



The China Sustainable Energy Program
中国可持续能源项目

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From the Director:

As we welcome the “Year of the Golden Pig,” statistics from China give us pause. China’s coal combustion is growing at a staggering rate, overwhelming the efforts of signatory nations to the Kyoto Protocol to curb global warming pollution.

In 2006 alone, China built 92,000 megawatts of conventional coal plants that will emit 575 million tons of carbon dioxide every year—nearly twice the carbon as the European Union is to cut under the Kyoto Protocol. Over the last four years, China added over 210,000 megawatts of conventional coal plants that will spew over 1.3 billion tons of carbon dioxide into the atmosphere annually—about 20 percent of U.S. global warming pollution. The International Energy Agency (IEA) now predicts that China could surpass the U.S. as the world’s number one carbon dioxide emitter as early as 2009.

Most of China’s new coal plants were not approved by the central government; local officials built them to support galloping economic growth. Whether China’s central government can assert control over local officials—and shift local investment into energy efficiency and renewable energy—is the key to whether China will take control of its global warming pollution and achieve its energy diversification goals.

Whether the United States will step up, stop hiding behind China, and adopt an aggressive national carbon dioxide cap—triggering a sufficiently high carbon price to drive investment into efficiency and renewables—is the key to whether the U.S. will lead global green technology markets in the future. U.S. leadership is a crucial prerequisite for encouraging China’s export-oriented market to shift into clean energy technologies.

China’s central government is striving to cut coal emissions. In 2005, China adopted a national 20 percent energy intensity improvement target (energy used per unit GDP) as the centerpiece of the 11th Five-Year Plan

(2006-2010). Achieving even half this target would far surpass the entire world’s Kyoto reduction commitment. In 2006, however, China fell short of the annual 4 percent target by 2.77 percent; Premier Wen Jiabao responded by announcing redoubled efforts to meet the national target.

Helping China become energy efficient needs to become the centerpiece of the U.S.’s, and the world’s, foreign and trade policies. Rhetoric in the U.S.—that limiting greenhouse emissions could penalize economic growth—is flat wrong; energy waste is the cheapest, cleanest, and most readily available energy resource. Cutting energy waste is profitable.

The grantees of the China Sustainable Energy Program (CSEP) continue to catalyze policies in China that are helping achieve the national energy intensity target and driving investment into clean technologies. Policy successes to date include fuel economy standards, bus rapid transit systems, nationwide renewable energy incentives, industrial sector targets, appliance efficiency standards, building codes, and demand-side management programs. The result has been billions of dollars of new investment in clean energy. CSEP works to help China help itself by adopting “best practice” energy efficiency and renewable energy policies. We are intensifying our efforts this year—with over 80 projects underway at the local level—to empower local officials to shift from conventional coal and into clean, profitable energy efficiency and renewable energy.

Please visit our **revamped website** at www.efchina.org for China’s latest policy developments. Join us in these efforts to help China, and the world, build a sustainable energy future.

Doug Ogden
Executive Vice President, The Energy Foundation
Director, China Sustainable Energy Program

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Program Updates—March 2007

Renewable Energy

In 2006, China installed just over 1,000 MW of grid connected wind turbines, an investment of over \$1 billion that brought **total installed wind capacity to 2,300 MW** by year's end (an increase of over 80%). There are over 2,000 MW of additional wind projects under construction or in advanced planning.

Electric Utilities

The National Development and Reform Commission (NDRC) and the State Electricity Regulatory Commission (SERC) formed **electricity dispatch rules** to give priority to cleaner resources, including renewables, natural gas, and combined heat and power; coal-fired power plants are to be dispatched last, and ranked based on their generation efficiency and environmental performance.

Jiangsu Province completed a 150 MW **Efficiency Power Plant (EPP)**—a bundle of investments into more efficient electric motors, lighting, industrial transformers, refrigerators, air conditioners, and the like—that directly offset the need to build a coal-fired power plant at a quarter of the cost of a new power plant, saving consumers over \$90 million. The Jiangsu Provincial Economic Commission provided over \$25 million in subsidies.

Buildings

The Ministry of Construction launched grantee-developed **energy efficient windows pilots** to demonstrate efficiency labels on state-of-the art windows. Commercial and residential building codes implementation pilots continue in six cities (Shanghai, Fuzhou, Xiamen, Shenzhen, Guangzhou, Chongqing), and are delivering greater energy savings than anticipated.

NDRC approved **mandatory energy information labels for central air conditioners and washing**

machines. In 2005, NDRC had approved similar labels for room air conditioners and refrigerators.

Industry

NDRC launched the **Top-1,000 Enterprises Program** on July 27th, 2006. NDRC signed **energy efficiency agreements with China's 1,000 largest enterprises** as well as with all provincial governors. NDRC launched a **“National Energy Conservation Center”** to establish and oversee a provincial network of energy conservation centers to provide technical outreach and training—including energy auditing and benchmarking to best practice—to all Top-1,000 enterprises.

