
Executive Summary
March 2011

THE °CLIMATE GROUP

COMMISSIONED BY

HSBC 
The world's local bank



This is part of
THE CLEAN REVOLUTION

**DELIVERING
LOW CARBON
GROWTH**
A Guide to China's 12th
Five Year Plan

THIS REPORT HAS BEEN PREPARED BY

THE °CLIMATE GROUP

AND COMMISSIONED BY
HSBC CLIMATE CHANGE CENTRE OF EXCELLENCE



ACKNOWLEDGEMENTS

REPORT WRITTEN BY
ALLISON HANNON. THE CLIMATE GROUP
YING LIU. THE CLIMATE GROUP
JIM WALKER. THE CLIMATE GROUP
CHANGHUA WU. THE CLIMATE GROUP

EDITED BY
BARRY KANTOR

DESIGNED BY
TRUE NORTH
GUYANG CHEN. THE CLIMATE GROUP

FRONT COVER IMAGE:
[LED LIGHTS ALONG THE NAMING RIVER IN CENTRAL GUIYANG, GUIZHOU, CHINA.](#)

EXECUTIVE SUMMARY

China has plans to continue its 'clean revolution' over the next five years, with significant targets for low-carbon energy, energy efficiency and clean technology (Figure 1). The policy framework, for this as contained in the 12th Five Year Plan (FYP) covering 2011-2015, will be more sophisticated, with phasing in of market mechanisms and 'bottom-up' action in provinces and cities. The report concludes that China's low-carbon ambitions are accelerating and will bend the nation's carbon emissions growth curve in the next five years. At the same time the country's energy supply is incorporating more non-fossil fuel sources and low-carbon technologies will continue to develop rapidly. The Chinese market for low-carbon technology is gradually opening to foreign owned enterprises, but competition is intensifying. Finally, China's approach to energy management is evolving to include market mechanisms, but challenges remain.

INDICATORS	11TH FYP (2006-2010) (TARGET)	11TH FYP (ACTUAL)	12TH FYP (2011-2015) (TARGET)	13TH FYP (2016-2020) (TARGET)
ENERGY INTENSITY (% REDUCTION IN FIVE YEARS)	20%	19.1%	16%	NOT SET
CARBON INTENSITY (% REDUCTION IN FIVE YEARS)	NOT SET		17%	40-45% VS 2005
NEW ENERGY (% OF GENERATING CAPACITY)	10%	9.6% ¹	—	15%
GROWTH RATES				
PRIMARY ENERGY CONSUMPTION (ANNUAL GROWTH)	4%	6.3%	3.75-5%*	—
ELECTRICITY ENERGY CONSUMPTION (ANNUAL GROWTH)	—	11%	8.5%*	(5.5%)*
ELECTRICITY GENERATING CAPACITY (ANNUAL GROWTH)	8.4% ^{2,3}	13.2% ⁴	8.5%*	(5.6%)*
GDP (ANNUAL GROWTH)	7.5%	10.6%	7%	—

*ASTERISKED NUMBERS INDICATE ESTIMATES MADE BY GOVERNMENT THAT ARE NOT FORMAL TARGETS. BOLD NUMBERS ARE NEW TARGETS.

FIGURE 1

KEY ENERGY AND CLIMATE POLICY GOALS AND INDICATORS IN CHINA 2006-2020

I — CHINA'S LOW-CARBON AMBITION IS ACCELERATING AND PLANS WILL BEND THE NATION'S CARBON EMISSIONS GROWTH CURVE

For the first time in a FYP, China has set a carbon-intensity reduction target of 17%⁵ and intends by 2015 to reduce energy intensity a further 16%⁶. In real terms, the 12th FYP should see China's CO₂ emissions rise from an estimated 7.02Gt (gigatonne) to 8.17Gt. This will avoid about 0.83Gt against the nation's previous trajectory (Figure 2)^{7,8,9}. In real terms, therefore, China is bending its emissions curve downwards: the 1.15Gt planned rise in CO₂ emissions in the next five years compares with 2.2Gt added during each of the 10th and 11th FYPs. This ambition is driven by a need for China to: maintain growth and investment; address real resource limits; be economically and competitive and technologically advanced; and 'keep its house in order' to be a trusted voice on climate and energy. We believe that this will lay the foundation for emissions to peak before 2030¹⁰.

