "sinks" not covered by target'. 26 November, http://www.reuters.com/article/2009/11/26/us-climate-china-copenhagen-sinks-idUSTRE5AP2WR20091126 Last accessed 10.08. 11

Reuters (2011). 'China set to cap energy use in national low-carbon plan', David Stanway, 4 August, http://www.reuters.com/article/2011/08/04/us-china-carbon-idUSTRE7731DF20110804 Last accessed 17.08.11

Richerzhagen, Carmen & Imme Scholz (2011). 'China's capacities for mitigating climate change', *World Development* 36(2): 308–324

Shaanxi Daily (2011). '酷中国—全民低碳行动计划' 巡展活动抵达陕西 ('Cool China- National Low-carbon plan' activity tour arrived in Shaanxi), 31 October, http://www.chinareports.org.cn/sx/Article/lanmu3/201110/289215.html Last accessed 4.11.11

Shenzhen Economic Daily (2011). '八市低碳试点 深圳名列其中 (Eight cities low-carbon pilots, Shenzhen among them)', 10 August, p. A12 http://szsb.sznews.com/html/2011-08/10/content_1697396.htm Last accessed 10.08.11

Shi, Yafeng, Yongping Shen, Ersi Kang, Dongliang Li, Yongjian Ding, Guowei Zhang & Ruji Hu (2007). 'Recent and future climate change in northwest China', *Climatic Change* 80:379–393

Sichuan Development and Reform Commission (2011). *四川省国民经济和社会发展 第十二个五年规划纲要 (Sichuan Province's Outline of the 12th 5-Year Plan for Economic and Societal Development)*, Available at http://www.scdrc.gov.cn/dir45/downloads/79739_0.pdf Last accessed 20.12.11

Sina Entertainment (2011). '旅游卫视获' 中国低碳榜样' 奖 媒体形象获肯定 (Travel Channel wins 'China low-carbon role-model' prize, obtains a positive media image)', 16 August, http://ent.sina.com.cn/v/m/2011-08-16/18213388358.shtml Last accessed 19.08.11

State Council (2005). *国务院关于加快发展循环经济的若干意见. 国发〔2005〕22号 (Some opinions of the State Council regarding the acceleration of developing the circular economy. National memo, number 22, 2005)*. Available at http://www.gov.cn/xxgk/pub/govpublic/mrlm/200803/t20080328_32695.html?keywords=%E5%9B%BD%E5%8F%91+2005+22%E5%8F%B7 Last accessed 20.12.11

State Council (2010). *国务院办公厅关于成立国家能源委员会的通知 (State Council's notification regarding the establishment of the National*

Energy Commission), 27 January, http://www.gov.cn/zwgk/2010-01/27/content_1520724.htm Last accessed 08.07.11

State Council (2011). *十一五’期间我国扭转能耗强度大幅上升势头 (The Period of 11th 5-Year Plan Reversed the Trend of a Great Increase in Energy Consumption)*, http://www.gov.cn/jrzg/2011-06/10/content_1881616.htm Last accessed 11.06.11

State Council Information Office (2009). ‘中国从眼前做起 加大节能力度 大幅降低碳排放强度(China will act from now on, increase energy saving efforts and greatly lower the carbon intensity)’ http://www.gov.cn/wszb/zhibo356/content_1474255.htm Last accessed 23.05.11

Stensdal, Iselin Phoebe(2010). *Deal Or No Deal – en studie av kinesiske klimaaktører og Kina under klimaforhandlingene i København, December 2009*, Masters thesis. Oslo: University of Oslo Department of Culture Studies and Oriental Languages

UN (2001). ‘Intensity of energy use’, http://www.un.org/esa/sustdev/natlinfo/indicators/isdms2001/isd-ms2001economicB.htm Last accessed 10.06.11

UNDP (2010). *China Human Development Report. 2009/10: China and a Sustainable Future: Towards a Low Carbon Economy and Society*, Beijing: China Translation and Publishing Corporation

UNDP (2011a). *UNDP China Success Stories. Combating Climate Change: Commercialising Clean Transport*, Available at http://www.undp.org.cn/downloads/ss/Combating_Climate_Change_Commercialising_Clean_Transport.pdf Last accessed 20.12.11

UNDP (2011b). *UNDP China Success Stories. Combating Climate Change: Market Transformation for Green Refrigeration*, Available at http://www.undp.org.cn/downloads/ss/Combating_Climate_Change_Market_Transformation_for_Green_Refrigeration.pdf Last accessed 20.12.11

US Energy Information Administration (2010). *International Energy Outlook 2010*, Washington, DC: US Department of Energy

