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CONGRESSIONAL TESTIMONY

Clean Energy in China and the U.S.:
It's Not What You Spend

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My name is Derek Scissors. I am Senior Research Fellow for Asia Economics at The Heritage Foundation. The views I express in this testimony are my own and should not be construed as representing any official position of The Heritage Foundation.

There are serious misconceptions regarding China's energy and environmental performance and what it means for the U.S. China is indeed spending a great deal of money on clean energy, but it is doing so largely in response to its own policy errors. The combined results of this spending and these errors are abysmal—waste, below-average gains in energy efficiency, lack of innovation, greater dependence on foreign sources, and a terrible record on the environment.

American misconceptions arise from the fact the Beijing has succeeded in one important area: green energy jobs. For the sake of jobs, Congress can choose to follow China's example, but the costs would be prohibitive. Not just money but efficiency, innovation, even environmental protection would have to suffer for the sake of employment. The U.S. boasts a far better energy and environmental record than China, and moving in China's direction would be very risky.

China: Is Green Energy Investment Helping?

One of the numbers that gets the most attention in clean energy debates is the amount countries are said to invest. According to the Pew Charitable Trusts, the People's Republic of China (PRC) spent a total of $100 billion in 2010 and 2011 on green energy, though noticeably less in 2011.[1] If "winning" in green energy is defined as just spending the most money, without reference to the outcomes, China is doing very well. That, however, is a very strange notion of success.

The first problem with grappling with how the PRC is actually doing is lack of transparency. Internal Chinese investment figures clash,[2] making it more difficult for foreign observers to draw conclusions. Some gaps are unintentional; elsewhere, there is deliberate obfuscation. China stopped publishing regular coal figures in 2010 as its share of global output approached 50 percent. It balks at almost any form of international monitoring, from a sweeping agreement on checking greenhouse emissions to U.S. embassy measurements of air pollution in Beijing.

A related problem is the contrast between capacity and actual use: The PRC's capacity to generate clean energy far outstrips its use. In wind power, the initial surge in capacity was half-wasted - over half the wind power generated in the first half of 2010 was unused. More recently, even capacity expansion in offshore wind has stalled due to delays and overcrowding.[3] In solar, Chinese equipment does get used, but almost entirely by others. The PRC now has the largest share of the world production market, but 95 percent has gone to exports.[4] China's world-leading investment in clean energy has managed not to provide the country with much clean energy.

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[1] "Who's Winning the Clean Energy Race? G-20 Investment Powering Forward, 2011 Edition" Pew Charitable Trusts, 2012, http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Clean_Energy/Clean%20Energy%20Race%20Report%202012.pdf (accessed June 11, 2012).

[2] See the China Electricity Council cited in "China to See Slow Power Consumption Growth," Xinhua, February 7, 2012, http://www.china.org.cn/business/2012-02/07/content_24576241.htm (accessed June 11, 2012), versus the National Bureau of Statistics in National Bureau of Statistics, China Monthly Statistics, Beijing, Volume 1 2012.

[3] "Grid Issue Taking Wind Out of Energy Plan's Sails," *China Daily*, February 16, 2011, http://www.china.org.cn/2011-02/16/content_21933267.htm (accessed June 11, 2012), and Liu Yiyu, "Wind Firms in Doldrums," *China Daily*, May 31, 2012, http://www.chinadaily.com.cn/cndy/2012-05/31/content_15430337.htm (accessed June 11, 2012).

[4] "Factbox: How China Promotes Its Green Sector," Reuters, January 17, 2011, http://www.reuters.com/article/2011/01/17/us-solar-china-idUSTRE70G2CH20110117 (accessed June 11, 2012).

Another area of the PRC's troubled "leadership" is hydropower. At home, hydro capacity outruns its use, just as with wind. Here the reason is not lack of connection but lack of water flow due to overconsumption and, to some extent, pollution. Major rivers now run dry and fail to reach the sea, and 25 percent of surface water is rated as unsafe.[5] Overseas, China has inked billions in contracts to build hydropower plants, mostly for less developed economies. These plants provide clear and important benefits but their environmental impact is dubious.[6]

Coal Production (tons, millions)

1998	1,110
1999	980
2000	880
2001	960
2002	1,110
2003	1,330
2004	1,610
2005	1,820
2006	2,070
2007	2,290
2008	2,620
2009	2,960
2010	3,240
2011	3,520

Sources: National Bureau of Statistics, China Monthly Statistics, Beijing, Volume 1 1999 – Volume 1 2010, and "Chinese Energy Chief Stresses Coal Consumption Control," *Coal World*, February 25, 2012, http://www.coalworld.net/indexnews/info.jsp?id=72651 (accessed June 11, 2012).

