

# SINOSPHERE



THE PROFESSIONAL ASSOCIATION FOR CHINA'S ENVIRONMENT

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*Contributing to a better environmental  
future for China and the world*

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## In This Issue

Sinosphere's unique contribution to the China-environment discussion manifests itself once again with this issue. Though we have consciously avoided a specific topic for this issue, two key themes are explored: the international aspects of China's environmental protection, and the elucidation of practical policy options.

This quarter's Sinosphere looks at the context in which environmental problems are addressed from four perspectives, and makes very clear that the market will determine the outcome of an increasingly large portion of China's environmental problems. First the global context in which China makes energy investment decisions is described. Mehmet Ögütçü surveys China's energy security situation and outlines the policy choices implied by international investment and the international energy market which China has aggressively joined. Second the specific national context in which air pollution is addressed is the topic of a report on a joint UNDP-CICETE project focused on five cities. Roger Rauffer and Wang Weili together identify key institutional factors related to China's choice of technology in air pollution control, in a report with broader implications than for only that specific problem.

Third, Jim Stover of ERM China (who has recently joined Sinosphere as China Correspondent) provides an update on China's investment in environmental protection. Focusing in particular on China's investment priorities which will determine where the environmental protection market goes in the next decade, Stover clarifies governmental decision-making in this key area.

Fourth, a report from the First NGO Forum matching Chinese and foreign non-governmental organizations and staff shows the bottom-up context. Though the nature of non-governmental activities in China and elsewhere provided much room for debate, both Chinese and foreign

participants agreed that "people's organizations" provide a much-needed counterweight and complement to governmental approaches to environmental protection.

As always, we value your feedback and input. Strong reactions will be considered for inclusion in the next issue in a new "letters" section. We look forward to hearing from you.

The Editors

## China Environment Briefing

### Anti Flood Investment Increased

Wang Shucheng, Minister of Water Resources, announced in August that the government plans to further increase its investment in water conservancy programs. An additional 10 billion yuan (\$1.2 billion U.S.) in funding will be added to the 60 billion yuan (\$7.2 billion U.S.) increase made last year. Half of these funds were designated for flood control, construction of levees and removal of embankments in various areas of both the Yangtze and Yellow rivers. The central government is expected to increase funds in Hunan, Hubei, Jiangxi and Anhui provinces. Some of the funding mentioned is to be used for the reparation of embankments along the rivers that have experienced severe problems as a result of over-logging and soil erosion. Soil erosion is a major ecological concern in two-thirds of the country's land mass.

### Nation Cleans Water in Major River System

The Haihe River is being added to a water monitoring system similar to the one on the Yangtze and Huaihe rivers and Taihu Lake managed by the State Environmental Protection Agency (SEPA). The Haihe flows in and around Tianjin and Beijing and has tributaries in Hebei, Henan, Shandong and Shanxi provinces. Shanghai will also be the subject of a comprehensive study in analyzing the quality of water in preparation for treatment. Both surface and underground water samples will be taken.

### Soil Erosion Control Urged

Zhu Rongji urged local governments in areas along the Yellow River (especially in the Loess Plateau) to take responsibility and initiative to introduce afforestation programs and to stop soil erosion. The return of farmland to a natural state and the cordoning off of hillsides have been suggested as potential solutions, even if the government must bear the expenses of relocation for local people.

## Joint Efforts to Explore New Energy

Since January of 1998, China United Coal Bed Methane Corp. Ltd. (CUCBM) has signed six contracts with foreign companies to explore Coal Bed Methane (CBM) in different parts of the country. The latest to be signed, with SABA Petroleum Inc., of the U.S., will enable joint exploration of Fengchang, Jiangxi province. SABA is expected to carry all financial obligations to drill 10 CBM wells. CUCBM has previously signed contracts with Texaco (1/98), for drilling in Anhui province and Phillips for drilling in Shanxi province. CBM is seen as "an unconventional form of natural gas" and could be tapped "as a new clean fuel source to achieve both ecological and economic benefits". CUCBM has been granted such privileges as tax reductions, duty exemptions and the right to make its own decisions in foreign trade and investment. CBM reserves are estimated to be at 30-35 billion cubic meters.

## Ecological Concerns Covered in Draft Law

The Standing Committee of the Ninth National People's Congress discussed special maritime ecological problems and reserved one chapter in a 10 chapter law for protecting maritime ecology problems. The article listed four priorities including:

- red tides which have begun to surface along the eastern seaboard and have resulted in economic loss,
- the 2.5 billion yuan (U.S.\$300 million) loss in maritime fishing,
- crude oil leakage in the Pearl river, and
- better detection of meteorological events through weather services to prevent catastrophes like last year's floods.

## Many Drawn to Help Green Desert

In an effort to help reverse desertification in the Engebei Desert in Inner Mongolia Autonomous Region, over 200 volunteers participated in an afforestation program sponsored by the China Youth Development Foundation and the Japan Desert

Afforestation Practice Association. Volunteers came from Japan and China. The organizers seek international aid to further the program in the Engebei Desert Development Model Zone, an area of about 20,000 hectares established in 1991.

emissions standards, which Beijing plans to adopt in 2004.

### **State Stepping Up Air Pollution Battle**

A draft for an amendment to the Law on Prevention and Control of Air Pollution, enacted in 1985, was submitted to the NPC's standing committee. It seeks to appropriate 180 billion yuan (\$21.7 billion U.S.) to curb acid rain and sulphur dioxide levels. 34 cities, most of them on the coast, would receive these funds. The majority of the funds, which are equal to about 1.5% of the cities' GDP, would be allocated to Beijing, Shanghai, Fuzhou in Fujian province, Shantou and Zhanjiang in Guangdong province and Suzhou in Jiangsu province. The amendment calls for limits on emissions and fines for those who exceed the limits. In addition, car emissions and dust from construction would be targeted.

### **Pollution Checked for Celebration**

The Beijing Public Safety and Traffic Administration (BPSTA) took steps to improve air quality for the 50<sup>th</sup> anniversary celebration on October 1. BPSTA gave orders to producers of pollutants to halt production from burning fuel and coal from Sept. 21 through Oct. 1. During this time no vehicles using diesel fuel, motorcycles, tractors or freight trucks were permitted to enter Beijing's Fourth Ring Road. Only vehicles which passed inspection were permitted inside the Fourth Ring Road. In addition, no burning of dead leaves or garbage was permitted.