Transportation

In October 2006, NDRC publicized the fuel economy data of 409 passenger car models; all met Phase I requirements of the **passenger car fuel economy standards** (which are 20 percent more rigorous than U.S. standards). Our grantee the China Automotive Technology and Research Center (CATARC) analyzed the fuel economy of 845 car models, including those certificated before and after the implementation of the fuel economy standard, and found that 84 percent met Phase I limits and 53 percent met Phase II limits (which are more rigorous and due by 2008).

The Ministry of Finance accepted CATARC's **fuel tax** proposal, which taxes larger engines (such as those in SUVs) up to 20 percent, and smaller engines only 3-4 percent. The goal is to encourage consumer purchases of smaller, more fuel efficient vehicles.

Workshop Updates

Ninth CSEP Senior Policy Advisory Council (PAC) Meeting



Our 9th PAC Meeting was held November 9-10 in Sanya, Hainan, and focused on ***Implementing China's 2010 Energy Intensity Improvement Target***. Attendees from the National People's Congress, State Council Development Research Center, directors of 28 provincial economic commissions and development reform commissions (who will author provincial implementation plans for the national target), and international experts discussed implementation strategies. Provincial efforts will include structural adjustment (including shifts from heavy to light industry); energy efficiency investment particularly by the largest "Top-1000" industrial enterprises; technology and energy management improvement; implementation of the Energy Conservation Law; energy pricing reforms; establishment of a national energy efficiency fund (expected in a proposed Energy Law for 2008); investment tax incentives. Challenges include equitable allocation of the national target among rich versus poor provinces. The forum helped to shape CSEP's 2007 agenda, which will emphasize 1) developing province-wide implementation plans; 2) assisting implementation of the Top-1000 Enterprises Program in several lead provinces; and 3) working with provincial finance and tax bureaus to develop incentive policies.

During the PAC meeting, attendees discussed rule of law developments facilitating the integration and implementation of international best practices into energy efficiency and renewable energy policies in China. Chaired by Cole Wilbur, Trustee and former President of the Packard Foundation, and Mao Rubai, Chairman of the NPC's Environment and Resources Committee, the event included presentations on implementation, amendments to, and development of the *Renewable Energy Law*, *Energy Conservation Law*, and *Energy Law of China*. The *Energy Law* could establish a Ministry of Energy to coordinate sustainable energy policy, in addition to an energy efficiency fund to

finance nationwide technology upgrades. CSEP presented an "Energy Vision for 2050," which examined the challenge of global warming in relation to China's energy development.



Dialogue Partners Meeting

CSEP benefits from ongoing advice from a group of 25 directors-general who oversee implementation of China's energy and environmental policies. We held our most recent Dialogue Partners meeting on June 24-25 in Beijing, which also focused on implementing the 2010 20-Percent Energy Intensity Target, particularly through tax and fiscal policies. The event produced these recommendations: 1) all provinces need to develop implementation plans for establishing energy efficiency investment incentives as the centerpiece of implementing their 20-Percent Energy Intensity Targets; 2) all local governments must be held accountable for real energy savings; for example, the central government should withhold highway or other funding if targets are not reached; and 3) local governments must adopt tax and fiscal incentives for clean technologies, as well as restrictive policies for polluting technologies, with revenues going towards commercialization of sustainable energy technology. The meeting included CSEP's latest Dialogue Partner, Jiang Bing of the Office of the National Energy Leading Group.

Renewable Energy Law Implementation Training

CSEP grantees the Center for Renewable Energy Development (CRED) and Tsinghua University jointly held a *Renewable Energy Law* (RE Law) implementation training workshop in December 2006. The workshop brought together officials from 15 provinces and municipalities who are responsible for renewable energy development. The two-day workshop gave an extensive introduction to RE Law regulations, methodologies for developing provincial RE plans, and renewable energy technology. CRED will assist five provinces in designing local RE Law implementation plans and in formulating implementation programs.

News Updates



China's power capacity soars

By Richard McGregor in Beijing
February 6 2007

China's soaring economic growth has been headlined in recent years by a single, attention-grabbing statistic: China each year adds new power generating capacity equal to the UK's entire electricity grid.

But China surpassed this benchmark last year, according to new figures released quietly at the end of January by the China Electric Power News, the mouthpiece of the state industry.

The paper reported that new power capacity in 2006 had expanded by 102 gigawatts, or roughly equal to the entire capacity of the UK and Thailand combined, or about twice the generating assets of California, the state with the biggest economy in the US.

The figures have received little coverage in part because many local and foreign industry experts were so surprised at the figures for new capacity that they questioned their accuracy.

"It was a shock even for us who track the numbers," said Jiang Lin of the China Energy Group at the University of California, Berkeley.

The State Grid Corp, which controls 80 per cent of China's power transmission, and which is generally the authority on such issues, also appeared to have been caught by surprise by the surge.

The State Grid itself estimated just months ago that new capacity would be about 75-80GW, a shortfall of about 20 to 25 per cent on the latest number.

Li Xiaolin, of the Songlin Group, a power consultancy in Beijing, said she had been inundated with calls from clients expressing disbelief at the number and asking her if it was correct.

Ms Li said her consultancy's initial assessment had now come up with a similar figure, of about 101GW.

"As for why the figure suddenly increased from 75GW to 101GW, there are two answers," she said. Power stations under construction had been commissioned much faster than expected, Ms Li said, and many built without central government approval had now been licensed.