Notwithstanding all the green energy investment, coal dominates generation of both electricity and energy, and that dominance is not subsiding. On the (unreliable) official tally, energy consumption was said to rise 7 percent in 2011. Coal demand rose almost 10 percent so that its share in realized energy consumption expanded. Thermal power generation, which in the PRC is utterly dominated by coal, outpaced overall electricity generation last year because realized hydropower generation fell outright. [7]

This is not surprising; coal's role has waxed for over a decade, the very period where green energy is supposed to have become important. When hydropower is included, green energy has

[5] Richard Spencer, "Yangtze River Water Level at 140-Year Low," *The Telegraph*, January 17, 2008, http://www.telegraph.co.uk/earth/earthnews/3322121/Yangtze-River-water-level-at-140-year-low.html (accessed June 11, 2012), and "China's Air Pollution Worsens After Economic Growth Rebounds From Crisis," Bloomberg, July 27, 2010, http://www.bloomberg.com/news/2010-07-27/china-s-air-pollution-worsens-after-economic-growth-rebounds-from-crisis.html (accessed June 11, 2012).

[6] Simon Marks, "Chinese Dam Project in Cambodia Raises Environmental Concerns," *The New York Times*, January 16, 2012, http://www.nytimes.com/2012/01/17/business/global/17iht-rbog-cam17.html?pagewanted=all (accessed June 11, 2012), and Derek Scissors, "China Global Investment Tracker Interactive Map," The Heritage Foundation, January 6, 2012, http://www.heritage.org/research/projects/china-global-investment-tracker-interactive-map.

[7] "China Energy Consumption Rises At Fastest Pace in Four Years," Bloomberg, February 22, 2012, http://www.bloomberg.com/news/2012-02-22/china-energy-consumption-rises-at-fastest-pace-in-four-years.html (accessed June 11, 2012), and National Bureau of Statistics, China Monthly Statistics, Beijing, Volume 1 2012.

in fact receded while coal has advanced. In the late 1990's, coal accounted for a bit over 60 percent of the PRC's energy use and a bit over 70 percent of its electricity. Those numbers are now 70 percent and 80 percent, respectively. Coal use accelerated most noticeably starting in 2002–2003, when the current Chinese government took office and emphasized investment in power-intensive heavy industries such as steel.[8] Eventually, supply could not keep up. As recently as 2007, China was a net coal exporter; it is now the world's largest coal importer.[9]

State Dominance and Its Impact

For a decade, the economic model has been to lend, invest, produce, and export. Coal and other energy consumption has essentially been forced to rise in response, far more than if growth had been consumption- or services-led. A simple way to understand Chinese energy investment is the state trying to clean up after itself. It typically fails because Beijing simultaneously takes actions that limit the value of clean energy investment.

The government does not encourage or shape energy development; it dictates it. The State Council requires "absolute control" of all energy production, starting with price-setting. When prices are permitted to rise, subsidies are often offered as compensation, so government involvement still increases. Price controls have consistently caused production of natural gas to fall short of grandiose plans.[10]

But coal, as usual, provides the starkest example of double-sided, self-defeating government intervention. Effective price controls, through electricity prices and central government coercion, keep coal cheap for industrial expansion and lead to more coal use.[11] This prompts calls for clean energy. But the subsidies Beijing then provides to green energy to make it competitive are much larger than they would have to be if the price of coal was not kept too low in the first place.