### **Clean Fuel buses to Run in Capital**

Cummins Engine Company Inc. has been contracted to provide Beijing with buses that run on natural gas. Three hundred buses are expected to be running in the capital by the end of September. The gas combusts fully and meets Euro II vehicle

## Featured Essays

### China's Rise in World Energy: Its Global Search for Supply Security

*Mehmet Ögütçü<sup>1</sup>*

#### Introduction

China is truly an energy superpower in the world system, being the second largest consumer and the third largest producer of energy, with a significant impact on the future of the world energy markets and the environment. Plus, it is the world's potentially largest market for energy products, services and technology. No one disputes that China's integration with the world energy system is critical for its own and the world's energy security. As China's energy industries become more closely tied into global markets, price volatility, supply fluctuations, technology advances and environmental pressures elsewhere are likely to affect the Chinese energy system more seriously than its more isolated past.

This paper focuses on the growing significance of China in world energy, potential effects of China's oil-import dependency on the country's future energy policy, and on world energy markets. It particularly looks into Beijing's emerging energy-security policies and the resultant energy-related links, which it has begun to establish with other key players in the Middle East, Russia, Central Asia and the ASEAN region, in search for some certainty of long-term supplies and reasonable protection against market volatility. The paper concludes that international co-operation and dialogue is essential in order to avoid misunderstandings, and attract

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more foreign investment for China's planned large-scale energy projects.

#### Soaring Demand

Because industry contributes such a large share of economic activity in China, it accounted for about two-thirds of total final energy consumption in 1995, mostly for heat—an unusually high share in comparison with, for example, 47 per cent in Korea and an average of 31 per cent in the OECD countries. Patterns of technological development will have a large effect on future industrial heat demand. Oil and gas will replace coal in significant amounts. Oil and gas also will likely penetrate the residential/commercial fuel mix rapidly, displacing coal—although not in rural areas, where coal will continue to dominate and substitute increasingly for non-commercial biomass (i.e., wood and straw). Partly for environmental reasons, official policy encourages the use of gas in urban residential areas. Gas networks already exist in many large cities, although much of the gas now comes from coal.

China shows extremely low energy demand for mobility (transport of all kinds)—about nine per cent of total final energy demand in 1995, compared with 33 per cent in the OECD countries and 23 per cent in developing countries as a group. Private passenger-vehicle ownership, a key uncertainty in the projections and one in which official policies may play a part, currently stands at only around three per thousand people, versus 27 in Thailand and 498 in Germany. Given the uncertainties, the projections posit that energy demand for mobility will grow at about 4.8 per cent a year, more than tripling by 2020<sup>2</sup>.

China's electricity demand has more than doubled in the last decade and probably will almost quadruple by 2020, rising linearly with GDP and at practically the same rate. Electricity will substitute for coal in many industries, both because of technological innovation and as the industrial structure becomes less energy-intensive. In the residential sector,

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<sup>2</sup> "China and the World Energy System: New Links", Mehmet Ögütçü, *The Journal of Energy and Development*, Vol.23, No.2. p.281-318.

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appliance-penetration rates are surging forward; they will continue to do so with strong growth in per capita incomes. Moreover, only about 80 per cent of the population are now connected to China's electrical grid; continued rural electrification will add still another force for high electricity demand growth.

The Asian economic crisis had a significant effect on the growth of world energy demand. With the

beginnings of an economic recovery demand growth could accelerate for 1999, but not to the levels of the early and mid-1990's. The crisis had a lesser effect on China's economic growth than on most other Asian countries. Although China achieved a first half-year GDP growth in 1999 of 7.6 percent, further growth could be difficult if present problems of dwindling foreign investments, falling exports and weak consumption are not resolved.

### Projections for the Chinese Energy System [Millions of tons, oil-equivalent (Mtoe)]

	1971	1995	2010	2020	1995-2020 <sup>1</sup>
<b>Total Primary Energy Demand</b>					
<b>Total</b>	<b>239</b>	<b>864</b>	<b>1 539</b>	<b>2 101</b>	<b>3.6</b>
Solid Fuels	190	664	1 087	1 416	3.1
Oil	43	164	355	506	4.6
Gas	3	17	57	81	6.5
Nuclear	0	3	19	33	9.6
Hydro	3	16	39	62	5.5
Other Renewables	0	0	2	3	---
<b>Total Final Consumption</b>					
<b>Total (including non-energy consumption of energy)</b>	<b>195</b>	<b>649</b>	<b>1 145</b>	<b>1 524</b>	<b>3.5</b>
Solid Fuels	147	416	617	755	2.4
Oil	37	132	280	395	4.5
Gas	1	13	36	47	5.2
Electricity	10	68	165	255	5.4
Heat (including other renewables)	0	19	46	71	5.3
<b>Energy Use in Stationary Services, by Fuel</b>					
<b>Total</b>	<b>179</b>	<b>521</b>	<b>850</b>	<b>1 079</b>	<b>3.0</b>
Solid Fuels	147	409	610	748	2.4
Oil	31	80	157	213	4.0
Gas	1	13	36	47	5.2
Heat (including renewables and non-energy consumption)	0	19	46	71	5.3
<b>Energy Use for Mobility</b>					
Total (mainly oil products)	6	59	130	190	4.8

**Notes:** 1. Average annual change, in per cent.

**Source:** IEA 1998 World Energy Outlook

Lukewarm domestic demand, as well as the slump in international oil prices, has posed a tough challenge for China's energy sector. The country's industrial

restructuring also contributed to the slowdown in

energy demand<sup>3</sup>.

China's National Bureau of Statistics reported that energy production in China dropped 3.8 percent in 1998. Total energy output in 1998 stood at 1.223 bn tons of standard coal equivalent. Production of coal dropped 5.5 percent to 1.236 bn tons, that of crude oil dipped 0.1 percent to 162.6 Mt, and that of natural gas dropped by 0.6 percent to 22.3 bcm. Electricity output, however, increased by 2.7 percent to 1.14 trillion kWh (929 bn kWh of thermal power, up 1.8 percent; 195 bn kWh of hydroelectric power, up 5.6 percent; and 14.1 bn kWh of nuclear power, down 2.1 percent). Despite economic growth of 7.6 percent in the first half of 1999, there was an exceptional decline in Chinese energy consumption -- 3.2 percent equivalent to a 0.3 percent decline in world consumption, according to BP Amoco.

### Supply Constraints

In addition to efforts to reduce energy consumption and improve energy efficiency, China's new energy strategy is diversifying away from the current over-dependence on coal, by strengthening oil and gas exploration/development, speeding up the development of hydropower and nuclear power for electricity generation, and developing rural energy (including small hydro-power, solar and geothermal) and renewables. The first half of 1999 witnessed China organizing a series of high-profile national/international meetings on energy policy issues, which highlighted the rising energy consciousness amongst the country's policy-makers.