An official for the State Grid defended its estimate, saying it had knowingly put out the lower figure because of the delays in the approval process overseen by another ministry.

"We expected the total capacity to reach 102GW last year, but we had to take account of the possible delays due to a slow approval procedure by the National Development and Reform Commission [the planning ministry]," the official said.

Just less than 90 per cent of the new plants are powered by coal, an inevitable result of a rapid build-up in capacity. Hydro power accounted for 10 per cent and new nuclear plants about 1 per cent.

"Hydro and nuclear plants can take years longer to commission than coal plants of similar size," said Jonathan Sinton, the China Programme Manager at the International Energy Agency in Paris.

The confusion over the numbers, and the explosion in capacity, is the result of the often competing and conflicting priorities of the central government and localities.

While Beijing still insists on approving every new power plant over a certain size, but many localities build them anyway in the expectation they will eventually get approval. Driving them is the fear that any delay would stunt the pace of regional development relative to other parts of the country.

There is no slowdown in sight. New capacity expected to come on line this year is about 90 GW.



China set to miss energy efficiency target

By Richard McGregor in Beijing

February 17, 2007

China is becoming more unlikely to meet its target to improve its energy efficiency by 2010, according to local and foreign analysts, because of the surge in investment in heavy industry in the past five years.

The failure to meet the target would be an embarrassment to Beijing, as it was one of only two numerical benchmarks laid out by the government in its latest five-year economic plan, covering 2006-2010. The other calls for China to double per capita income between 2000 and 2010, something that is easily in sight because of strong GDP growth.

“Without major incentives to support energy efficiency technologies and discourage wasteful practices, it is almost certain that the target won’t be met,” said Jiang Lin, of the China energy group at the University of California, Berkeley.

The ambitious target requires China to cut the amount of energy used per unit of economic output by 4 per cent annually, or 20 per cent in the five years to 2010.

China has yet to release official 2006 figures, but a senior official in January said the country had missed its efficiency target for the year and preliminary data suggested that energy efficiency had increased by only about 1 per cent for the year.

The target’s importance may galvanise central government and prod it into the introduction of harsher measures to force local governments and businesses to use energy more effectively.

China will also be under rising international pressure to act, especially as the country is expected to surpass the US in 2009 as the world’s largest emitter of greenhouse gases.

China secured huge gains in energy efficiency through two decades from 1980 during its initial transition from

a command to quasi-market economy. But a surge of spending on new steel, aluminium, chemical and cement plants and the like from about 2001 has begun to reverse those gains.

Such heavy industries are much more energy-intensive than the services sector, which dominates output in most industrialised countries.

“An investment boom skewed towards heavy industry has turned around the energy efficiency picture,” said Trevor Houser, of China Strategic Advisory, in New York.

China’s iron and steel industries use 16 per cent of total energy consumption, he said, versus 2 per cent for the same industries in the US.

Significant improvements would come only through “hard decisions about the composition of industrial structure”, Mr Houser said. “You cannot do it through technology and greater efficiency alone.”

Despite the government’s commitment to slow investment, the race for growth everywhere across China has far outstripped the ability of the central government to impose its will on localities.

Niu Li, a researcher at the State Information Centre, said the measures launched by the government so far had been aimed at industry restructuring “which takes years to bear fruit”.

“Moreover, local companies do not have the incentive to make extra investment in new technology, as this will cut profits,” he said.

“China may make some progress in reducing energy consumption, but it is impossible for the country to reach the target of 4 per cent reduction a year.”

Newsweek
INTERNATIONAL EDITION

The Coal Trap

Beijing battles for control of a runaway industry that both powers China, and threatens its future.

By Jonathan Ansfield
January 15, 2007



It isn't the Great Wall or the Three Gorges Dam, but the launch last month of China's most robust—and efficient—coal-fired power plant was hailed as a critical feat. Make that "ultra-supercritical": that's the name for the technology behind the next-generation 1,000-megawatt electricity plant located near the city of Wenzhou, in bustling, coastal Zhejiang Province. The \$2.3 billion plant, which abuts the East China Sea, employs energy-saving "clean coal" technology. Because its hulking boilers can heat steam to 600 degrees Celsius—well beyond the "critical" boiling point—the plant needs 17 percent less coal than an average Chinese power plant to produce a kilowatt-hour of electricity.

Officials at the state power giant Huaneng, which owns the plant, also boast that the facility sets new standards for pollution control. They say it will reduce carbon dioxide emissions (the major cause of global warming) by roughly 14 percent and almost completely eliminate sulfur dioxide discharges that pollute the air. China's five state energy giants are building roughly 10 additional ultra-supercritical plants similar to the Wenzhou facility. "China has to go down this road," plant manager Li Jianmin told NEWSWEEK, "to reconcile our demand for power and development with the pressure [to protect] our resources and environment. This will be a big improvement."

Nothing in China needs improvement more urgently than the aging and coal-dependent energy industry. Coal is the world's cheapest and dirtiest energy source, and China has 1 trillion tons of proven reserves; only the United States and Russia have more. Such an ample supply has been serendipitous in a country where the demand for electricity has risen by 60 percent since 2000. China now accounts for one third of global coal consumption, devouring 2.2 billion tons last year to generate 80 percent of its electricity and 75 percent of its home heating. China's heavy industry would be lightweight without coal.

