



This windmill in Xinjiang in western China is part of China's commitment to renewable energy. China invested \$34.6 billion in clean energy in 2009.

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## From Crisis to Opportunity: How China is Addressing Climate Change and Positioning Itself to be a Leader in Clean Energy

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China and the United States are the world's largest emitters of global warming pollution, and as both nations face an increasing dependence on foreign oil and dirty coal, their joint leadership is crucially needed to address global climate change and move the world to a clean energy economy.

With global warming already taking a toll on China's agricultural production, water supplies, and coastal cities, a major shift in energy supply and use is urgently needed. To combat global warming, China has committed to reduce its carbon intensity by 40 to 45 percent from 2005 levels by 2020, increase the share of non-fossil energy in its primary energy consumption to around 15 percent by 2020, and increase forest coverage.<sup>1</sup> To meet these targets, China is moving to strategically establish itself as a leader in developing and deploying the clean energy solutions of the future: wind and solar power; advanced coal technology; electric vehicles, advanced batteries and high-speed rail; smart grid technology; and more energy-efficient industries, buildings, lighting, and appliances.

## China is Taking Action to Curb Global Warming

Some of China's recent actions to curb its greenhouse gas emissions growth and reduce carbon intensity include:

**Showing Leadership in Renewable Energy.** China invested \$34.6 billion in clean energy in 2009, more than any other country.<sup>2</sup> The central government has set aggressive targets to increase non-fossil fuel energy, including renewables, to 15 percent of primary energy consumption by 2020. The 2005 Renewable Energy Law, strengthened in 2009 with additional provisions, set in place several market-based programs that have driven much of this expansion. In July, the National Energy Administration announced plans to spend \$738 billion over the next ten years on alternative energy development, a figure which includes renewables as well as nuclear and unconventional gas exploration.<sup>3</sup>

■ **Wind**—China became the world's leading manufacturer of wind turbines last year and has set a national target for wind power of 100 gigawatts by 2020.<sup>4</sup> China outpaced the United States in new wind installations in 2009, adding 13 gigawatts compared to 10 gigawatts in the U.S., a gap which is projected to increase in 2010. In July 2009, China set a feed-in tariff for new onshore wind power plants of up to \$0.089 per kilowatt hour, a significant premium over coal-based electricity. China also has plans to develop its offshore wind resources, beginning with the 102-megawatt Donghai Bridge wind farm near Shanghai, the largest offshore wind project outside of Europe. As a result, China's top three domestic manufacturers doubled their global market share from about 12 percent to almost 23 percent from 2008 to 2009.<sup>5</sup>

■ **Solar**—China is the top manufacturer of solar photovoltaic (PV) cells in the world. The central government has also established policies to boost domestic PV deployment, such as the Golden Sun program, which is providing installation subsidies of about \$1.5 billion for large-scale systems. The "Solar Roofs" program, initiated in 2009, provided \$176 million last year in installation subsidies for integrated PV in buildings.<sup>6</sup> China's solar hot water heater market is the largest in the world, with enough capacity to provide hot water for 60 million households.<sup>7</sup>

■ **Smart grid**—China is working to build a stronger and smarter grid that can increase efficiency and facilitate the integration of renewable energy. Stimulus funding in 2010 made China the world leader in smart grid investment, with \$7.3 billion slated for the year.<sup>8</sup> The State Grid Corporation announced in May it will invest \$44 billion through 2012 to build ultrahigh-voltage transmission lines, increasing to \$88 billion through 2020. Chinese companies have already begun to export this technology to India and other developing nations.<sup>9</sup>