Beyond prices, the latest incarnation of state energy policy is the 12th five-year plan. Some goals, such as those for electric vehicles, are far from being met.[12] Others are standing orders modified only by placing the word "new" before the word "energy." One such goal is to suppress competition. The three national oil majors account for well over 90 percent of oil production and over 95 percent of gas production. Oil and solar may seem strange bedfellows, but the PRC is

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[8] Derek Scissors, "Deng Undone: The Costs of Halting Market Reform in China," *Foreign Affairs*, May/June 2009, http://www.foreignaffairs.com/articles/64947/derek-scissors/deng-undone (accessed June 11, 2012).
[9] "China Surpasses Japan As Largest Coal Importer," Dow Jones, January 25, 2012, http://www.iss-shipping.com/microsites/NewsDetails.aspx?msid=194&newsid=6439 (accessed June 11, 2012).
[10] As an illustration, see "Chinese Cities Grappling with Natural Gas Shortage," Xinhua, November 23, 2009, http://english.people.com.cn/90001/90778/90860/6821411.html (accessed June 11, 2012), and "Australia Cancels $40.4 Billion Natural Gas Contract with China," *People's Daily Online*, January 5, 2010, http://english.people.com.cn/90001/90778/90860/6859711.html (accessed June 11, 2012).
[11] "Development and Reform Commission Asked for Breach of Contract Prices of Coal Enterprises to Resume Contract Price," Xinhua, June 25, 2010, http://www.china-daily.org/China-News/Development-and-Reform-Commission-asked-for-breach-of-contract-prices-of-coal-enterprises-to-resume-contract-price/ (accessed June 11, 2012).
[12] "China 'Can Still Lead' in Green Cars," *China Daily*, April 21, 2012, http://www.china.org.cn/environment/2012-04/21/content_25200574.htm (accessed June 11, 2012).

molding solar in oil's image, handing out gigantic loans to a select few solar companies and then implementing regulations on standards that will drive most small firms out of business.[13]

The PRC spends heavily on green energy in large part because it has bigger energy and environmental problems than any other country in the world. Most of those problems are inflicted by the Chinese state itself. Giving Beijing credit for spending on green energy is like looking at a stunt driver's medical bills and giving her credit for investing so much in her health.

State Control of Energy – A Summary

Coal	Price controls discourage use of other sources
Gas	Price controls discourage competition, innovation
Oil	Regional monopoly blocks competition, innovation
Solar	Trying to imitate oil

China and the U.S.: Win or Lose

Sino-American energy and environmental relations can be cooperative, competitive, or imitative. Most observers would choose cooperative, but a country that fights transparency and adopts contradictory policies is not a pleasant partner. Joint research, touted in the Strategic and Economic Dialogue, is reasonable, but expectations should be minimal. Beijing's clear pattern is to put state control of energy first, with energy efficiency and ecological protection secondary.

In this light, any breakthroughs would come from the U.S. and then be adopted by China. This is occurring now in natural gas, where China is openly jealous of American progress. The PRC is said to have larger shale reserves than the U.S., but its huge, sheltered companies and massive spending have seen it only fall further behind in technology and extraction, and Beijing has been forced to seek foreign assistance.[14] Cooperation with China should be seen more as a contribution to the global community than as a way to make progress on American aims.

Competition: We Win

If the PRC does get help to tap its gas reserves, it will of course become a competitor for the U.S. This has already happened in wind, solar, and elsewhere: China took technologies developed by others and became a major commercial presence. Is this an economic or energy threat to the U.S.? It depends first on American priorities. For more than a generation, the U.S. has emphasized energy efficiency and innovation while seeking self-sufficiency and trying to protect the environment. This approach has borne fruit.

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[13] "Yingli's $5.3b Loan May Help China Double Global Solar Panel Supply," *China Daily*, July 9, 2010, http://www.chinadaily.com.cn/business/2010-07/09/content_10087488.htm (accessed June 11, 2012), and Du Juan, "Solar Industry 12th Five-Year Plan Issued," *China Daily*, February 25, 2012, http://www.china.org.cn/business/2012-02/25/content_24728487.htm (accessed June 11, 2012).

[14] "China's Shale Reserves Already Surpass the U.S.," *Real Clear Energy*, December 19, 2011, http://www.realclearenergy.org/charticles/2011/12/19/chinas_shale_resources_already_surpass_the_us.html (accessed June 11, 2012), and Leslie Hook, "China Sets Target for Shale Gas Development," *Financial Times*, March 16, 2012, http://www.ft.com/intl/cms/s/0/2e7a77ac-6f59-11e1-9c57-00144feab49a.html#axzz1xQ5FoJl0 (accessed June 11, 2012).