But like 19th-century England or the Soviet Union in its industrial heyday, China is seeing coal-driven growth turn ugly. As in India, another economic comer with power problems, China has been growing so fast, for so long, that the central government has lost control of the energy industry. Nearly half the coal plants built in China between 2001 and 2005 were small, old-fashioned models erected by local officials, often without Beijing's full approval. President Hu Jintao and Prime Minister Wen Jiabao are trying to change that. They've made energy efficiency a national priority—and the central government will spend hundreds of billions over the next 20 years building nuclear plants and developing renewable-energy platforms such as solar forests, wind farms, biomass fuels, not to mention *qingjie meitan*, or clean-coal technology.

Both Hu and Wen tout "sustainable" and "scientific" development as the key to curtailing the social costs of unfettered growth. But Beijing's effort to clean up and control the coal economy will take decades to produce results, and meanwhile China is courting a catastrophe that could impair the health of its people. The dilemma is ironic. If Hu and Wen succeed, China will become a cleaner country—but the transition will also help slow down the growth of a manufacturing juggernaut that has helped bring millions of Chinese out of poverty and drive down the cost of everything from toys to TVs worldwide. If the leaders fail, China's environmental problems will get worse.

China is already enveloped in a toxic cloud that's visible from space. Virtually every day in December, Beijing looked like a film negative of itself—spectral and acidic. And coal emissions do not respect borders. Sulfur dioxide discharges from China are being blown across the Pacific, causing acid rain in South Korea, Canada and Europe. Experts say that sulfur dioxide emissions

from coal combustion (25 billion tons in 2005, tops worldwide) kill about 400,000 Chinese prematurely annually. "Cleaning up the coal industry must be the No. 1 task," says Yang Fuqiang, chief Beijing representative to the Energy Foundation, an American NGO.

"Otherwise, its impact on the land, the environment, the people and the economy will make it very hard for the country to sustain itself."

In the cool, moist climes of southern Guizhou province, more than 10 million villagers have rotted teeth, arsenic poisoning or knock-knees, because they hang-dry corn and hot peppers indoors over coal-heated stoves (then proceed to eat it).

The stoves are also to blame for the No. 1 killer of rural women: respiratory disease. The World Bank recently called Linfen—a coking city in northern Shanxi province—the world's most polluted city. Of the world's 20 most polluted cities, 16 are in China. By 2009, the International Energy Agency predicted in November, China will overtake the United States as the world's biggest emitter of CO₂—a decade earlier than it originally thought.

Beijing aims to reduce the country's energy consumption by 20 percent by 2010 and has pledged to reduce key pollutants like sulfur dioxide by at least 10 percent over the same period. Central policymakers also have begun to tinker with taxes, tariffs and commercial mechanisms to clean up the energy industry. China's state energy conglomerates are investing heavily in mechanized mines, next-generation power plants and coal-based fuel alternatives to oil.

But grand plans are not easily implemented in China. Beijing is pushing coal-based power plants that are clean, efficient and big. But it's had a tough time enforcing orders to dismantle or retrofit the smallest and dirtiest facilities. For a short time in 1999-2000, Beijing stopped approving new plants. But as soon as the freeze was ended, "everybody and his mother went out and built a power plant," says Joseph Jacobelli of Merrill Lynch in Hong Kong. Provincial and city officials are preoccupied with finding more energy, amid growing electricity shortages. There have been rolling blackouts in the south and southeast since 2002, because China's coal-distribution system can't keep up with demand.

The official Xinhua News Agency said last month that the 2006 goals for energy efficiency and pollution reduction would not be met. By midyear, energy use and

sulfur dioxide emissions had edged up 1 and 6 percent, respectively, as provincial party leaders who'd vowed to help modernize power plants were renegeing on their pledges. "China is adapting to new [energy] technologies faster than the United States," says veteran Beijing-based energy analyst James Brock. "The problem is the embedded interests, which perpetuate the existing system."

Beijing first caught on to the concept of clean coal—a catchall phrase for improvements ranging from modernizing mines to developing clean liquid or gasified coal for cars and power plants—in the 1980s. Back then, China's energy needs were relatively modest—the country was a net exporter of oil. Today China imports 40 percent of its crude oil. High oil prices, along with the country's noxious coal plants, have motivated Beijing to embrace new clean-coal technologies once deemed uneconomical. In fact, the government and state firms are sinking a reported \$128 billion into new pipelines and plants that can gasify or liquefy coal—turning it into relatively clean diesel fuel for vehicles, methane for power generation and dimethyl ether for transport, home cooking and heating.

In the grasslands of Erdos, in Inner Mongolia, the Shenhua company is erecting the world's first commercial plant that converts coal directly into refined oil that could go into making plastics or fueling cars. Shenhua is also working with private foreign firms—including Shell and Sasol, the South African coal-to-liquid pioneer—to produce clean diesel fuel indirectly from gas, a more proven technology. By 2013, says Sasol China chief Andre de Ruyter, the joint venture will be processing 80,000 barrels a day of low-emissions diesel fuel at each of two new Chinese plants in the provinces of Shaanxi and Ningxia.

