Climate change policy

Doing more than you think

by Deborah Seligsohn

China has a robust climate change policy, including ambitious energy efficiency and renewable energy goals and a long-standing reforestation program. This is not what you will generally hear in the United States, where many ignore China's domestic programs and focus instead on its refusal to accept targets for reduction of greenhouse gases. Europeans – while more sympathetic to China's argument that as a developing country it is entitled to more relaxed emissions targets – are also surprisingly ill-informed about the rapid changes in Chinese energy and environment policy over the last five years. And when international observers do recognize that China is trying to increase energy efficiency, reduce exports of energy intensive goods and promote renewables, they often dismiss these efforts as being driven by industrial policy aims rather than a concern for the global environment.

China already has a well-formed set of policies aimed at mitigating climate change

But this misses the point. It is precisely because China's energy efficiency and pollution-abatement programs have support from industrial planners that these programs are likely to be successful. Moreover, industrial policy is just part of a larger confluence of domestic and international pressure that has created a real consensus in China for an energy policy that emphasizes thrift and the deployment of cutting-edge technology.

At the heart of China's program is the backing of industrial planners

Energy: security drives efficiency

One of the key drivers of China's emerging climate change policy is energy security. China has abundant coal, but security of petroleum supplies has been a frequent worry. The discovery in the 1960s of Daqing, the world's second largest oil field, made China self-sufficient in oil for three decades, and Daqing became an important symbol of national self-reliance. But after China became a net oil importer in 1994, it adjusted to this new reality quite easily, and the mantra of self-sufficiency gave way, in national planning discussions, to a more market-oriented view that oil was simply a commodity to be imported from the world market.

Energy security is a key driver of China's climate policy

In 2005, however, China became the focus of global criticism because of its increased energy demand. This criticism made policy makers fear that China's ability to import needed energy resources was under threat. After oil imports spiked by 17% in 2004 (well above the trend growth rate of 6-7%), international concern over China's energy thirst grew and was expressed particularly stridently in the United States. In the summer of 2005 the US House of Representatives voted to show its displeasure at both an attempt by China National Offshore Oil Corporation (CNOOC)

Global criticism of China's rising energy demand is misplaced

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to purchase US oil company Unocal, and the planned sale of Westinghouse AP 1000 nuclear power plants to China. The two votes led to different outcomes: CNOOC withdrew its bid, while the Westinghouse sale ultimately went through with funding from the US Exim Bank. But the net result was to greatly increase Beijing's concern about relying on international sources for energy.

This concern prompted the National Development and Reform Commission (NDRC) to dust off some existing energy efficiency programs, add some energy substitution measures – including new renewable energy goals and an intensified focus on nuclear energy – and encompass these into clear energy targets in the 11th Five Year Plan (2006-10).

More with less

% change in energy use per unit output, 2007

Coal mining	-11.5
Cement	-7.3
Soda ash	-6.4
Copper	-5.0
Paper	-4.7
Ethylene	-4.0
Alumina	-3.9
Oil and gas	-3.0
Power generation	-2.6

Source: Energy Research Institute

Pollution awareness grows

Another major contributor to policy shift in Beijing was a rapidly growing awareness of the damage caused by domestic pollution. China's expertise, institutional infrastructure and international engagement had gradually grown. Its environmental policy-making body rose from advisory group in 1972 to an agency in 1998 and reached full ministerial status in 2008. China signed on to key environmental treaties (including the Framework Convention on Climate Change, UNFCCC, and Agenda 21 environmental goals) at the Rio Convention in 1992. This growing environmental awareness was catalyzed by a large spill of toxic chemicals in the Songhua River in China's industrial northeast which shut down the water supply for the city of Harbin for several days in November 2005.

The 2005 spill of toxic chemicals into the Songhua River led to a rethink of development priorities

This was the first Chinese environmental catastrophe with national reverberations. Coming just a year and a half after the 2003 SARS crisis, it helped propel the Chinese leadership away from a narrowly economic view of development and toward a broader definition encompassing ideas like a healthy populace and attractive, environmentally sustainable cities. As a result, strong pollution abatement and energy conservation goals were enshrined at the 11th Five Year Plan. (These are frequently referred to together under the rubric *jieneng jianpai* or "energy efficiency and pollution abatement.") The key requirements for the 2006-10 plan period are a 20% reduction in energy intensity relative to GDP and 10% reductions in sulfur dioxide and chemical oxygen demand, key measures of air and water pollution respectively.