**Using Energy Efficiently.** Reducing energy intensity, or the energy consumed per unit of gross domestic product, is a central pillar of the current 11th Five Year Plan. In order to meet its goal of reducing energy intensity by 20 percent from 2006 to 2010, the central government forced shutdowns of inefficient factories and power plants, incentivized less energy-intensive high-tech sector growth, promoted local energy savings, and required that new coal-fired electricity plants meet the highest efficiency standards. As of the end of 2009, these actions resulted in a 15.6 percent drop in energy intensity. According to one estimate, if China were to succeed in reaching its 20 percent energy intensity reduction target, it would avoid emitting approximately 4.3 billion tons of carbon dioxide emissions.<sup>10</sup>

**Enforcing Stricter Energy Codes and Standards for Buildings and Appliances.** China's strategy for meeting energy efficiency targets relies on reducing energy waste in buildings and appliances. China has long enacted national building energy standards that mandate reducing new building energy use by 50 percent, and is currently revising these standards to push the energy reduction even further to 65 percent. However, because improving code compliance is a challenge, China is developing a national building energy rating and labeling system that is more comprehensive than what is currently deployed in the United States. The national labels cover both residential and commercial buildings. China has also focused on energy retrofits for existing buildings, and has almost reached its goal of retrofitting 150 million square meters of residential buildings in the cold climate region by the end of 2010. Successfully meeting the current Five Year Plan's targets in these areas would reduce carbon dioxide emissions by 540 million tons.<sup>11</sup>

**Developing Advanced Coal Technology.** China relies on coal for 70 percent of its total energy needs. It has been closing down older, smaller, less efficient power plants as it builds new, larger, more efficient power plants.<sup>12</sup> From 2006 to mid-2010, China retired 71 gigawatts of inefficient coal-burning power plants.<sup>13</sup> China is also developing and deploying more efficient coal-fired power generation technologies such as combined heat and power, ultra-supercritical boilers, integrated gasification combined cycle (IGCC) and carbon capture and storage (CCS). It has broken ground on its first IGCC power plant in Tianjin, which is slated to include CCS, a technology that captures the carbon dioxide emitted from coal-fired power plants and disposes it into deep geologic formations. China's first full-range CCS pilot project is expected to be built at a coal-to-liquids plant in Inner Mongolia by the end of 2010, capable of sequestering 100,000 tons of carbon dioxide per year in its first stage.<sup>14</sup> In mid-2009, a large post-combustion carbon capture facility, located in Shanghai, began operation producing around 100,000 tons of food-grade carbon dioxide per year.<sup>15</sup>

**Electrifying Transportation.** China's automobile fuel economy standards are among the strictest in the world, behind only Japan and the E.U.<sup>16</sup> In addition, China is moving to capitalize on its strengths in battery technology and its status as the largest automobile market in the world to become a leader in hybrid and electric vehicles. The government has recently expanded a subsidy program to incentivize purchases of alternative energy vehicles for government and fleet use to 20 pilot cities, and initiated a subsidy program for private consumers in five cities.<sup>17</sup> Its goal is to raise annual production capacity of hybrid and all-electric cars and buses to 500,000 by the end of 2011.<sup>18</sup> Further, China is the world's leader in electric scooters, with an estimated 120 million