If the top priority is energy self-sufficiency, Chinese actions are not directly relevant to the U.S. However, the extent of American self-reliance has been increasing while China's decreases, so that the PRC's model provides little reason for a change in American policy.[15]

America Versus China: The Scoreboard

Target	Winner
Self-sufficiency	U.S.
Efficiency	U.S.
Ecology	U.S.
Technology	U.S.
Jobs	PRC

If the top priority is energy efficiency, the U.S. is clearly winning. Poor data from Beijing again obscure the situation, but China's economy was half the size of the American economy by the end of 2011. Yet the Energy Information Administration, which has consistently underestimated the PRC's expansion, estimates its energy consumption at 10 percent–15 percent larger than American energy consumption last year. The efficiency gap has been widening. The International Energy Agency found the U.S. improved energy efficiency 2.5 percent annually from 2000 to 2009, compared to China's 1.7 percent. This occurred despite the much larger scope for improvement on the western side of the Pacific.[16]

It is difficult to imagine true competition in technology in the foreseeable future. The PRC has a huge market and will continue to try to lure foreign players to offset its own failings, but the requisite state control of energy and lack of protection for intellectual property are powerful disincentives. It is not surprising that the larger energy investments have been made by Chinese firms in the U.S., rather than the reverse, led by gas but also including biofuels and wind.[17]

If the top priority is a cleaner environment, there is no competition: Cheap Chinese solar panels, wind turbines, or natural gas all contribute positively to that end in all countries. In fact, they seem to contribute more positively to protecting the environment outside China than inside.

Cleaner energy improves water and air quality, both areas where America far outperforms China, but attention has been focused on capping or reducing greenhouse gas emissions. The record

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[15] "BP Energy Outlook 2030," BP, January 2012, http://www.bp.com/liveassets/bp_internet/globalbp/STAGING/global_assets/downloads/O/2012_2030_energy_outlook_booklet.pdf (accessed June 11, 2012).

[16] "International Energy Outlook 2011," U.S. Energy Information Administration, September 2011, http://205.254.135.7/forecasts/ieo/pdf/0484(2011).pdf (accessed June 11, 2012), and "China Passes U.S. as World's Biggest Energy Consumer," Bloomberg, July 20, 2010, http://www.businessweek.com/news/2010-07-20/china-passes-u-s-as-world-s-biggest-energy-consumer.html (accessed June 11, 2012).

[17] Ryan Dezember and James T. Areddy, "China Foothold in U.S. Energy," *The Wall Street Journal*, March 6, 2012, http://online.wsj.com/article/SB10001424052970204883304577223083067806776.html (accessed June 11, 2012); "China Egg Producer to Set Up U.S. Biogas Project with Smithfield," Bloomberg, February 17, 2012, http://www.bloomberg.com/news/2012-02-17/china-egg-producer-to-set-up-u-s-biogas-project-with-smithfield.html (accessed June 11, 2012);, and Brian Spegele, "Chinese Firm to Build Big Wind Farm in U.S.," *The Wall Street Journal*, September 20, 2011, http://online.wsj.com/article/SB10001424053111904106704576579741179230646.html (accessed June 11, 2012).

shows the U.S. as the world's best performer since 2006, the golden age for green energy. [18] The PRC, in stark contrast, has moved from roughly equal to the U.S. in emissions in 2006 to half again higher or more (with an economy half the size). China's emissions per unit of GDP are thus four times America's and its emissions *per capita*, while lower, are soaring. Projections over the next decade have gross Chinese emissions larger than the rest of the world combined.[19]

Emissions Trend (tons, billions)

Year	U.S.	PRC
1998	**5.65**	**3.65**
1999	5.69	3.57
2000	5.87	3.56
2001	5.75	3.64
2002	5.82	3.92
2003	5.87	4.50
2004	5.94	5.28
2005	5.94	5.85
2006	5.84	6.50
2007	5.91	7.01
2008	5.46	7.78
2009	5.04	8.11
2010	**5.25**	**8.95**

Source: Jos GJ. Olivier, Greet Janssens-Maenhout, Jeroen A.H.W. Peters, and Julian Wilson, "Long-Term Trend in Global CO_2 Emissions: 2011 Report," PBL Netherlands Environmental Assessment Agency and Institute for Environment and Sustainability (IES) of the European Commission's Joint Research Centre (JRC), 2011, http://www.pbl.nl/sites/default/files/cms/publicaties/C02%20Mondiaal_%20webdef_19sept.pdf (accessed June 11, 2012).