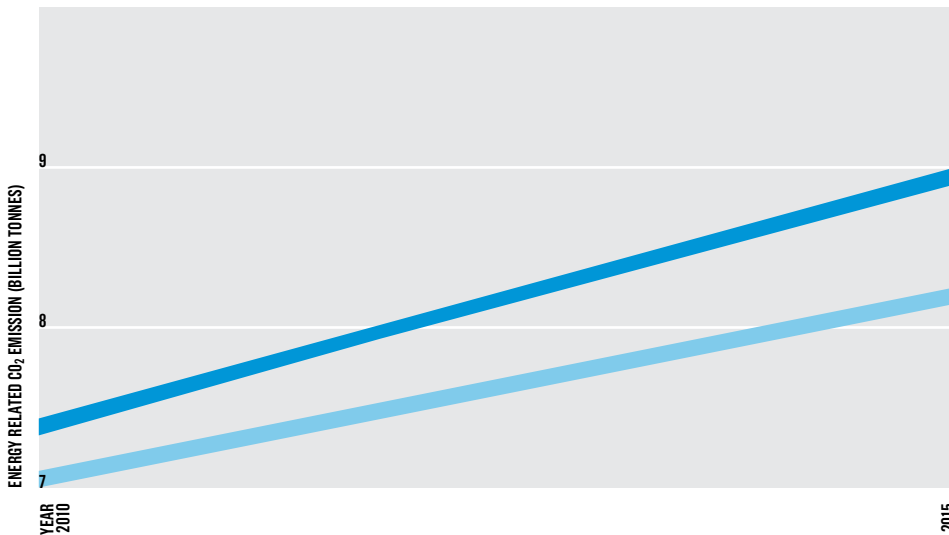


FIGURE 2
ESTIMATED EMISSIONS AVOIDED IF CARBON INTENSITY TARGET OF 17% FOR 12TH FYP IS REACHED, AGAINST IEA CURRENT POLICIES SCENARIO REFERENCE^{11,12}

■ REFERENCE SCENARIO
■ 17% REDUCTION

China's low-carbon-energy technology targets also compare favourably with the International Energy Agency's (IEA) World Energy Outlook 2010 scenario for containing climate change by stabilizing atmospheric concentrations of CO₂ at 450ppm (parts per million) by 2100, suggesting that China is 'pulling its weight' in this regard (Figure 3) and it is believed that low-carbon energy deployment will be on or ahead of target.

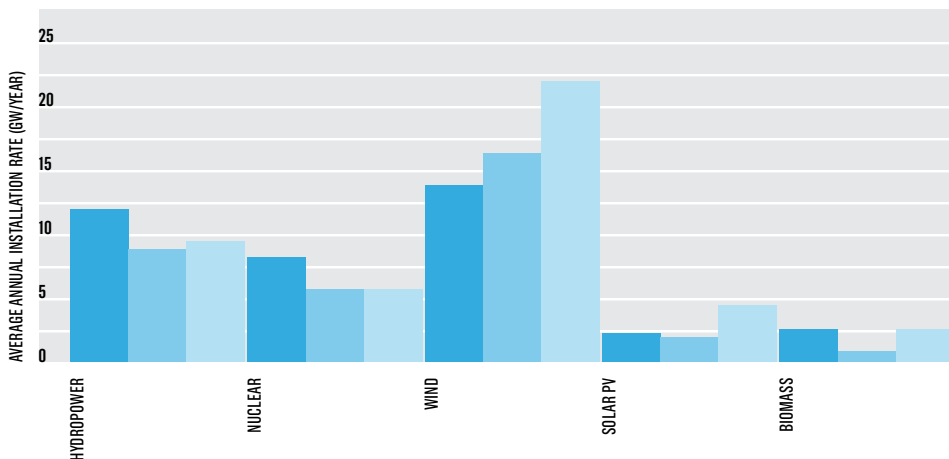


FIGURE 3
CHINA'S LOW-CARBON ENERGY TARGETS COMPARED AGAINST IEA'S 450PPM SCENARIO AND HSBC'S¹³ ESTIMATES OF ACTUAL ANNUAL DEPLOYMENT 2010-2020