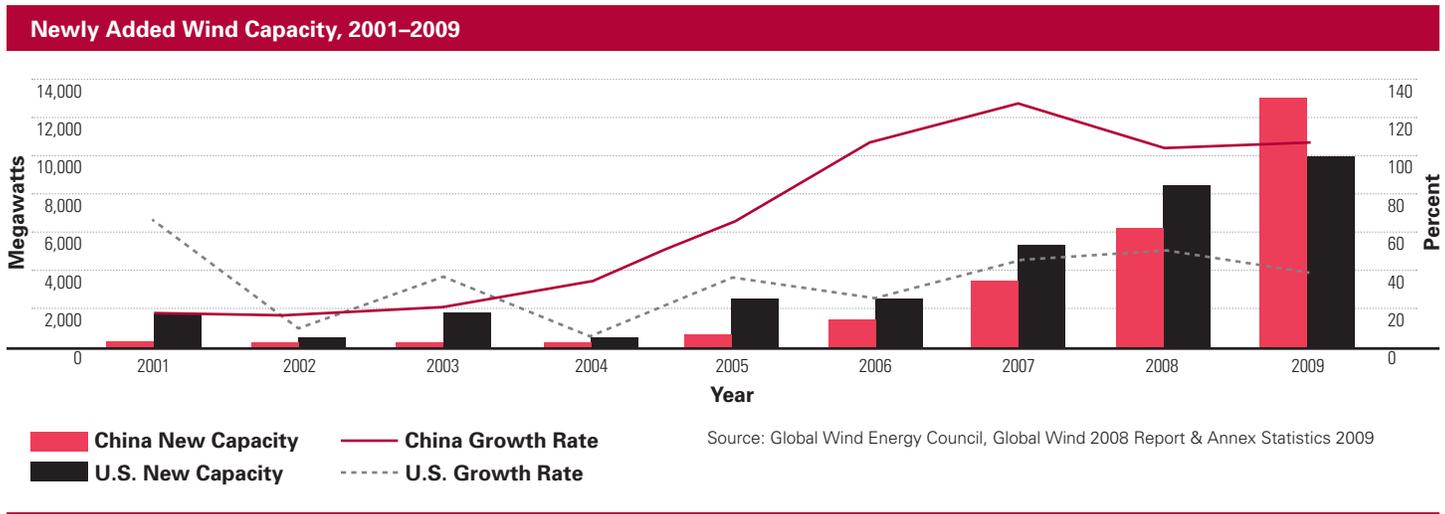
already on the road and another 20 million sold each year.<sup>19</sup> China is building the largest high-speed rail network (trains traveling faster than 125 miles per hour) in the world, with over 4,000 miles already in operation and more than 6,200 miles currently under construction.<sup>20</sup>

### Now Is the Time for Global Innovation

China has recognized that the current economic downturn can be an opportunity to innovate and reposition its response to global warming. While China's government has resisted setting a firm cap on the country's emissions, it realizes that action to combat global warming cannot wait. Now more than ever, both China and the United States have the opportunity to reduce their greenhouse gas emissions, protect their citizens from the growing dangers of climate change, create millions of green jobs, and build the clean energy economies of the future.

#### About NRDC's China Program

For nearly 15 years, NRDC has been working to improve environmental protection and reduce energy consumption in China by developing stricter energy codes and standards for buildings and appliances; helping to establish provincial demand side management programs to fund large-scale investments in industrial energy efficiency; working with factories to find cleaner production methods; supporting efforts to develop advanced coal technologies; and strengthening environmental laws and enforcement by encouraging the development of a robust environmental legal system to monitor and enforce against violations. The on-the-ground work of our 30-person staff in Beijing has been recognized by both governments as a model for achieving concrete reductions in energy use, emissions, and global warming pollution.