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<sup>3</sup> While growth in consumer demand slowed, a surge in government public works and infrastructure spending helped to keep China's GDP growth from falling further. Exports fell 4.6 percent year-on-year in the first half of the year, while imports rose 16.6 percent on the back of the government crackdown on smuggling. China's trade surplus is narrowing. Contracted foreign direct investment plunged 19.9 percent in the first six months, while utilised foreign direct investment fell 9.2 percent to \$18.6 bn. Retail prices of commodities fell 3.2 percent year-on-year in the first six months, while consumer prices slipped 1.8 percent. China's foreign exchange reserves stood at \$147 bn by the end of June 1999. China is reportedly considering a retreat from its pledge not to devalue its currency, in response to the increased competitiveness of goods from other East Asian countries. If China devalues, it could have serious implications for the other economies of the region

They have brought into focus the evolving blueprints on China's long-term energy policies. What distinguished most of these deliberations has been the increasing emphasis on adopting an integrated approach to holistic energy management as opposed to the piecemeal approach that existed in the past.

Oil accounted for about 20 per cent of final commercial energy consumption in 1996. The IEA projections show that share rising to almost 26 per cent by 2020, with imports at eight million barrels a day (b/d)—about 400 million tones (Mt) a year\* — four times projected domestic output in that year, and more than the projected net imports of 7.6 million b/d of the OECD Pacific countries (Japan, Korea, Australia and New Zealand) combined.

China has many prospective and unexplored areas, both onshore and offshore, but the longer-term outlook and Chinese hopes depend largely on the geologic potential and development of the remote, inhospitable Tarim basin in the northwest. Tarim is one of three largely unexplored basins (the other two are Junggar and Turpan-Hami, and the three often are called the "Far Western Basins") in the huge Xinjiang-Uyghur Autonomous Region, whose western borders touch Kazakhstan, Kyrgyzstan and Tajikistan. Experts once suggested that this, the most promising of all China's hydrocarbon resources, could have reserves topping the proven reserves of Saudi Arabia—but Chinese estimates have dropped steadily, although they remain high. According to the second national oil and gas resource assessment conducted by the CNPC, the basin has 10.8 billion tons of oil reserves and 8,400 billion cubic meters (bcm) of natural gas, or one-seventh of the country's oil and one-quarter of its natural gas<sup>4</sup>.

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\* Note that the Chinese find this projection too high.

<sup>4</sup> "Tarim Basin to fuel China", 10 November 1998, Zhao Shaoqin, *China Daily*, p.1. Xinjiang's annual oil output now accounts for 11 per cent of China's total production, with projections for it to rise to 20 per cent by 2000. CNPC plans to produce 30 Mt annually in the region by 2005. Exploration and development have been slow, with not very encouraging initial experiences of foreign oil companies at work in the basin. Estimates of its potential reserves still vary from as little as a few billion barrels to upwards of 80 billion. Indeed, Chinese reserve estimates remain extremely uncertain in general. The oil (*footnote continued*)

It is fairly clear in any event that, given the difficulty of finding oil and then extracting it in that inhospitable terrain, plus the need to construct thousands of kilometers of pipeline to deliver it cost effectively to market, Tarim oil will be high-cost oil. “High cost” is, of course, a relative term. It depends on international oil prices, which, if high, could render Tarim oil competitive with imports. Presently low international prices could rise. Yet their effect in the short term creates a powerful economic justification for holding back CNPC’s grand pipeline visions, which would delay the arrival of Tarim oil on the markets in the longer term, or raise its cost relative to imports if the alternative, rail transport, must be used. Official forecasts of oil supply for the coming decades do not factor in massive quantities of Tarim oil. On the other hand, no sign appears of any slowing of efforts to explore and develop the Tarim basin. If anything, CNPC pushes them harder. This suggests a policy decision, *de facto* or explicit, to develop Tarim as a long-term energy security measure but hold back on the pipeline investment unless or until its economics improve. Oil in the ground but available is high-quality energy security.

Hopes are also pinned on the hydrocarbon resources of the South China Sea, which are relatively unknown. Several unconfirmed Chinese reports place potential oil reserves at 213 billion barrels, while the US Geological Survey (USGS) estimated reserves in 1994 at 28 billion. Such reserves could support production of from 140,000 b/d to 370,000 b/d—similar to the current capacity of Brunei and Vietnam but significantly less than China’s projected import requirements. Some experts believe that natural gas will comprise the largest component of the South China Sea’s hydrocarbon deposits, but estimates of this resource vary widely as well; the USGS estimate is 266 trillion cubic feet.

As for natural gas, production grew strongly in the 1960s and 1970s after discovery of large fields in

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supply projections used here match a conservative view of production development, based on a national reserve estimate of 29.5 billion barrels. Production rises until about 2010, then declines to around two million b/d by 2020.

Sichuan Province, but it remains a marginal fuel within the vast Chinese energy system, used mostly as a feedstock for the fertilizer industry and currently satisfying only about two per cent of energy demand, much lower than the world average of 23.6 percent. This will be changed, with gas becoming much more widely used. With cutbacks in recent years, current production is low relative to reserves. Proven reserves amount to over 1.5 trillion cubic meters (tcm), less than four per cent of the estimated potential. The current trend indicates annual production of 25 billion cubic meters (bcm) by 2000 from 22.3 bcm in 1997 and almost 30 bcm by 2005. Longer-range official targets suggest output of 72 bcm in 2010 and 95 bcm in 2020, although the IEA projections hold to about half those levels mainly due to delivery problems and premature gas market.

Natural gas offers a future supply source. Its use will increase but, once again, infrastructure problems intervene. Pipeline construction and downstream facilities lag upstream progress. Largely because of these infrastructure obstacles, the IEA’s scenario holds increased gas production to about half the official Chinese forecasts. The Chinese are close to decisions to build the required terminals and other facilities to begin importing liquefied natural gas (LNG), primarily from Indonesia but also from the Middle East. A full-fledged switching policy could well boost demand to 95 bcm as early as 2010 and to 140 bcm in 2020, with 75 bcm going into power generation, 30 bcm consumed in the chemical sector and 35 bcm used as city fuel.

Coalbed methane (CBM), a kind of gas formed and stored in coal seams and absorbed on the surface of coal, can be an important source of clean gas energy for China. To prevent gas explosions, 6 bcm of methane are expelled from China’s mines annually, seriously polluting the environment and wasting energy resources. The country’s CBM resources are around 30,000-35,000 bcm to the depth of 2,000 meters below the surface, almost equal to that of conventional natural gas and ranking third in the world. By 2010 the annual production of CBM could reach 10 bcm, according to the recently

established China United Coalbed Methane Co. Ltd.<sup>5</sup>

### Inadequate Energy Delivery Infrastructure

Even if China would be able to bring in oil and gas supplies, how would they reach the end users? Insufficient investment in the past, combined with instances of inadequate project planning, management and co-ordination, have held the expansion of China's physical infrastructure to half the rate of demand growth over the past decade. The transport and power sectors have the most serious shortfalls. The World Bank has estimated demand-necessary infrastructure spending over the ten-year period to 2004 at a total of \$ 1.5 trillion, of which transport accounts for \$600 billion and energy for \$490 billion.