Worldwide, the best hope for eliminating coal-plant CO₂ emissions is a costly, unproven, yet much-trumpeted technology called IGCC—Internal Gas Combined Cycle. It converts coal to gas and siphons off the carbon so that, theoretically, it can be stored underground, once "sequestration" technology hits the market. But that day is perhaps a decade off. China hopes to fire up its first three IGCC plants by 2010.

China's coal industry is a mix of state heavyweights and small operations run by local governments and entrepreneurs (often in collusion). Small mines account for a third of the coal output—and two thirds of all coal-mining deaths. Fatalities fell an estimated 21 percent in

2006 after Beijing shuttered 1,700 of the country's 26,000 mines. The government's work-safety czar, Li Yizhong, described the closed mines as "life-devouring traps." He said that safety-inspection fraud is widespread. Local folk rarely tip off regulators about the existence of unsafe or substandard mines, because the villages depend on them. By law every coal mine must have a washing facility—but only around 30 percent of China's coal is properly rinsed of ash (which adds to pollution) and tailings (that reduce energy efficiency).

Regulation is a problem in the power industry as well. Almost all newer plants in China have equipment to filter out sulfur dioxide or particulates, or both—but it is often unused. Operating the pollution-control systems is expensive—and some plants only turn the filters on when inspectors come knocking, says Jiang Xinmin, a professor with the Energy Research Institute, a state-run think tank under the National Reform and Development Commission, which oversees energy policy.

The market may help save China from itself. As part of its modernization drive, the central government is phasing in new resource taxes to drive unsafe or inefficient coal mines out of business. Sulfur dioxide is the only coal pollutant that is taxed in China today. The fine per ton of discharge has tripled in recent years, but many experts insist it should be higher. China's socialistic power-distribution system will also be reformed. Right now, it gives all producers (big and small, clean and dirty) equal access to the electricity grid. It will be replaced by a system that allows cleaner, more efficient utilities to sell more electricity than others—and to buy out the grid quotas of antiquated plants.

Beyond that, the two-year-old global carbon-trading market, established by the Kyoto Protocol, could help clean up China. It encourages advanced nations to invest in emission-reduction ventures in developing nations. Already, more than 200 projects have been launched in China alone. Jin Jiaman, head of the Beijing-based NGO Global Environmental Institute, is bringing in U.S. investors to back 25 efficient, coal-burning cement factories in China, in return for carbon credits to be sold on to England. The idea, says Jin, is to "set a model" for the rest of China's 4,000 cement makers, which whip up 45 percent of the world's cement and consume more than 100 million tons of coal a year.

The geopolitics of pollution and economic growth are gnawing at China. Even if China starts to meet its Green

GDP targets, a swelling economy and population means more pollution, in absolute terms. The West counts on China for inexpensive textiles, cement and steel—but is putting pressure on Beijing to raise the value of the yuan, which would slow exports, and to clean up its foul environment. Beijing resents the scolding, partly because China needs rapid growth to produce jobs and partly because the West has been a major contributor to global warming. Alex Westlake, chief operating officer of the London-based carbon-trader Camco International suggests that China should resist pressure to revalue the yuan and instead "increase the environmental and social costs of the goods it produces." In short, impose a coal tax on Chinese goods. That's likely to happen over time. With so many new coal projects in the works, the costs will reverberate worldwide. But so, too, will the benefits of a cleaner China.

Inter Press Service News Agency

Biofuels Eating Into Food Grain Stocks

December 20, 2006

By Antoaneta Bezlova

China's biofuel industry is booming thanks to voracious demand for energy to power the country's high-flying economy.



Applying modernised versions of ancient chemical processes to convert crops and oils into energy sources, Chinese entrepreneurs have created a profitable "green business" with plenty of room to grow.

But worried over surging crop prices China is now clamping down on the use of corn and other edible grains for producing biofuel. While it wants to support the growth of alternative energy sources, Beijing says the issue of national food security should take precedence over the country's green agenda.

"In China the first thing is to provide food for its 1.3 billion people, and after that, we will support biofuel production," the state-run newspaper People's Daily quoted Wang Xiaobing, an official at the Agriculture

Ministry's crops cultivation department as saying this week.

China has been encouraging the production of biofuel such as ethanol and methane from renewable resources to reduce the country's growing dependence on imported oil. Once an exporter, China now imports at least 43 percent of its oil supply.

Biofuel is also seen as environmentally friendly substitute to polluting oil. Chinese economic planners have made the development of green energies, like ethanol fuel and biodiesel, a key priority in the country's five-year economic plan. By 2020 they want green energies to account for 15 percent of all transportation fuels.

Yet surging demand for biofuel is now partly blamed for recent price hikes in the food market and for shortages in grain stocks. Wheat prices are at their highest level in a decade, due to poor harvests in key producing countries like the United States and Australia, while corn prices have surged by up to 20 percent in local markets.

Beijing has begun auctioning some of its wheat reserves to halt the rise in crops prices and prevent panic among the public. Despite predictions that this year would see another bumper harvest, Chinese government officials feel compelled to restrict the use of corn for producing biofuel.