■ CHINA'S TARGETS
■ IEA'S WORLD ENERGY OUTLOOK 2010 450PPM SCENARIO
■ HSBC ESTIMATES

II — GROWTH IN ENERGY SUPPLY WILL INCORPORATE AN INCREASING SHARE OF NON-FOSSIL FUEL SOURCES

China reached a 9.6% share of primary energy from non-fossil fuel sources in the 11th FYP against the target of 10%¹⁴. Challenges came from larger than predicted overall energy consumption and from delays in developing hydroelectric and nuclear power over the last five years^{15,16}. Current indications are that these technologies will now progress more rapidly with stronger government backing. Progress on low-carbon energy will come from a four-fold growth in nuclear power to 40GW (gigawatts)¹⁷, 63GW of new hydroelectric capacity, a growth of 22GW in gas-fired generation¹⁸, 48GW¹⁹ of new wind capacity to more than double the current capacity and solar capacity expected to reach 5GW of by 2015²⁰. These figures are against the backdrop of an estimated additional 260GW of coal generation²¹ (Figure 4) – although the share of coal in the energy mix is anticipated to fall from 72% to 63% (Figure 5).

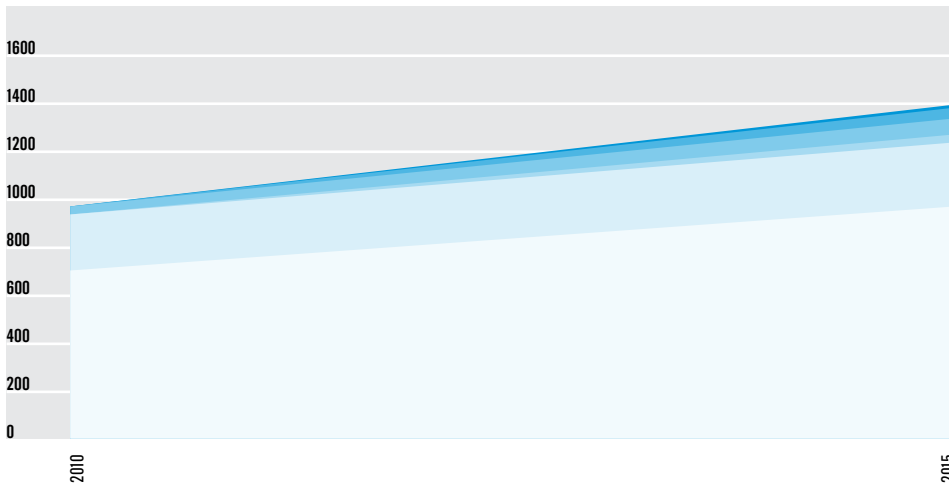
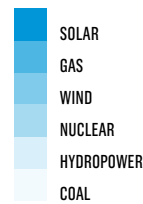