In this immense and heavily-populated land, the economic geography has favored industrial and commercial growth in the East and South, far from the nation's key—and very substantial—onshore reserves of coal, oil and hydropower in the North and West, and ill-served by an energy-delivery infrastructure that could not keep up with burgeoning demand. Imported oil increasingly fed economic development in the East and South, even when China remained a net oil exporter. Fast-growing oil imports eventually gained the upper hand for the country as a whole in the first half of the 1990s, almost a quarter century after the reforms began.

After many years of neglect, however, China's recent infrastructure investment performance has improved. Across the economy as a whole it averages around 6.5 per cent of GDP, well above the developing-country average of four per cent and not far from the World Bank's recommended level of seven per cent. In March 1999, Finance Minister Xiang Huaicheng announced to the National People's Congress that Beijing would open the floodgates with a 14.7 per cent rise in budget expenditures and a 57 per cent jump in the fiscal deficit (but to only 1.7 per cent of anticipated GDP), largely on infrastructure spending to reach the

official seven per cent economic growth target for the year.

Oil moves chiefly by pipeline, although the network is not complete and crude oil must often switch to overcrowded, relatively inefficient and expensive rail transport to reach refineries<sup>6</sup>. Generally speaking, crude oil flows from north to south and from east to west. Unless or until the northwestern Tarim basin becomes more important, the key centres of domestic onshore and offshore production will remain in the northeast. China had in place some 19,340 km of oil and gas pipelines in 1997, about 55.84 per cent more than the 10,800 km of 1983—but traffic through them rose by only about ten per cent, to 59 billion ton/km from 53.4 billion ton/km, probably because of bottlenecks at either end.

Poor natural gas infrastructure continues to remain a critical issue in China<sup>7</sup>. Development of a long-distance natural gas pipeline network has been listed as one of China's key national infrastructure projects. Pipeline construction and downstream utilization projects are at present lagging upstream progress. China aims to develop a national grid capable of transporting 150bcm/year of gas. Preliminary feasibility studies are under way concerning the construction of a national gas pipeline system – a main line delivering gas from

<sup>6</sup> Oil products move mainly on the clogged rail network, with some coastal shipping as well. Although refineries are going up rapidly in the East and South, regional imbalances remain in the refining industry. Earlier, most of the refineries were built near the northeastern oilfields, far from the regions of high demand. Moreover, many locally-owned refineries as well as some owned by CNPC and other oil State companies are located in areas without pipelines. The total length of China's refined oil pipelines is only 1,700 kilometers.

<sup>7</sup> To get oil out of Tarim and into domestic markets, CNPC envisions a 4200-km pipeline system, capable of delivering 20 Mt annually from Xinjiang to southwestern and eastern China. With estimated construction costs exceeding \$1.2 billion and Tarim's output growing more slowly than expected, this remains a vision. Undaunted, and perhaps hoping that smaller, sunk investments will render the entire project more unstoppable, CNPC has elected to build pieces of the network. The first, a 480 km stretch within the region from Korla to the Shanshan oilfield near Turpan, opened in late 1997 and can handle up to 10 Mt of oil a year, for transshipment some 1900 km farther by rail to refinery facilities in Lanzhou, Gansu province.

<sup>5</sup> *China Daily*, 3 January 1999.

western producing regions to eastern consumers, supplying a total of 19 bcm of gas per year to the lower reaches of the Yangtze River by 2010. The country also intends to develop gathering centers and storage capacity of 15-17bcm.

Overarching planning and industrial policy are needed to promote natural gas development focusing on constructing a reliable and highly efficient natural gas delivery system, gas fuelled power generation, industrial use and distribution for residential use. CNPC has also drawn up an ambitious plan to build a nationwide pipeline network to channel its abundant gas reserves located in the western regions to the more prosperous east. By 2002, the pipeline network will be capable of supplying 4 bcm of gas to Shanghai every year. By 2010, the corporation's plan is to drill 45 bcm of gas and be capable of piping 19 bcm of gas to eastern China annually. According to CNPC, approximately 7,000 kilometers of pipeline will be completed by 2010.

### **Improving Regulatory Framework: Post-March 1998 Reforms**

While reform has unleashed and abetted the Chinese economy's outstanding economic potential over the past 20 years, it has left the energy sector untouched until recently. Broadly speaking, characteristics typical of "command and control" systems still dominate the energy sector<sup>8</sup>. In March 1998, the government announced a profound reorganization and streamlining of government, and restructuring of certain state companies. Few sectors were more greatly affected than energy. Though these reforms appear to be substantial and wide ranging – on the organizational charts at least – it remains to be seen what impact they will have on the effectiveness of government and on the performance of the state industries.

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<sup>8</sup> The constitution described private enterprise as "complementing" state ownership; but under the amendment to the constitution, approved by the National People's Congress in March 1999, non-state enterprises are now called important components of the socialist market economy. Clarification of their legal status is expected to arouse the enthusiasm of the non-state sector and give it an enhanced role in the economy.

In this new thinking, China's energy security arising from the widening gap between domestic production and consumption is an overriding concern. There is also recognition that the next steps of the reform process and the date of World Trade Organization (WTO) membership is closely linked. Because WTO membership affects so many different areas of economic activity it does require delicate policy decisions by the Chinese leadership in the energy sector. China is aware of the need to overhaul its energy industries before dropping tariffs and opening up to potentially less expensive imports. WTO membership could have positive effects on China's economic climate by promoting transparency, helping to create a "rule-based" economy, and strengthening the confidence of foreign investors. It would also open up the Chinese economy, including the energy sector, to greater foreign involvement. In the short term, there is a real question as to whether the Chinese state energy companies would be able to compete against the multinationals.

China plans to launch the more targeted, second phase of reforms upon the completion of a trial period of three years. This helps explain why the newly-created or revamped government structures are still shaky and the newly appointed bureaucrats are uneasy. Several new players have entered into the energy field, each trying to test the ground and carve out their own sphere of influence, often in competition with the existing players. One objective—to introduce competition and separate the commercial operators from the policy makers and regulators—shows few signs, so far, of realization. The state energy companies have excessive power and their governmental superiors do not possess sufficient authority, enforcement muscle or staff to discipline them, much less to introduce adequate regulation. The new system thus runs a real risk of "regulatory capture", whereby the proper subjects of regulation become themselves the *de facto* regulators<sup>9</sup>.

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<sup>9</sup> See for an in-depth discussion of this issue: "Energy Policy and Structure in the People's Republic of China", a major report sponsored by the European Commission and the Ministry of Science and Technology, China, December 1998.