"We have a principle with biofuel: it should neither impact the people's grain consumption, nor should it compete with grain crops for cultivated land," the People's Daily quoted Yang Jian, director of the development planning department under the Agriculture Ministry, as saying.

Government officials estimate that corn contributes around three-fourths of the raw material used for making ethanol in China. Output of ethanol fuel is projected at 1.3 million tonnes this year, according to the China Daily. Experts however, say that output from private and public producers this year may reach five million tonnes.

With biofuel demand booming, existing producers have been ramping up production and new players have been entering the market. They made only one million tonnes of ethanol fuel in 2005 but by 2010 China's ethanol-fuel production may reach as high as 10 million tonnes, local press reports say.

As biofuel is produced from renewable biological resources, what government officials worry is that possible overcapacity may lead to a shortage of edible grains and feedstock supplies. This has already happened with cornstalk used in ethanol production. Cornstalk prices in China have jumped 500 percent to 30 US dollars per tonne since 2005.

The same is now happening with the corn. Industrial processing in China consumed 23 million tonnes of corn in 2005, an annual increase of 16.5 percent from 2001, while corn production increased at the slower rate of five percent during the same period, according to a circular released this week by the National Development and Reform Commission (NDRC), China's top economic body.

While rivalry between food and fuel producers for grains is not limited to China, the problem is particularly acute here because of the country's low per-capita arable land to feed its vast population.

The grain crop is expected to hit a record 490 million tons this year, the third straight year of bumper harvests but Chinese planners are worried that fast-shrinking farming land could affect grain supply in the near future. Arable land is said to have shrunk by 8 million hectares between 1999 and 2005.

"We should never relax our efforts to focus on grain production by ensuring there is enough acreage and improving per-unit output," Yang Jian was quoted as saying.

Experts warn that if ethanol production continues to be corn-based, China will be forced to import the crop by 2008. Relying on crop imports is a sensitive issue as the government policy supports food self-sufficiency for the sake of national security.

"The excessive growth of corn processing has resulted in scarce feed for livestock and affected the development of animal husbandry. Some main producing areas are even considering importing corn," said the NDRC circular. It demanded that local producers step up efforts to make ethanol from non-grain sources, such as potato and sweet sorghum.

Chinese producers however, continue to make ethanol from corn because the mass planting of non-grain feedstock as cassava and sorghum has yet to be

implemented on a large scale due to the lack of suitable farming technologies.



Chinese Watchdog Calls for New Powers to Protect Environment

By Sam Bond
September 1, 2006

China's State Environmental Protection Agency (SEPA) has publicly urged the Government to amend outdated legislation to stem the rapid deterioration of conditions across the vast country.

The existing Environmental Protection Law was brought in in 1989 and predates China's dramatic economic growth, and the wave of pollution incidents that has come with it, and current political structures are tying the agency's hands, it claims.

SEPA has carried out an investigation looking at how effective, or ineffective, the law has been in 20 cities and regions and concluded that the vast majority of people do not believe the Government is being sufficiently held to account when it comes to environmental protection and a staggering 95% believe Government officials, as well as industry, should be held accountable for pollution incidents.

The agency's proposed amendment says there is a need for greater independence for environmental watchdogs if they are to carry out their job effectively.

Under the current law local environmental protection departments answer to both local government and SEPA.

But, according to SEPA, the former have real power over the appointment of officials and manage the finance of such departments and this has led to a conflict of interests, as environmental officers are unlikely to be too critical of their paymasters.

In North China's Shanxi Province, only 65 of 680 enterprises producing coke have permission from the local environmental protection watchdog and only 5 per cent of all these firms reach the State's required standard

for discharge of sulphur dioxide. When these firms were allowed to operate by local governments, environmental watchdogs could do nothing about it.

Chinese legislation does embrace the polluter pays principle and says that leaders of enterprises that have violated environmental rules in discharging pollutants should be punished.

But in reality these penalties are rarely enforced due to local protectionism.

"Even if the SEPA's new efforts could get somewhere, they would hardly make any substantial progress because the administrative penalties and ceiling for fines stipulated in the current law are not severe enough," said a spokesman for the agency.

"Such bites without teeth have created an embarrassing situation, in which those firms that abide by rules and treat their pollutants before discharging them have spent much money on building and maintaining treatment facilities, while those that defy the rules benefit from sparing the expense.

"This is one of the major reasons behind the ever-worsening environmental pollution nationwide."

Stanford Report

Forum Examines Technologies Aimed at Reducing Greenhouse Gases

By Dawn Levy
October 25, 2006

In the coming century, climatologists predict a world that's 5 to 12 degrees Fahrenheit hotter. In America, that will likely mean a drier grain belt in the Midwest, endangered water supplies and forests in the West and stronger hurricanes in the Gulf Coast. Globally, sea levels are already at the upper limit of what the Intergovernmental Panel on



Climate Change predicted a decade ago. Greenland is melting faster than scientists expected, and tropical corals struggle to survive as ocean chemistry changes. Increased damage from storms, floods and wildfires could lead to property loss and population displacement.