Policy enforcement in China is essentially iterative – try, try, and try again

International observers frequently criticize China for announcing grand-sounding policies and failing to implement them at the local level. This short-sighted view fails to appreciate the iterative nature of Chinese policy enforcement: a policy is announced, implementation fails, the reasons for failure are studied, and better implementation mechanisms are introduced. It often takes three to five years before the results of a policy initiative become evident on the ground. After China failed to meet energy efficiency goals in 2006, provincial governments and major industries were publicly criticized by Premier Wen Jiabao and forced to produce better plans for meeting their energy targets. The result was a greatly strengthened Top 1,000 Enterprises energy efficiency program,

which imposes energy efficiency targets on the nation's biggest industrial enterprises, and which is being replicated on the provincial level (see sidebar, "Targeting the big boys").

Other measures included the elimination of VAT rebates on energy intensive exports, including steel and cement, and the closure of inefficient plants. In 2007 China closed 14.4 gigawatts (gw) of electric power plants, more than 1,000 obsolete cement plants with annual production of 50m tons, and thousands of aluminum, steel, glass and paper factories. These renewed efforts produced both energy-efficiency and industrial policy benefits. The annual reduction in energy intensity jumped from

Energy intensive exports have lost their tax rebates

Targeting the big boys

China's energy and climate policies are driven by a structure of energy use and emissions vastly different from that in other countries. Industry accounts for 71% of China's primary energy use, compared to 49% in India and 25% in the United States. Conversely, transportation, which makes up about a third of emissions in the OECD, accounts for just 10% of China's emissions (see chart, "It's all about industry"). Thus China's energy and climate policies focus mainly on industry.

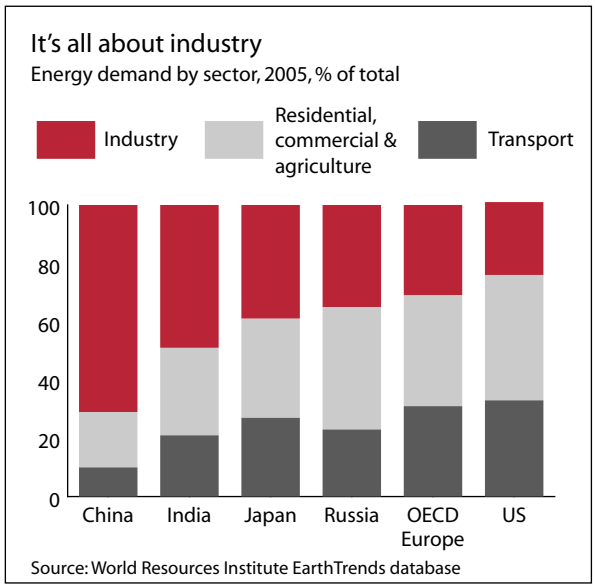
The centerpiece of China's drive to reduce energy intensity by 20% is the Top 1,000 Enterprises Program. This program, established in its current form by NDRC in 2006, focuses on increasing energy efficiency in China's 1,000 largest state-owned enterprises, which account for at least 33% of total primary energy demand and 47% of industrial energy demand. Analysis of the program by a team from the Lawrence Berkeley National Laboratory (LBNL) in the US found the program is right on track, having achieved 20% of its five-year target in its first year.*

A key to the program's success is the establishment of clear lines of authority both through provincial governments and within enterprises. LBNL reports that 95% of enterprises appointed energy managers in the program's first year. Savings result from better energy management as well as specific investments in improved technology. In many industries, NDRC has mandated state-of-the-art equipment for new facilities. This includes the use of supercritical and ultra-supercritical coal-fired power plants and rotary kilns for new cement plants.

The government tasked NDRC, the National Bureau of Statistics, and the General Administration of Quality Supervision, Inspection and Quarantine with monitoring the program. Regular inspections are conducted by experts from NDRC's Energy Research Institute and other agencies.