This still-complex structure, moreover, repeats itself in parallel fashion at the provincial and lower levels, further diffusing the lines of policy and regulation. Thus, the common strands of the past persist: a lack of separation between regulators and operators, and large, state-owned firms. In the oil and gas sector, the big energy companies have international as well as domestic ambitions. In the oil and gas sector (including petrochemicals), an oligopolistic structure has emerged because it will have the most impact on China's growing energy interface with the rest of the world. The four State energy companies grouped under the State Administration of Petroleum and Chemical Industries (SAPCI) may, in principle, compete, both domestically and internationally, and across the spectrum of exploration, production, refining and marketing. Some see them as modeled on the Korean *chaebols*, although, while very large, they do not have the *chaebols'* cross-industry conglomerate characteristics. If one ignores that they are State energy companies, they look more like big oil and gas firms of the western model.

Domestic petroleum producers have suffered greatly because their production costs are usually higher than overseas counterparts. China's oil producers are re-orienting their development strategy in light of international market contingencies. 1999 will be the first time China's oil giants have paid more attention to economic returns than to output. A series of new strategies, such as cutting operating costs and speeding up the development of natural gas business, have been adopted. The CNPC, which oversees most of the country's major oil fields, is expected to produce 106.6 Mt of oil in 1999, 780,000 tons less than in 1998. The Sinopec, which operates the Shengli and Zhongyuan oil fields and other oil fields in South China, is expected to cut high-cost oil output by 1.2 Mt and cancel construction plans relating to 440,000 tons of low-efficiency production capacity in 1999<sup>10</sup>. The CNOOC has gone through an especially

difficult period because its crude oil must be sold completely in line with international prices<sup>11</sup>.

In many countries with long traditions of officially-controlled prices, energy tariffs are among the last to be let go, partly because governments see energy utilities as natural monopolies needing controls, and partly because almost everywhere they consider energy products as strategic commodities. Moreover, the introduction of competition—market pricing—in energy presupposes effective regulatory systems and institutions, which do not yet exist in China. China's leaders have struggled to introduce a semblance of market pricing into the energy system. But they have moved relatively cautiously and progress has occurred faster in some parts of the energy sector than in others<sup>12</sup>.

The June, 1998 oil price reforms are not fully operational; they remain in a transitional period of indeterminate length as the government worries about vulnerability to international price instability just when the parallel reforms of the institutional structure are being digested<sup>13</sup>. Nevertheless, domestic prices have held only slightly above international levels since the summer of 1998. In

<sup>11</sup> CNOOC's crude oil sold at US\$12.11 per barrel in 1998 compared with US\$19.46 in 1997. CNOOC aims to further reduce its production costs from the current US\$11.78 per barrel to less than US\$10 per barrel in the next two or three years. CNPC is ready to lay off 100,000 workers by the end of 2000 and will also close some high-cost oil wells. China National Star aims to reduce its crude oil production cost to US\$10 per barrel.

<sup>12</sup> The oil industry probably has seen the most ostensible progress on prices. This has taken some time and gone through a series of iterations since 1980. China instituted in the early 1980s a two-tier system (one heavily controlled price for sales of production within the state Plan and another, freer one for direct sales of above-plan output), which persisted in progressively attenuated form until the 1998 reforms. With further but incomplete liberalization of controls in 1992-94, a market price for refined products gradually emerged. Distribution-system reforms in 1994 removed certain price controls to generate more oil-company revenues but also eliminated sufficient intermediary links in the distribution process to hold domestic retail prices steady despite significantly higher crude oil prices at the time. Finally, a probably quite decisive step came in 1998, towards full linking of domestic and international prices.

<sup>13</sup> "The New Oil Price Reform in China: Moving Toward Market Deregulation?" Kang Wu, 24 August 1998, FACTS Inc., Honolulu.

<sup>10</sup> "China's oil firms refocus operations", Zhao Shaoqin, *China Daily*, 14 February 1999, p. 8

fact, the steep drop in international oil prices beginning in late 1997 may actually have propelled the price-system reforms forward. It surprised the Chinese industry and probably demonstrated to policy makers that China's petroleum sector is more porous—more linked with the international industry—than they hitherto had realized. The first half of 1998 saw a surge in legal and illegal imports of both crude oil and refined products as the gap yawned between low international prices and high domestic ones. Domestic oil stocks rose, onshore production cutbacks ensued and the oil companies' financial performance plummeted. Initially, the government tried to crack down on smuggling and imposed temporary import bans; but these measures could not fully insulate the Chinese oil sector, and the price reforms followed quickly.

### **Environmental Constraints and Efficiency Gains**

China will probably become the world's largest greenhouse gas producer by 2020, elevating concerns over China's energy policy beyond the local and regional level. While Chinese officials take the line in global forums that emission control is primarily the responsibility of the industrial countries themselves and that they should bear much of the cost of emissions reductions in the developing world, evidence indicates that they have considerable awareness of China's own role. When circumstances permit, they will opt for fuel choices, technologies and energy efficiency measures, which have emissions-reduction potential.

The national government does not very actively advertise its environmental concerns to the outside world, which instead encounters attitudes and rhetoric with an extremely defensive tone. Yet national standards and a fair amount of environmental legislation do exist, and the government is well aware that pollution levels in Chinese cities approach crisis proportions. While China currently spends less than 1 percent of its GDP on environmental protection, both Chinese government officials and foreign experts alike acknowledge that pollution may be costing the country 10 times as much.

China is in the process of spending 450 billion yuan (\$54 billion) on environmental protection between 1996 and 2000, and the figure accounts for 1.3 percent of the gross national product and 3.5 percent of the total social fixed-asset investment, respectively, for the period. Of the total, 182 billion yuan (\$21.9 billion) will be spent on water-treatment facilities, 208 billion yuan (\$25 billion) on the control of air pollution, and 50 billion yuan (\$6 billion) on solid-waste treatment. This indicates bright prospects for environment-related industries<sup>14</sup>.

In addition to the quantity of domestic energy resources, their use will be critical to the implementation of demand side and technology deployment policies. Some of the most important energy options for China over the coming three decades include continued advances in end-use technologies, advanced renewable technologies, fuel cells, gas-to-liquid conversion, further developments in clean coal technologies and gas turbines, carbon capture and sequestration processes, and perhaps, hydrogen technologies.

While achieving remarkable success over the past two decades in reducing energy intensity, China still has one of the most wasteful energy sectors in the world. A study by China's Energy Research Institute indicates that China has the potential to cost-effectively achieve a further 30-50 percent reduction in energy consumption by raising its industrial energy efficiency to international levels. On average, energy intensity, a measure of energy consumed per unit of economic output, has dropped by over 4 percent each year since 1977. Without this reduction, China would now be consuming twice as much energy as it actually does. Energy consumption in 1995 would have been about 2,500 million tons of coal equivalent (Mtce), compared to the actual level of 1,250 Mtce, if intensity remained constant at the 1980 level<sup>15</sup>.