The final priority is jobs. The reason Beijing ratcheted up lending, investment, and production in 2002–2003, thus ratcheting up coal use and carbon emissions, was to create jobs. Renewables are more labor-intensive than fossil fuels, sometimes far more.[20] This is a drawback from the standpoint of cost and efficiency but a positive with regard to employment. A natural result is that a job-seeking China will favor green energy more than an efficiency-seeking U.S. will.

Further, when domestic supply outruns demand, the excess is shipped overseas. Chinese jobs then seem to come at the expense of foreign jobs, a source of broader tension. In energy, solar is

[18] "Global Carbon-Dioxide Emissions Increase by 1.0 Gt in 2011 to Record High," International Energy Agency, May 24, 2012, http://iea.org/newsroomandevents/news/2012/may/name,27216,en.html (accessed June 11, 2012).
[19] Justin Gillis, "Carbon Emissions Show Biggest Jump Ever Recorded," *The New York Times*, December 4, 2011, http://www.nytimes.com/2011/12/05/science/earth/record-jump-in-emissions-in-2010-study-finds.html (accessed June 11, 2012), and Keith Bradsher, "China Fears Consumer Impact on Global Warming," *The New York Times*, July 4, 2010, http://www.nytimes.com/2010/07/05/business/global/05warm.html (accessed June 11, 2012).
[20] Robert Pollin, James Heintz, and Heidi Garrett-Peltier, "The Economic Benefits of Investing in Clean Energy," Department of Economics and Political Economy Research Institute (PERI), University of Massachusetts, Amherst, and Center for American Progress, June 2009, http://www.peri.umass.edu/fileadmin/pdf/other_publication_types/green_economics/economic_benefits/economic_benefits.PDF (accessed June 11, 2012).

the most obvious example: Chinese solar subsidies are wildly excessive if the purpose is just to serve the home market; they began as a response to incentives offered in Europe. With Europe now unable to afford its incentives, Chinese panels have been diverted to the U.S.

Imitation: We Lose

As in other areas, the U.S. is suffering in clean energy from China's job-seeking. Should America fight fire with fire? Should Washington even go beyond simple retaliation and adopt "the Beijing model" in energy? Should Congress pass legislation aimed at China that would create more green energy jobs in the U.S.? The short answer to all three questions is "No." Jobs would be created but at the cost of a pronounced deterioration in overall energy performance.

If green energy was already as efficient as conventional, no subsidies would be needed. More green energy jobs at the moment means less energy efficiency. Further, truly ensuring job creation requires picking winners. Small, nimble firms can drive large employers out of business: Jobs first means this competition must be suppressed, as in the PRC. The result is unavoidably less innovation. Finally, more clean energy jobs means less clean energy. Chinese subsidies harm U.S. manufacturing but cut the price of power generation from renewables. Blocking Chinese goods would raise the price, make green energy less competitive, and undercut ecological gains.

The worst idea, though, is for America to imitate China in clean energy. Even if Beijing were making wise choices for China, it is extremely unlikely these choices would be wise for the U.S. The U.S. is in a far better situation than China. The U.S. has a fundamentally more conducive system for innovation. The U.S. would certainly suffer from imitating Chinese practices with regard to transparency.

The U.S. is also blessed with a far better resource endowment—more usable land and much more water per person. The water gap, in particular, is an obstacle to Chinese natural gas development. So it is no surprise that China invests a good deal in water. But it would still make no sense at all for the U.S. to match this investment. Coal generates about twice as much of America's electricity as natural gas does. Coal generates about 20 times as much of the PRC's electricity as natural gas does.[21] This is not a model that the U.S. should follow.

Even in solar, subject of much debate, the end of European incentives reveal the cost of Chinese subsidies. As a group, LDK Solar, Suntech Power, and Yingli Green Energy were offered tens of billions in government assistance, and their announced debt runs in the billions. Their combined market capitalization is now short of $1 billion. U.S. government solar subsidies can be deemed inadequate compared to China's, but the same is true for ensuing losses. All the PRC has on its side is raw spending, spending that is often wasted and other times is merely an attempt to compensate for harmful policy decisions in other spheres. The U.S. has done far better.

[21] Frank Wolak and Richard Morse, "China's Green Gift to the World," *The Guardian*, December 30, 2010, http://www.stanford.edu/group/fwolak/cgi-bin/sites/default/files/files/China's%20green%20gift%20to%20the%20world_Dec%202010_Wolak_Morse.pdf (accessed June 11, 2012).

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