FIGURE 4
TARGETED GROWTH IN INSTALLED GENERATING CAPACITY (GW)
FOR 2015, COMPARED TO THE CURRENT MIX^{22,23,24}



FIGURES TAKEN FROM PUBLICLY AVAILABLE DATA FROM THE NATIONAL ENERGY BOARD AND THE CHINA ELECTRICITY COUNCIL

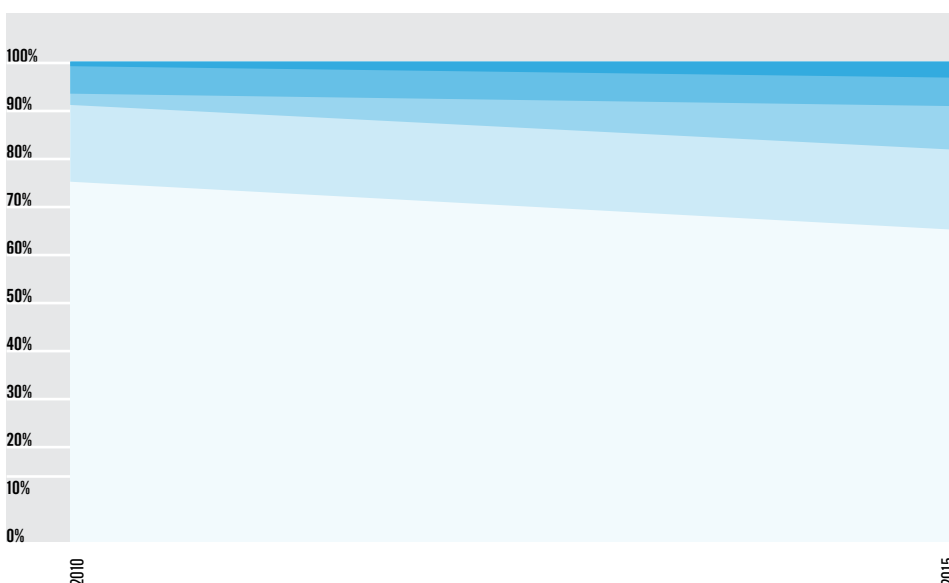
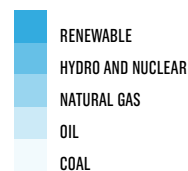


FIGURE 5
TARGETED CHANGE IN THE COMPOSITION OF CHINA'S PRIMARY
ENERGY SUPPLY BY SOURCE, 2010-2015^{25,26}



FIGURES TAKEN FROM PUBLICLY AVAILABLE DATA FROM THE NATIONAL ENERGY BOARD AND THE CHINA ELECTRICITY COUNCIL

III — CHINA WILL ACCELERATE THE GROWTH OF LOW-CARBON TECHNOLOGIES

Considering both export and domestic consumption, the 12th FYP sets out aggressive growth plans for strategic emerging industries (SEIs) critical to economic restructuring, including electric vehicles, next generation information technology, energy efficient products and renewable energy. A figure of RMB 10 trillion (\$1.5 trillion) of public and private investment in the next five years across all SEIs has been discussed but a government target may not be set. Fiscal incentives form part of an integrated strategy. Research and development funding is set to increase dramatically, leveraging public and private sources from the current 1.7%²⁷ to reach 2.2-2.5% of GDP²⁸. Technologies including new energy vehicles and LED lighting are set to play a big role in the longer term, as China's large-scale manufacturing will drive down international prices.

IV — THE PICTURE WILL GRADUALLY OPEN UP FOR FOREIGN-OWNED ENTERPRISES (FOEs) BUT COMPETITION IS INTENSIFYING

Following the trend of state-owned enterprises (SOEs) opening up to foreign equity investment, participation in national R&D programmes will gradually open up to FOEs, but access to direct funding is likely to remain restricted to majority Chinese joint venture partnerships. China recently announced moves to strengthen its intellectual property (IP) regime under the 12th FYP, which is increasingly significant for its own domestically-derived IP. The extent to which this will impact FOEs' experience of operating in China is not clear, however.

V — CHINA'S APPROACH TO MANAGING ENERGY IS EVOLVING WILL BE MORE MARKET-ORIENTED, BUT CHALLENGES REMAIN

The 12th FYP measures include regulation, technology development, capital investment and market mechanisms. We expect better-planned phase-out of inefficient infrastructure and clearer devolution of central targets by sector and province. Data quality on energy continues to improve²⁹, enabling more effective regulation. Market mechanisms, including energy price reform, carbon trading pilots, energy labelling of consumer products and support for energy services companies, will be actively developed and are likely to form a key element for China's energy policy framework by 2015.

On the national agenda since 2002, energy price-reform has become urgent to rationalize investment, and market mechanisms are an experiment for a nation accustomed to administrative regulation. Industrial energy efficiency measures remain critical to success³⁰. Some local governments struggle with limited capacity to implement changes and still perceive energy intensity reduction to be at odds with economic growth. Access to capital for energy efficiency projects is a priority, especially for non-SOEs. Nuclear and hydroelectric power will take higher priority in this FYP. Coal-fired generation and heavy manufacturing still make up the lion's share of China's emissions (81%)³¹. There is no provision for carbon capture and storage in the FYP although it remains a development priority in energy R&D. Although absolute coal-generating capacity will increase, outstripping new energy growth in 2015, the share of coal in the energy mix will decline.