<sup>14</sup> "Environmental protection industry reports good earnings", *China Business Daily*, 25 March 1999.

<sup>15</sup> Official figures on oil consumption by the transport sector, also reported in IEA data, probably are underestimated due to the methodology of data collection in China. (footnote continued)

## China's Emerging Energy Security Concerns and Measures

Two central points of view contend within China's energy policy machinery. The first, perfectly understandable because the country has only recently lost its self sufficiency in oil after a long period of successfully meeting its domestic needs, would bend the nation's exertions and resources primarily to moving back towards self sufficiency. Proponents of this view can reasonably point to still-high estimates of unproven reserves, as well as the potential for technical advances, fuel switching and energy-efficiency gains to make their case for energy autonomy.

They also can point to events within living memory, such as Western embargoes and the chaos in the energy sector, which followed the breakdown of Soviet-Chinese relations in the 1960s, as demonstrating the risks of international energy interdependence. Such an argument always has appeal on strategic and security grounds.

The second viewpoint urges a different allocation of effort, with more relative emphasis on seeking reliable and secure supplies of imported energy. It takes oil-import dependence as an inevitable consequence of economic success and would use China's growing influence in international energy markets to ensure that imported energy is in fact reliably available when and where needed. It also appeals to the emerging commercial interests of the big State energy companies. Because their business and policy roles are so closely commingled, they can ensure that this viewpoint has influence. To some extent, the State energy companies' forays into international markets as traders and investors have already established China's presence and given this viewpoint a solid place in Chinese policy. One can never be entirely sure whether a move by CNPC, SINOPEC or CNOOC—an investment in a foreign oil field, for example—has commercial motivations, policy impetus, or both.

Nevertheless, as long as the debate<sup>16</sup> continues and reform remains incomplete, China will continue to have difficulty in articulating how it weights the classical elements of an energy policy—development of indigenous oil and gas, diversification of energy sources and imported energy supplies, and encouragement of energy conservation and efficient energy use—and translating them into official programmes. Many policies co-exist, sometimes as complements, sometimes in competition, but their interrelationships have poor definition. There are several strategies rather than a single one, and many actions, which may or may not reflect policy. This is the sense in which policy drift persists.

Yet “drift” does not imply “paralysis”. Government and the State energy companies in fact show highly activist tendencies. The two basic points of view get accommodated in: (1) an approach that still stresses a goal of independent domestic primary energy supply, accompanied by an ambitious, costly energy development plan for oil, natural gas, coal, eight nuclear plants, ten or a dozen large and smaller hydroelectric facilities and over 30 thermal power plants; and (2) aggressive trade and investment strategies that stress positioning China for energy security in a longer-term scenario of dependence on imported energy. Much official rhetoric manages both to highlight energy independence and to leave ample room for international action. Notwithstanding the ongoing debate, therefore, China has reacted with alacrity, after just a few years of rising net oil imports, to begin forging a credible set of linkages with international energy markets. We now take a look at them in detail.

### *Energy Security Measures*

Actions to deal with import dependence, underway and at various stages of implementation, cover all the standard fields: creation of a strategic oil reserve; pursuit of diversified, secure import

<sup>15</sup> *China Energy Databook*, Lawrence Berkeley National Labs, 1996; *China Energy Annual Review*, State Economic and Trade Commission, Beijing, China, 1996.

<sup>16</sup> Some characterize this debate as one between “nationalists” and “internationalists”. These terms, however, could have pejorative connotations not intended here.

sources; more receptive policies towards foreign investment in Chinese energy; and Chinese investment in foreign production facilities, plus (possibly) oil and gas pipelines in producing countries or from them to China. All these actions show dual motivations. China seeks a place in the existing global system of energy production and trade but, where it can, also pushes at the frontiers in an attempt to open new connections in the global markets. Increasingly—as in all heavily import-dependent countries—external energy policies come to form a subset of foreign economic and security policies in general.

Standard thinking on energy supply security in general and strategic reserves in particular involves relatively new concepts for Chinese energy policy makers, who look for guidance in the energy security policies of other importing countries, especially those of the OECD. The *China Energy Strategy Study (2000-2050)* (PRC, 1996) mentions the strategic oil reserves of the United States and Japan, and suggests that China should consider establishing a 15 Mt reserve (about a month's consumption) in 2000 and expand it to 64 Mt (three months' consumption) in 2010. CNPC has expressed interest in beginning to develop a strategic oil supply system, to include oil reserves as well as seaport expansions to better handle and store import flows. The research institutes of both the SDPC and CNPC have publicly suggested slower production in some fields to leave reserves in the ground, an

attractive proposition when imported oil has lower real cost than some domestic output and above-ground storage infrastructure is scarce.

Press reports in 1997 indicated that a decision on strategic reserves had been considered and made, and that some new national oil storage facilities might be completed before 2000. In January 1998 (a few months before the energy-industry re-organisation took place), the SDPC unveiled details of some proposed storage locations. The potential sites include several deep-water ports—Huangdao in Shandong, Aoshan Island in Zhejiang, Maoming in Guangdong and Dalian in Liaoning. An oil product terminal is under construction in Qinzhou. The Guangzhou Petrochemical works operates a new terminal in Huizhou Daya Bay, capable of handling ships up to 250,000 DWT.

### *Evolving Oil Trade Patterns*

Policy makers in every country dislike surprises, and those abroad will not envy the rapid shifts in oil trade patterns with which their Chinese colleagues have had to cope in recent years. Between 1990, when China exported almost five times as much in total tonnage of crude and products as came inbound, and 1997, when it imported well over twice as much as it shipped abroad, the comfortable patterns of self-sufficiency known to an entire generation since the Daqing fields came into production in the 1960s turned upside down.

## SINOSPHERE

<b>China: From Oil Supplier to Oil Customer</b> (Millions of tones)		
	Crude Oil	Oil Products
<b>Imports</b>		
1990	2.92	3.12
1993	15.67	17.39
1997	35.33	23.20
<b>Exports</b>		
1990	23.99	5.42
1993	19.44	3.71
1997	19.83	5.56
<b>Source:</b> IEA and The East-West Center Energy Program Database.		