The program improves efficiency at the top of the food chain; the government is also systematically lopping off the bottom through large-scale closures of inefficient facilities. As a result, significant efficiency improvements per unit output have been registered in numerous industries (see table "More with less").

The focus on industry does not mean that other sectors are being ignored. Energy consumption by buildings and vehicles – whose share will inevitably grow – is already subject to various policies which should help slow the rate of demand increase. These include the development of subway and bus rapid transit systems in more than a dozen large cities, high-speed intercity rail lines to provide an alternative to air travel, and better building codes for energy conservation.



*Lynn Price, Wang Xuejun and Yun Jiang, "China's Top-1000 Energy-Consuming Enterprises Program: Reducing Energy Consumption of the 1000 Largest Industrial Enterprises in China," LBNL-519E, June 2008 (http://ies.lbl.gov/iespubs/LBNL-519E.pdf).

an anemic 1.6% in 2006 to 3.7% in 2007 and could well exceed 4% this year. Meanwhile, market-leading firms favored by the central government (such as the top cement firm, Anhui Conch) have benefited from the elimination of inefficient competitors.

Bad news for Chinese farmers

China's leaders understand the disastrous effect climate change may have on their country

As domestic momentum behind the *jieneng jianpai* policy grew in 2007, international developments helped drive China toward a fully articulated climate change policy. China faced sharply increased international criticism for its growing emissions. More important, the Chinese leadership began better to understand how China would be affected by climate change's impacts. These factors created a greater willingness to help move the global process forward.

Chinese researchers play a major role in the work of the Inter-governmental Panel on Climate Change

The Fourth Assessment of the Inter-governmental Panel on Climate Change (IPCC), released in February 2007, was the first such document widely discussed in China. At least 10% of the document's co-authors were Chinese, including Qin Dahe, administrator of the Chinese Meteorological Administration, who co-chaired the IPCC's science working group. In the year running up to the release, many of these Chinese co-authors began speaking at government meetings about how climate change would affect China. The news they brought was not good.

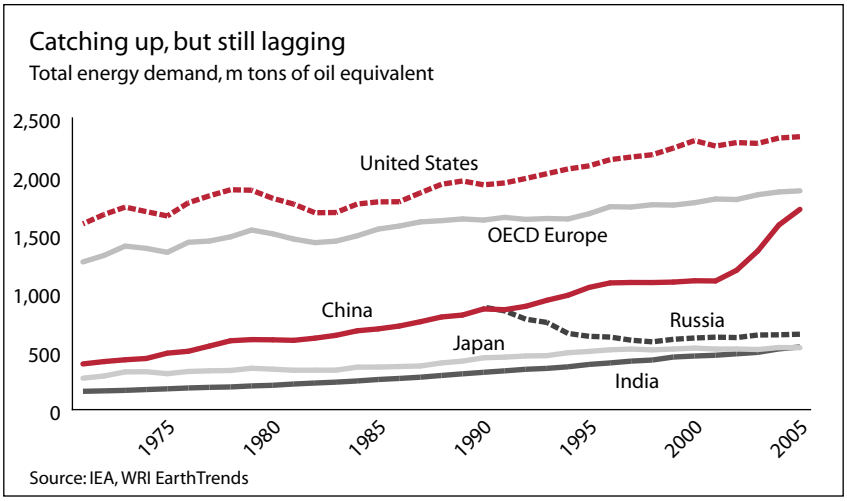
Climate change will likely exacerbate droughts in the north and west, and flooding in the south and east

The key concern was new analysis of the potential impact of climate change on Chinese agriculture. Earlier models suggested that higher atmospheric CO_2 levels might "fertilize" crops and lead to higher yields. The models in the Fourth Assessment, however, suggested that climate change would not benefit Chinese agriculture but would in fact exacerbate droughts in the arid north and west, and aggravate flooding in the wet south and east. Both developments would worsen China's water shortage (since land absorbs less water during floods than during slower and steadier rainfall) and topsoil erosion problems.* Specific events – increased floods and droughts in 2005-06 – helped catalyze awareness of the risks, just as Hurricane Katrina focused the attention of the US public on climate change.