The targets are set and the plans are in motion to build on the ambition of the 11th FYP for China's movement towards clean and efficient energy use. The 12th FYP makes it clear that China is determined to capture the economic opportunities that exist from addressing climate change.

- 1 Xie, Zhenhua (Sep 30, 2009). Power industry 10th FYP review and 11th FYP perspective (in Chinese). CEC. Retrieved February 15, 2011 from <http://info.electric.hc360.com/2006/09/30080952891-2.shtml>.
- 2 Wang, Youling (Dec 15, 2010). China's renewable energy contributes to 9.6% of total energy consumption (in Chinese). Xinhua News Agency. Retrieved February 15, 2011 from http://www.gov.cn/jrzq/2010-12/15/content_1766566.htm.
- 3 Zheng, Xiaoyi (Jan 7, 2011). CEC: China's power capacity reached 962 GW in 2010 (in Chinese). Xinhua News. Retrieved February 15, 2011 from http://news.xinhuanet.com/fortune/2011-01/17/e_12986305.htm?finace.
- 4 CEC (Sep 10, 2006). CEC released 2005 power industry statistic report (in Chinese). CEC. Retrieved February 15, 2011 from <http://www.cec.org.cn/hengyuanyudianlitongji/hangyetongji/2010-11-26/30070.html>.
- 5 Premier Wen Jiabao. (2011). address to National People's Congress 2011 (anticipated at the time of going to print).
- 6 *ibid*.
- 7 Ma, Jiantang (Jan 20, 2011). National economic situation is generally good in 2010 (in Chinese). State Statistics Bureau. Retrieved January 20, 2011 from http://www.stats.gov.cn/tjfxjdx/20110120_402699441.htm.
- 8 Calculated based on business as usual assumptions and calculations from: Lynn, Price et al. (2011). Assessment of China's Energy-Saving and Emission-Reduction Accomplishments and Opportunities During the 11th Five Year Plan. Lawrence Berkeley National Laboratory and Azure International. Retrieved February 15, 2010 from <http://china.lbl.gov/sites/china.lbl.gov/files/ACEStudy2011.pdf>.
- 9 International Energy Agency (2010). CO2 Emissions from Fuel Combustion, Highlights. IEA. Retrieved January 24, 2011 from <http://www.iea.org/co2highlights/co2highlights.pdf>.
- 10 Xu, Bo et al. (June 1, 2010). An analysis of Chinese carbon dioxide mitigation strategy. Royal Institute of Technology, Sweden. Retrieved February 15, 2010 from http://www.kadinst.hku.hk/sdcon110/Papers_PDF/p263.pdf.
- 11 Energy Research Institute, NDRC. (2011). Unpublished internal research.
- 12 The IEA reference scenario refers to energy-related emissions only, whereas the 12th FYP carbon intensity target (17%) anticipates emissions reductions achieved partly through afforestation. Here, we apply the 17% to China's energy-related emissions, given that the associated 12th FYP energy intensity target is 16% and the new energy percentage is expected to increase over the five year period (i.e. energy-related carbon intensity will decline proportionally faster than energy intensity).
- 13 Robins, Nick et al. (September 2010). Sizing the climate economy. HSBC Global Research.
- 14 Wang, Youling (December 15, 2010). China's renewable energy contributes to 9.6% of total energy consumption (in Chinese). Xinhua News Agency. Retrieved February 15, 2011 from http://www.gov.cn/jrzq/2010-12/15/content_1766566.htm.
- 15 Xing, Baijing (Nov 3, 2010). 12th FYP hydro power target: 63 GW capacity will be installed by 2015 (in Chinese). China Securities Journal. Retrieved February 15, 2011 from http://news.xinhuanet.com/fortune/2010-11/03/e_12731518.htm.
- 16 Liu, Weixun (Jan 12, 2011). Energy Bureau officer: will speed up the hydro power construction and increase the power electricity price (in Chinese). Economic Observer Newspaper. Retrieved February 15, 2011 from http://www.eeo.com.cn/industry/energy_chem_materials/2011/01/12/191319.shtml.
- 17 National Energy Bureau (July 21, 2010). Energy Bureau's media release to introduce energy and economic trend in the second half of 2010 (in Chinese). China.com.cn. Retrieved Feb 15, 2011 from http://www.china.com.cn/policy/txt/2010-07/21/content_20540104.htm.