"Taking [climate change] seriously is really not a matter of personal virtue; it's hard economics," Steve Chu, director of the Lawrence Berkeley National Laboratory and 1997 winner of the Nobel Prize in physics, told an audience of 400 in the Frances C. Arrillaga Alumni Center Sept. 18 at the second annual research symposium hosted by the Global Climate and Energy Project (GCEP). "A dual strategy is needed, both conservation and developing new sources of energy."

Chu's keynote speech, titled "The Energy Problem, Our Current Choices and Future Prospects," set the stage for a three-day forum at which speakers from Stanford and elsewhere discussed diverse technologies aimed at reducing greenhouse gases.

Chu's talk explored technologies including nuclear, wind and solar. Nuclear fission supplies about 20 percent of U.S. electricity, and maintaining that level would require new, higher-energy plants to replace decommissioned ones and expanded solutions for dealing with waste. Technology to capture wind is well developed, he said, noting that the biggest turbines are able to extract 50 percent of the wind's kinetic energy, which is close to the theoretical upper limit of 59 percent. It's "not insurmountable" that solar power alone—captured in photovoltaic cells or biomass—could allow the entire world's population to rise to a European standard of living, he said. A giant weed called miscanthus could produce enough ethanol to eliminate our reliance on gasoline, he said, outlining a scenario in which one acre of the drought-resistant grass produced 3,000 gallons of ethanol.

While climate modelers disagree about the degree of climate-change effects, the press often misrepresents this debate among scientists, Chu said. "The press portrays it as, 'Well, we don't really know what's going to happen.' That part is true. But then the public automatically thinks, 'Well, maybe it's real, maybe it's not.' That part is not true. The spread is between bad and very, very bad."

Case in point: An optimistic model says the Sierra snowpack will decline by 30 to 70 percent, Chu said. A pessimistic model says it will decline by 73 to 90 percent. "If the Sierra snowpack declines by even 50

percent, this will have a profound impact on our water supply because the combination of dams and snowpack provides us with the water supply for the summer and late, early fall and even spring," he said.

Even in the face of uncertainty, climate change is affecting wallets. Chu cited a relationship between the temperature of water and the power of a hurricane: The warmer the water, the more ferocious the hurricane. Scientists say the relationship has a 90 percent chance of being correct. But with even a 50 percent chance of correctness, insurance companies adjust their rates.

"Changing the demand side of energy remains still the lowest-hanging fruit," said Chu, advocating conservation. "We use about 2 to 2.5 times more energy per person than Northern Europe."

On the supply side of energy, there's good news and bad news. "The good news is we won't run out of energy for the next 100 years or 300 or 500, probably 1,000 years—and that's [also] the bad news because that energy is in the form of fossil energy," Chu said. It exists as oil, natural gas and coal.

"The default source of energy in the United States is coal," Chu said. Natural gas prices have risen by a factor of four, driving Calpine, an energy-producing company, into bankruptcy because it can't run a cost-effective operation in the face of supply problems. "A number of natural gas power plants will be built in the coming 10 or 15 years, but unmistakably, coal plants will be increasing," he said, expressing optimism about the technical feasibility and safety of carbon capture and storage from coal plants.

China's woes are our woes

"We cannot solve global warming without addressing China and India," said Doug Ogden, director of the China Sustainable Energy Program and another

speaker at the symposium. Coal is "coming on strong" in these developing nations, he warned.

Four countries have most of the world's coal: the United States (27 percent), Russia (17 percent), China (13



percent) and India (10 percent). In 2002, coal accounted for 26 percent of world energy sources but a whopping 70 percent of China's energy—"the dirtiest energy mix on the planet," Ogden said. Coal is abundant and cheap—even free. Ogden mentioned a region where people just scoop up coal dirt from the hills and burn it for cooking.

Coal's convenience may contribute to the fact that 16 of the world's 20 most air-polluted cities are in China. Coal burning releases carbon dioxide and other greenhouse gases, sulfur oxides and other contributors to acid rain, and mercury and other health-harming contaminants. Each year, 400,000 Chinese die prematurely and 75 million suffer asthma attacks. And air pollution knows no borders. Ogden noted that 40 percent of U.S. mercury contaminants originate overseas.

Ogden presented an overview of governmental and grassroots efforts in China, which is ramping up its economy to achieve a Western standard of living while grappling with greenhouse gases produced through energy consumption. By 2020, as megacities rise, superfactories roil and automobiles rumble, China's gross domestic product is expected to quadruple and its energy consumption is expected to at least double.

Coal will continue to dominate China's future energy supply, Ogden said. For this reason, advanced coal technologies are essential. Carbon capture and sequestration may reduce emissions by 20 percent, he said.

China is likely to develop carbon-neutral coal, but only after the United States does, Ogden predicted. He said the Chinese tend to approach problems incrementally, "crossing the river by feeling the stones," rather than "leapfrogging across the United States."

Nonetheless, the Chinese have been champions of energy efficiency in some regards, Ogden said. Per capita, they consume about 10 times less energy than Americans. And the inefficient engines in typical sport utility vehicles will be illegal on Chinese streets starting in 2008.

Other presentations

Scholars made two dozen other presentations at the symposium. Among them were Wes Hermann, a research and development engineer for GCEP, who gave an overview of the places where energy could be found

and harnessed, such as ocean tides, and John Weyant, a Stanford professor (research) of management science and engineering, who explored the economic impacts of energy choices.