Chinese leaders and the big oil companies have reacted slowly to the changes. A policy view on energy-supply security has developed, compounded of a drive for diversification of import sources and a search for reliable suppliers, with “reliability” defined in terms of suppliers’ political friendliness and a capacity to ship plenty of oil, especially crude, in excess of refinery capacity and domestic needs. In practical terms, these considerations have pushed China’s oil trade in the same direction as they have that of other nations: towards the Middle East. That

region has displaced the Asia-Pacific area as China’s principal source of crude oil, but China also has made major strides towards diversification elsewhere. Asia-Pacific countries remain overwhelmingly the main sources for oil products, whose imports are far from negligible because China itself has a chronic shortage of refinery capacity relative to demand. These products, of course, can be and often are the output of Asian refineries using feedstocks from the Middle East.

<b>Diversification of Chinese Oil Import Sources, 1990-97</b> (Per cent of total imports)				
Region	Crude		Products	
	1990	1997	1990	1997
Middle East	39.4	47.5	1.2	1.8
Asia-Pacific	60.6	26.2	85.5	81.6
Africa	0	16.7	0	0.4
Others	0	9.6	13.3	16.2
<b>Source:</b> IEA and East-West Center data				

In 1990, just three countries merited breakout in the data as key suppliers of crude oil: Indonesia principally, plus Oman and Iran. By 1997, the list included ten, far more widely spread around the world: Oman (which had displaced Indonesia as principal supplier, shipping three times as much crude as China’s total imports in 1990), Yemen, Iran

and Saudi Arabia in the Middle East; Indonesia in

Asia; Angola and Congo in Africa; and Argentina, the United States and Russia among the “others”<sup>17</sup>.

Increasing Chinese crude imports in favour of the Middle East do not represent a withdrawal from traditional Asia-Pacific suppliers. China imported more than five times as much crude from them in 1997 as in 1990. It reflects, instead, a region-wide trend towards heavier imports from outside the region as economic growth boosts demand beyond the capacity of Southeast Asian suppliers to meet it in the medium and long term. Oil dependence (net imports as a per cent of demand for crude and products) in the Asia-Pacific countries reached 61 per cent in 1997 and is forecast to rise to 66 per cent in 2005. Somewhat obscured by the softer demand created by the Asian crisis (the dependence measure fell to 58 per cent in 1998), these trends will re-establish themselves as the crisis wanes.

The implication for China lies in its participation in the general shift towards the Middle East. It is part of a region-wide, indeed global development. To satisfy its own rising demand, China must, along with others, enhance its role as a player in those markets. While it has had some success in diversifying elsewhere, it must turn like everyone else to the region with the most abundant supplies, and it is doing so. The implication for other players—both suppliers and importers—lies in China’s entry as a competitive buyer into the global system.

From the supplier side, Middle Eastern countries also have active interest in developing the Chinese market. Saudi Arabia represents a good example, Kuwait another. The Saudis see China as a lucrative market for crude oil and investment in the petrochemical sector. Depending on whether the Chinese side wants to go forward, Saudi Aramco

already has negotiated a US\$ 1.5 billion deal to expand and upgrade two refineries in China in return for a long-term Chinese commitment to import Saudi crude. As China entwines itself ever more closely with the global system, the close intermingling of trade and investment flows into and out of its oil and gas industry will become increasingly apparent and important. The global industry offers a paramount example of how investment and trade move together.

Another measure of “linkage” concerns the degree to which oil imports become embedded in a broader trading relationship. China tries hard to establish such links and has had some success. Among its main suppliers of both crude and products in 1997, in only four did oil trade take the lion’s share of total exchanges (the sum of exports and imports in Chinese data): Oman (100 per cent), Angola (93 per cent), Congo (92 per cent) and Yemen (83 per cent). All others had shares well under 50 per cent. Among the Middle Eastern countries, Saudi Arabia and the United Arab Emirates are China’s principal overall trade partners. Iran is not insignificant, with over US\$ 1 billion in total trade, of which 41 per cent involved Chinese crude imports.

With the recent swap arrangement between China and Iran following China’s investment in Kazakhstan’s Uzen field (see below), plus a US\$ 250 million Iranian investment in a Chinese refinery upgrade to take Iranian sour crude, Iran will rise in importance as a crude supplier to China. The Chinese-Iranian relationship has developed and changed over at least three decades, raising concerns within the international community from the mid to late 1980s that China was using arms exports and nuclear co-operation as building blocks to bolster it. Since the US-China Summit of 1997, China appears to be curtailing sensitive nuclear transfers to Iran as part of a wider and more positive trend in Chinese non-proliferation policy. Arms sales may be falling as well. The Sino-Iranian ties are steadily moving to more substantive economic and trade relationship.

At one time, the evidence pointed strongly towards an element of Chinese foreign policy that aims to develop economic relations with countries not only politically friendly or potentially so, but also distant

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<sup>17</sup> The concentration on Oman and Yemen in the Middle East derives in part from a technical factor. Chinese refineries, originally built to process sweet domestic crude oil, can readily use Omani and Yemeni crudes, but have difficulty with the sour crudes from elsewhere in the region. Refinery conversions/upgradings under way probably will in time allow far greater diversification of import supplies among the Middle Eastern countries. Oman and Yemen may lose market share but not necessarily volume as Chinese crude imports mount in absolute terms over the long term.

politically from countries which China saw as adversaries. In its heyday, oil trade operated more as a tool of that policy than as a driver of it. The nature and levels of Chinese activity in Iran, Iraq and Sudan all point to its continuation, but in a very different, more moderated guise, with the oil element playing a much more prominent role in relation to purely political adventures. Like all countries, China seeks niches where it can function as the major player, or one of them, rather than just as one among many. Yet the field for such initiatives narrows steadily relative to the growing oil import needs which propel China into the global oil production and trading system and require that it adapt—as a fierce competitor—to it. From the evidence of its oil trade and investment relationships so far, the adaptation appears well under way.

Chinese oil trade policy in general, more than its overall trade policy, still shows signs of the *dirigisme* and sometimes protectionist tendencies associated with command-economy habits. The government remains all too ready to impose draconian measures by decree—the import ban in 1998 provides a good example—in part because incomplete domestic price reform creates disequilibria and a tendency continues to view trade as a “swing” variable that can be manipulated at will to restore domestic balance. Such uses of trade policy disrupt markets and do not help the development of reliable and secure supply relationships in the long run. They also create new imbalances, such as the rampant smuggling problem with which the Chinese also had to cope in 1998, and they illustrate the close interconnections between domestic reform and trade liberalization.

### **Foreign Investment: In and Out**

Investment flows, especially foreign direct investment (FDI), create links between a nation’s energy sector and the international energy system as firmly and surely as do the patterns of energy trade. China faces two urgent pressures: to develop its domestic energy system rapidly and massively as demand swells with growth; and to establish secure access to oil from abroad to satisfy rising net import demand. The first goal will be impossible to achieve

without heavy private foreign investment<sup>18</sup>. The second can be helped along significantly by judicious Chinese investment in energy assets outside its own borders. Both have begun to occur.