- 18 National Energy Bureau (July 21, 2010). Energy Bureau's media release to introduce energy and economic trend in the second half of 2010 (in Chinese). China.com.cn. Retrieved Feb 15, 2011 from http://www.china.com.cn/policy/txt/2010-07/21/content_20540104.htm.
- 19 Li Jufeng (January 2011). Presentation at CREIA Annual Meeting. Chinese Renewable Energy Industry Association. Retrieved February 20, 2011 from <http://www.creia.net/>.
- 20 Ordos Coal Bureau (January 12, 2011). National energy and economy working session: Transfer the energy development model, enhance the supply and guarantee ability, and build up a safe, stable, economic and clean modern energy industry system (in Chinese). Ordos Coal Bureau. Retrieved February 15, 2011 from http://www.ordos.gov.cn/pub/ordsmt/hydt/201101/t20110112_277848.html.
- 21 *ibid*.
- 22 *ibid*.
- 23 National Energy Bureau (July 21, 2010). Energy Bureau's media release to introduce energy and economic trend in the second half of 2010 (in Chinese). China.com.cn. Retrieved February 15, 2011 from http://www.china.com.cn/policy/txt/2010-07/21/content_20540104.htm.
- 24 Xing, Baijing (Nov 3, 2010). 12th FYP hydro power target: 63 GW capacity will be installed by 2015 (in Chinese). China Securities Journal. Retrieved February 15, 2011 from http://news.xinhuanet.com/fortune/2010-11/03/e_12731518.htm.
- 25 China Energy Research Observer Net. National Energy Bureau officials interpret 12th FYP energy plan and development priorities (in Chinese). China Energy Research Observer Net. Retrieved February 15, 2011 from http://www.chinaero.com.cn/jdzt/2010_nyjj/zxd/2010/11/69857.shtml.
- 26 Coal, whose share of energy increased to 72% in the 11th Five Year Plan, is anticipated by the government to reduce to a 63% share of the mix by 2015.
- 27 Xinhua news agency. (Nov 23, 2010). China spends 1.7% of GDP on R&D. China Daily. Retrieved March 1, 2011 from http://www.chinadaily.com.cn/business/2010-11/23/content_11594870.htm.
- 28 Xiao, Ming and Li, Jiaofeng (April 29, 2010). The R&D investment indicator will increase in 12th FYP (in Chinese). 21st Century Business Herald. Retrieved February 15, 2011 from <http://www.21cbh.com/HTML/2010-4-29/3NM0DAWME3NDK3NA.html>.
- 29 Based on preliminary and final energy values from 1990 to the present day published by the National Bureau of Statistics, showing diminishing errors in energy data over time. Increased academic and research interest in China's energy statistics has similarly led to more accurate data over time.
- 30 A Special Energy Savings Plan anticipated from the National Development and Reform Commission (NDRC) later this year will be significant in this respect.
- 31 International Energy Agency (2010). CO2 Emissions from Fuel Combustion, Highlights. IEA. Retrieved January 24, 2011 from <http://www.iea.org/co2highlights/co2highlights.pdf>.

ABOUT THE REPORT

The report is a guide to the implications of China's 12th Five Year Plan (FYP) for the country's efforts to develop a lower carbon economy, considering related policies and trends in the process. It has been prepared by The Climate Group and commissioned by The HSBC Climate Change Centre of Excellence, building on the five-year HSBC Climate Partnership in which both organizations participate alongside WWF, Earthwatch and the Smithsonian Tropical Research Institute.

Our findings are based on a review of successive drafts of the Plan, the most recent draft of which was presented on 5th March 2011 at the National People's Congress, supplemented by interviews and conversations (some on a non-attributable basis) with experts in the public and private sectors in China. It also builds upon earlier research into China's climate change and energy policy.

Authors

Changhua Wu
Jim Walker
Allison Hannon
Ying Liu

Contact details

The Climate Group in China
Jim Walker
jwalker@theclimategroup.org

The Climate Group outside China
Allison Hannon
ahannon@theclimategroup.org

HSBC
Nick Robins
nick.robins@hsbc.com