Christopher Edwards, an associate professor of mechanical engineering at Stanford, spoke about how to achieve ultra-high efficiency in engines by taking reactants to extreme states of energy density prior to conversion. His work may lay the foundation for engines that are 60 percent efficient. Compare that to today's engines, which are about 33 percent efficient.

Zhenan Bao, an associate professor of chemical engineering at Stanford, talked about solar cells made with carbon-based, or organic, materials. She spoke about improving the efficiency of organic solar cells both through development of new materials and understanding of the underlying physics governing device operation.

And geophysicist Mark Zoback, the Benjamin M. Page Professor of Earth Sciences at Stanford, spoke about sequestration of carbon dioxide in coal. Compared to sequestration in deep aquifers and depleted oil and gas reservoirs, sequestration in coal poses two major advantages, he said. Carbon dioxide stays in the coal because the gas sticks to the mineral surface, and injection of carbon dioxide may liberate coal-bed methane, offsetting the cost of sequestration and making available a relatively clean fossil fuel.

 Associated Press

China Mulls Raising Oil, Power Prices

August 14, 2006

BEIJING - China is considering easing controls on the price of oil, power and other resources, letting market forces push them up in an effort to cut widespread waste, a state newspaper said Monday.

The government is "determined to make prices more dependent on market forces," the China Daily said, citing Bi Jingquan, a deputy minister of the Cabinet's National Development and Reform Commission, the country's top planning agency.

Bi's comments, made in a speech last week, are "the first time the government has firmly expressed its

determination for price reform,” the newspaper said. It didn’t give a timetable for price changes or say how much costs might rise.

Economic planners have long complained that China’s low government-set prices for energy and raw materials encourages waste by factories, mines and other businesses.

But despite opening up other parts of the economy to market forces, the communist government is reluctant to end price controls for raw materials for fear of hurting struggling state industries and possibly fueling social unrest.

The proposed changes come amid government efforts to rein in rapid growth in some parts of the economy, which expanded by 11.3 percent in the second quarter.

Chinese leaders worry that excessive investment in factories, luxury apartments and other assets could fuel inflation and leave companies and banks with dangerously high debt.

The price changes being considered could affect coal, electricity, oil, natural gas and water, with subsidies for the poorest families to offset higher costs, the China Daily said.

Chinese leaders want the country to reduce the amount of energy consumed for each unit of economic output. But the government reported last month that figure crept up by 0.8 percent in the first half of this year.

The government raised retail prices for gasoline and diesel in May, but they are still below world levels. Chinese oil companies and refiners have been expected to absorb changes in supply costs in order to prevent shocks to the economy.

A report released over the weekend by a Cabinet think tank, the Development Research Center, called for pricing reforms to promote more efficient economic growth, the China Daily said.

“The price reforms should increase the costs of resource products for businesses with low efficiency,” the report was quoted as saying.

The newspaper cited the example of coal mines, which it said are charged too little for land rights, encouraging waste.

The Cabinet report said mines in the northern province of Shaanxi, China’s main coal-producing region, remove on average only 30 percent of the coal in a seam, leaving the other 70 percent behind, according to the China Daily.

“Low fees have caused a lot of waste,” Huang Shengchu, president of the China Coal Information Institute, was quoted as saying.



China: A New Course for the Ship of State

By Erica Gies
July/August, 2006

China is the second-largest emitter of global warming gas, with a population four times that of the largest emitter (the

U.S.). Ryan Wiser, a scientist at Lawrence Berkeley National Lab who conducts energy policy analysis in China, says the country (with 12 percent annual economic growth) has seen a 15 percent increase in energy demand over the last couple of years.



More than 80 percent of that growth has been met with new coal-burning power stations, which worries scientists since coal is one of the most serious global warming aggravators. However, China’s government passed a comprehensive renewable energy law that went into effect last January. It enabled the widespread development of solar, wind, geothermal, small hydro and biomass, and also encourages research into tidal power.

Jan Hamrin, president of the Center for Resource Solutions, a U.S. renewable energy organization working in China, says Chinese officials were receptive to the security and environmental benefits of the technology. “Almost everyone in China is painfully aware of the air pollution, most of which is caused by the burning of coal,” she says. “That pollution results in respiratory disease, increasing the cost of health care, and lowers agricultural production.”

The government has set an impressive target of 15 percent renewable energy by 2020. “Given the rate at which China’s demand is increasing, that’s a huge commitment,” says Hamrin. The target excludes large hydropower, but sets a host of internal targets for biomass, wind and small hydro. “One thing is important to recognize here,” cautions Wisser. “Laws in China generally look a lot different than laws in the U.S. They tend to be broad statements of political principle, often not backed by enforcement mechanisms.”

At the 2004 China Wind Power Summit, Huang Yicheng, president of the China Energy Research Association, noted that China has a potential wind power capacity of 250 gigawatts, the largest in the world. Recently, GE Energy supplied 34.5 megawatts of wind turbines for the first large-scale project in mainland China’s Hebei Province.

“China is like a supertanker, says Hamrin. “It takes an awful lot to make it change course, and you can push and push and you’re not always sure that you’re having an effect. But once it starts to change, it is very hard to stop.”