Global forums have pushed the leadership's focus on climate change

A final impetus was the prominence of climate change in international meetings attended by top Chinese leaders in 2007. The Chinese leadership was briefed on the subject no fewer than five times that year, starting with the G8 Summit in May 2007. For the first time, President Hu Jintao had to speak on climate change directly, which meant careful preparation, inter-agency coordination, and the involvement of outside advisors. Moreover, China came under intense scrutiny as its total greenhouse gas emissions rose rapidly towards US levels, and extrapolations of China's emissions growth rates led to some extremely alarmist projections.

* See, for example, a presentation by Chinese Agricultural University Professor Lin Erda, http://www.authorstream.com/Presentation/Connor-16585-Erda-Lin-Climate-Change-Impact-Adaptation-Policy-China-Frequent-occurrence-abnormal-weather-conditi-seedcount-presentation-002-Entertainment-ppt-powerpoint/

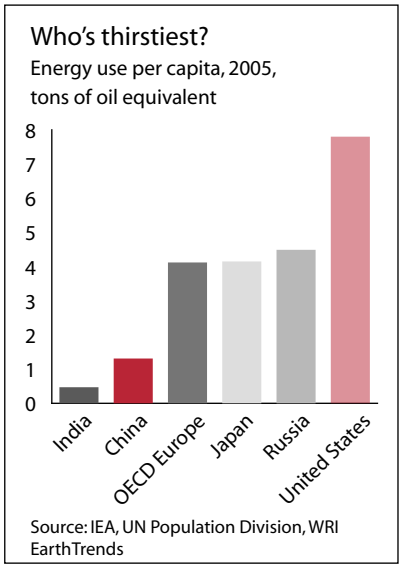


Thanks to the confluence of all these forces, China's government in June 2007 issued its National Climate Change Policy. To a large extent, this was simply a compilation of previously existing policies on energy efficiency, renewables, reforestation and family planning.* But it was significant nonetheless. It was the first time China made a positive, formal statement in the international arena tying its energy policy to climate mitigation. It also signaled a more active role in international discussions. In five international meetings that year, culminating in the UNFCC meeting in Bali in December 2007, China became more of a positive force, with the Chinese delegation being both active behind the scenes and increasingly vocal in public about the need for a comprehensive climate change agreement.

The government issued its first National Climate Change Policy in June 2007

The road ahead

In short, China's record on climate change is impressive. It has put in place measures to increase energy efficiency and curb greenhouse gas emissions; it is investing heavily in new technologies; and these measures and investments are being conducted within a comprehensive policy framework with clear and measurable targets. It is true that, because China's economy is growing rapidly, these measures will merely slow the rate of increase in its emissions, not lead to absolute reductions. But China's per-capita energy consumption and greenhouse gas emissions are about one-fifth of US levels, and one-third Europe's (see chart, "Who's thirstiest?"). The scope for absolute reductions is clearly greatest in the rich countries. If the United States, Europe and Japan move decisively to reduce their emissions, China can take advantage of the new, transformative technologies thereby created to reduce its emissions as well.



*China contends that its family planning policy has contributed to climate-change mitigation, by reducing the number of people demanding energy services and thus preventing CO_2 emissions. While such calculations work for highly developed countries, China's greenhouse gas emissions come mainly from industry. Average household emissions are so minuscule that it is difficult to demonstrate any link between population growth and emissions. Yet even if one excludes population policies, China's climate change program fits a reasonable definition of a comprehensive mitigation policy, as it encompasses energy efficiency, renewables and reforestation efforts.

The US should show a similar resolve to China to curb carbon emissions

In order to move forward, the first step would be for the United States to demonstrate a resolve similar to China's to curb carbon emissions. Next, an international climate agreement should be forged recognizing what China and other developing countries can do, and enabling them to do more. Such an agreement should include a common understanding of the goals of climate change mitigation, but allow for flexibility in the means used to achieve those goals. Europe, under the Kyoto Protocol, developed use of the cap-and-trade mechanism for curbing carbon emissions, and the United States looks likely to adopt cap-and-trade as well. Cap-and-trade is suitable for countries with sophisticated financial systems; but developing countries may do better with techniques such as China's: efficiency targets for industry, renewable energy targets, and taxes on energy-intensive exports. Developing countries will also need tangible incentives for policies to curb carbon emissions from non-industrial sources that will grow in importance as their economies diversify – for example, mass transit, building efficiency and integrated urban planning policies.