## ENDNOTES

- <sup>1</sup> For more details, see: [www.nrdc.org/international/copenhagenaccords/](http://www.nrdc.org/international/copenhagenaccords/).
- <sup>2</sup> The Pew Charitable Trusts, *Who's Winning the Clean Energy Race?* (2010). Available at: [www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Global\\_warming/G-20%20Report.pdf](http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Global_warming/G-20%20Report.pdf).
- <sup>3</sup> Shanghai Daily, "10-Year Plan for Clean Energy," 21 July 2010, available at: [www.china.org.cn/business/2010-07/21/content\\_20544793.htm](http://www.china.org.cn/business/2010-07/21/content_20544793.htm).
- <sup>4</sup> There are some expectations that China's wind target will be increased to 150 GW by 2020. See Eric Martinot and Li Junfeng, "Renewable Energy Policy Update for China," *Renewable Energy World International Magazine*, 13(4) (2010), available at: [www.renewableenergyworld.com/rea/news/article/2010/07/renewable-energy-policy-update-for-china](http://www.renewableenergyworld.com/rea/news/article/2010/07/renewable-energy-policy-update-for-china).
- <sup>5</sup> According to figures from BTM consulting.
- <sup>6</sup> The Solar Roofs program is on track to provide a similar amount of funding this year. See Wang Qing, "Solar roofs become a modern building trend" (Chinese), 6 Sept 2010, *China Construction News*, available at: [news.dichan.sina.com.cn/business/2010/09/08/210061.html](http://news.dichan.sina.com.cn/business/2010/09/08/210061.html).
- <sup>7</sup> Eric Martinot et al.
- <sup>8</sup> Zpryme, "Smart Grid Snapshot: China Tops Stimulus Funding" (2010), available at: [www.zpryme.com/reports/smart\\_grid\\_snapshot\\_global\\_and\\_china%20federal\\_stimulus\\_funding\\_zpryme\\_jan27\\_2010.pdf](http://www.zpryme.com/reports/smart_grid_snapshot_global_and_china%20federal_stimulus_funding_zpryme_jan27_2010.pdf).
- <sup>9</sup> Chen Aizhu, "China to spend \$44 bln by 2012 on UHV power lines," 21 May 2009, available at: [in.reuters.com/article/idINPEK1781620090521](http://in.reuters.com/article/idINPEK1781620090521).
- <sup>10</sup> Lawrence Berkeley National Laboratory, "Assessment of China's Energy-Saving and Emission-Reduction Accomplishments and Opportunities During the 11th Five Year Plan" (2010), available at: [china.lbl.gov/publications/the-ace-study](http://china.lbl.gov/publications/the-ace-study).
- <sup>11</sup> NRDC calculations based upon LBNL 2010 assessment study cited above.
- <sup>12</sup> China has been building the equivalent of 2 plants a week, while destroying about one-half a plant a week (NRDC calculations based upon Chinese energy data).
- <sup>13</sup> CBN Weekly, "National Energy Administration: Closure of small power plants this year finishes ahead of schedule" (Chinese), 26 July 2010, available at: [www.cs.com.cn/ssgs/04/201007/t20100726\\_2525813.htm](http://www.cs.com.cn/ssgs/04/201007/t20100726_2525813.htm).
- <sup>14</sup> Xinhua, "The Significance of China's first complete CCS project" (Chinese), 30 August 2010, available at: [www.xinhuanet.com/chinaneews/2010-08/30/content\\_20764783.htm](http://www.xinhuanet.com/chinaneews/2010-08/30/content_20764783.htm).
- <sup>15</sup> Wang Ying, "Moving Forward with Carbon Capture Plans," 31 August 2009, *China Daily*, available at: [www.chinadaily.com.cn/bizchina/2009-08/31/content\\_8634756.htm](http://www.chinadaily.com.cn/bizchina/2009-08/31/content_8634756.htm).
- <sup>16</sup> See International Council on Clean Transportation, "Global passenger vehicle fuel economy and GHG emissions standards: April 2010 update," available at: [www.theicct.org/2010/04/ghg-fe-standards-update/](http://www.theicct.org/2010/04/ghg-fe-standards-update/).
- <sup>17</sup> Reuters, "China to subsidize hybrid, electric car purchases," 1 June 2010, available at: [www.reuters.com/article/idUSTOE65007Z20100601](http://www.reuters.com/article/idUSTOE65007Z20100601). See also: Xing Xiaodan et al., "New energy pilot programs expand to 20 cities" (Chinese), 4 June 2010, *China Government Purchase News*, available at: [cfen.mof.gov.cn/web/meyw/2010-06/04/content\\_636600.htm](http://cfen.mof.gov.cn/web/meyw/2010-06/04/content_636600.htm).
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- <sup>20</sup> Su Qinghua, "China enters the high speed rail era: Who benefits from the 2 trillion yuan investment?" (Chinese), 6 May 2010, *Electric China*, available at: [finance.ifeng.com/news/20100506/2152803.shtml](http://finance.ifeng.com/news/20100506/2152803.shtml).