Weber, Christopher L., Glen P. Peters, Dabo Guan & Klaus Hubacek (2008). ‘The contribution of Chinese exports to climate change’, *Energy Policy* 36:3572–3577

Wen Jiabao (quote): Report on the work of the government, Speech delivered to the National People’s Congress 5 March 2010. Transcript available at http://www.ccpph.com.cn/res/Englishzk/EnglishDocuments/201005/P020100512693225009554.pdf Last accessed 18.05.11

World Bank (2009). *World Development Report 2010*. Washington, DC: World Bank

World Bank (2011). ‘Press Release. China: World Bank to help improve energy efficiency in Shandong’, 9 June, http://climatechange.worldbank.org/news/china-world-bank-help-improve-energy-efficiency-shandong Last accessed 04.01.12

WRI–CAIT database (World Research Institute. Climate Analysis Indicator's Tool). Available at http://cait.wri.org Last accessed 20.12.2011

Wübbeke, Jost (2010). *The Power of Advice. Experts in Chinese Climate Change Politics*. Lysaker: FNI report 15/2010

Wübbeke, Jost (forthcoming). 'China's climate change expert community – Principles, Mechanisms, and Influence', *Journal of Contemporary China*

WWF China (2010). '中国保定与丹麦桑德堡携手共建低碳城市 (Chinese Baoding and Danish Søderborg join hands and build low-carbon cities)', 20 October, http://www.wwfchina.org/wwfpress/presscenter/pressdetail.shtm?id=1105 Last accessed 19.08.11

WWF Denmark (2010). 'Støtteerklæring til Sønderborgs klimasamarbejde med Baoding, Kina' (Declaration of support to Søderborg's climate-cooperation with Baoding, China), 15 October, http://www.wwf.dk/dk/Menu/Nyheder/St%C3%B8tteerkl%C3%A6ring+til+S%C3%B8nderborgs+klimasamarbejde+med+Baoding,+Kina Last accessed 19.08.11

Xinhua (2011). '中国将开展碳排放交易试点 建设碳排放交易市场 (China will develop carbon emission trade pilot & build a carbon emission trade market ', 17 July, http://news.xinhuanet.com/politics/2011-07/17/c_121678687.htm Last accessed 05.12.11

Xu, Qinhua (2007). *China's Energy Diplomacy and its Implications for Global Energy Security*. Fredrich Ebert Stiftung Briefing Paper 13, August 2007, Berlin: Friedrich-Ebert-Stiftung. Available at http://library.fes.de/pdf-files/iez/global/04763.pdf Last accessed 12.01.12

Yu, Yongding (2010). 'China's response to the global financial crisis', 24 January, http://www.eastasiaforum.org/2010/01/24/chinas-response-to-the-global-financial-crisis/ Last accessed 11.07.11

Zhang, Junfeng & Kirk R. Smith (2007). 'Household air pollution from coal and biomass fuels in China: measurements, health impacts, and interventions', **Environ Health Perspectives* June115(6): 848–855

Zhang, Zhongxiang (2010). 'Assessing China's energy conservation and carbon intensity: how will the future differ from the past?' ch.6 in Ross Garnaut, Jane Golley & Ligang Song (eds.) *China: The Next Twenty Years of Reform and Development*, Canberra: ANU E Press

Zhao, Zhen-Yu, Jian Zuo, Lei-Lei Fan & George Zillante (2010). 'Impacts of renewable energy regulations on the structure of power generation in China: A critical analysis', *Renewable Energy* 36: 24–30

Appendix 1
Selected Chinese terms

21st Century Business Herald	21世纪经济报道
China Environmental News	中国环境报
China Green Times	中国绿色时报
Cool China	酷中国
National Advisory Committee on Climate Change	气候变化专家委员会
Southern Weekend	南方周末

Appendix 2
Interviews/conversations in Beijing, September 2011

1. The Climate Group
2. Peking University
3. Renmin University
4. NDRC Climate Change Department
5. NDRC – Energy Research Institute

The Fridtjof Nansen Institute is a non-profit, independent research institute focusing on international environmental, energy, and resource management. The institute has a multi-disciplinary approach, with main emphasis on political science, economics, and international law. It collaborates extensively with other research institutions in Norway and abroad.

FRIDTJOF NANSENS INSTITUTT
FRIDTJOF NANSEN INSTITUTE

Fridtjof Nansens vei 17, P.O. Box 326, NO-1326 Lysaker, Norway
Phone: (47) 67 11 19 00 – Fax: (47) 67 11 19 10 – E-mail: post@fni.no
Website: www.fni.no