Developed countries must collaborate on the sharing of technology

Finally, developed countries must commit to collaboration and shared technology. China wants to be part of creating the best technologies of tomorrow, and is already active in developing wind, solar, nuclear and clean coal systems. Developed country governments would do well to work with Chinese partners as equal investors in new technologies. Both sides will benefit from the scale made available by China for the development and deployment of new technologies. The benefits from a collabor-

Cleaning up the energy mix

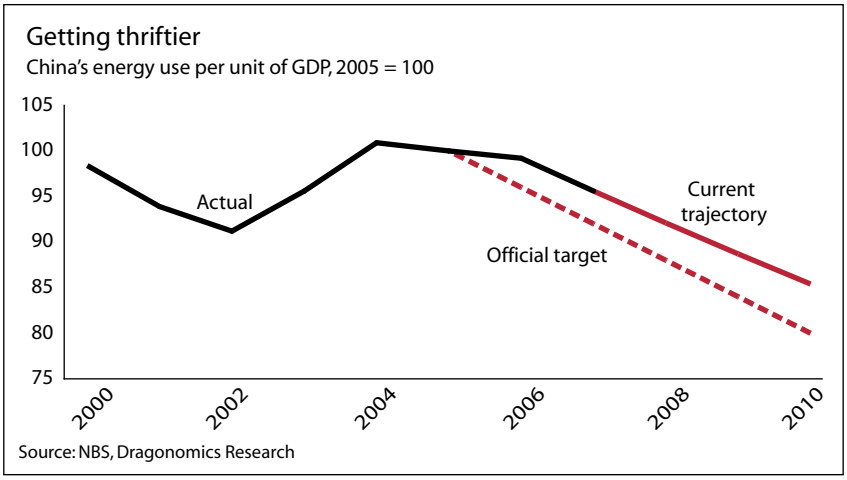
Improving energy intensity is just part of China's environmental and energy challenge. Another key task is to move away from a heavy reliance on coal, which produces more greenhouse gas emissions per unit of energy than most other fuel.

To date, much of China's non-coal energy has come from hydropower, and hydropower growth will continue to be significant. But China has set an ambitious target of having 15% of installed electricity capacity come from renewable sources by 2020. This target includes a planned 100 gw of wind power. China already has one of the fastest-growing wind sectors in the world, and has raised its wind power goal five times as it keeps exceeding targets.

Solar power represents another good opportunity. China already accounts for 70% of global production and consumption of solar water heating equipment. It also produces 35% of the world supply of photo-voltaic cells. Because PVCs are costly, most of this production is exported to Germany, Spain and California, which are subsidizing solar build-outs. But as solar moves down the cost curve, China is poised for self-sufficiency in solar panels.

Chinese policy also promotes natural gas – the least carbon-intensive of the fossil fuels – through liquefied natural gas projects and a variety of programs to increase domestic methane supply. These include the capture of coalmine methane, which is now mandatory for all mines of sufficient scale, and waste gas recovery from industrial processes and landfills. These projects have the double benefit of providing a clean fuel and reducing methane emissions (methane being a more intense warming gas than CO_2).

In addition, China has significant nuclear ambitions, with plans to build at least four new plants a year for the next two decades. A host of projects target the development of new technologies, including integrated gasification combined cycle power plants (which produce cleaner, more efficient electricity from coal and capture CO_2); new-generation nuclear technologies; and alternative transportation technologies involving the use of hydrogen and dimethyl ether as fuels.



ative approach will flow both ways. Developed countries will profit from access to Chinese expertise. China, meanwhile, will benefit from greater exposure to success stories from around the world, and will view the global fight against climate change as an effort in which it has a financial stake, rather than as something that brings only economic costs.