Inward Investment. Before 1990, FDI did not exist in China’s public utilities and energy sector, in contrast with the rest of the economy where inflows over the two decades since reforms began have made China the world’s second largest destination for FDI. Official hesitation to open the sector manifested itself in heavy state intervention, long, complicated approval processes and the lack of an institutional and legal framework comfortable for investors. All still is not well, from the investors’ point of view. They continue to criticize this lack, especially the ambiguous separation of institutional responsibilities between the central and lower-level governments. They also find difficult the incomplete moves toward market pricing. Permission to invest still requires approval from both the government authorities and the State companies involved; the State companies can face a clear conflict of interest as they seek to protect their own market positions.

Since 1990, nevertheless, the system clearly has loosened and changed its stance. Chinese authorities have overcome much of their reluctance to accept a foreign presence in the sector. Recent energy-market reforms, expanded capital markets, the deregulation that has occurred and state-sponsored initiatives all have spurred both FDI and foreign portfolio financing in Chinese energy. The State companies themselves participate in and seek ventures with foreign investors much more frequently than before. The pace of foreign investment in the energy sector, especially in relation to China’s needs, still does not match its buoyancy elsewhere in the economy, but much change has occurred. Much more must occur if China wishes to meet the financing and

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<sup>18</sup> Between 1979 and the end of 1997 China cumulatively approved 304,866 foreign-invested enterprises, with contracted foreign investment valued at US\$521.1 billion and paid-in investment at US\$221.8 billion, according to MOFTEC official statistics. Foreign direct investment increased from US\$2.3 bn in 1987 (and US\$41.7 billion in 1996) to US\$45.58 billion in 1998. Hong Kong, Japan, Chinese Taipei, the US and Singapore are the top five investors in China, accounting for about 83 percent of China's total FDI in 1997.

technology requirements of its domestic energy investment targets. China desperately needs foreign capital to develop its energy sector.

The development of offshore oil production has depended from the start on heavy participation of foreign companies in exploration and development. In fact, the offshore subsector offers the notable exception to China's reluctance until the present decade to open its territory in this strategic industry to international investment. China opened the South China Sea to foreign firms in 1980 and the East China Sea (including Bohai Bay) in 1992. CNOOC, the leader in the field among the Chinese State companies, has tried hard to adopt standard international investment practices, and it has benefited greatly from an array of joint-venture operations. CNOOC has produced 15/16.3 Mt of crude oil and 2.6/4bcm of natural gas in 1997/1998<sup>19</sup>. CNOOC wants to be able to produce by 2005 ten million tones of oil from South China Sea, 10 Mt from Bohai and natural gas of 10 Mt oil equivalent from its offshore areas.

For *downstream operations*—refining and petrochemicals—the focus shifts from CNPC to SINOPEC and CNOOC as the chief dealmakers with foreign investors, although CNPC is not absent from these businesses. In mid-1997, SINOPEC announced a moratorium on building new refineries for at least three years, apparently to reduce its total investment under the current Plan (1996-2000) by the equivalent of US\$ 4 billion, to a still-sizeable US\$ 18 billion. This could boost Chinese imports of oil products, in which SINOPEC also has a large interest. The company will go ahead with upgrading existing refineries (foreigners welcome). It has allowed Total of France to finish its new Dalian refinery, now fully operational (or nearly so) at 100 000 b/d; it will sell 85 per cent of its output in the domestic market rather than exporting 70 per cent as originally intended. Plans for several foreign and joint-venture refinery projects linked with SINOPEC, however, have gone on ice.

It is settled policy in many countries of the Middle East to seek to invest in downstream facilities of their import customers in return for long-term import contracts or FDI in their own crude oil production development. This represents a *quid pro quo*, which China must sometimes provide in order to gain access to secure oil supplies. Clearly, it also cements international relationships on a long-term basis. A good example is the US\$1.5 billion deal under negotiation with Saudi Aramco, in which Aramco would invest in and supply oil to joint-venture refineries in China that would sell their output domestically and export it. The talks center on expanding and upgrading the Thalín refinery at Qindao (Shandong) as well as some Saudi presence at the Maoming refinery in Guangdong. Reports indicate that Thalín would receive 10 Mt of Saudi oil a year for 50 years. Other foreign investors also can be involved in such deals.

Investing in Foreign Energy. With its entry into the price-volatile global oil bazaar as an importer, China quickly learned the hazards of relying solely on purchase policies in the open markets. The more aggressive recent foreign investments of its State companies, notably CNPC and CNOOC, stem directly from a May, 1997 policy paper in which former Premier Li Peng both blessed Chinese involvement in the exploration and development of international oil and gas resources, and tied such projects specifically to the objective of stable, long-term supplies of oil and gas. One Chinese source foresees half of China's crude imports coming directly or indirectly from Chinese-owned fields by 2000.

China's overseas investment forays include, so far, several Middle Eastern countries, plus Argentina, Bangladesh, Canada, Colombia, Ecuador, Indonesia, Kazakhstan, Malaysia, Mexico, Mongolia, Nigeria, Pakistan, Papua New Guinea, Peru, Russia, Thailand, Turkmenistan, Venezuela and the United States<sup>20</sup>. CNOOC has investments in Indonesia and the Gulf of Mexico, and plans new ventures in the Middle East (especially Iran), Central Asia, Myanmar and other parts of Asia. CNPC has been

<sup>19</sup> China National Offshore Oil Corporation (CNOOC), Annual Report, January 1999, Beijing.

<sup>20</sup> For a brief overview of China's overseas petroleum investments see *China Economic Review*, July 1998, p.36.

the most active, however, with exploration and production contracts (sometimes for petrochemicals) signed or under negotiation in at least 20 countries. By the end of 1997, it had pledged more than US\$ 8 billion for oil concessions in Sudan, Venezuela, Iraq and Kazakhstan, plus—at least notionally—another US\$ 12.5 billion to lay four immense (but still far from real) oil and gas pipelines from Russia and Central Asia to China. The oil projects in Iraq, Kazakhstan, Sudan and Venezuela are large-scale.

CNPC's entry into Kazakhstan laid down a Chinese marker of some importance in oil-rich Central Asia, a key foothold where Chinese presence had previously been minimal. The solid parts of this activity involve an investment of US\$ 4.3 billion over 20 years in Kazakhstan's state-owned Aktyubinsk oil company, plus a 60 per cent stake, worth US\$ 1.3 billion to be invested through 2002, in a joint venture with the Kazakh firm Uzenmunigas, to develop Kazakhstan's Uzen field on the east Caspian Sea coast. Uzen is estimated to hold 130 Mt to 200 Mt of oil, with near-term production at eight Mt per year through 2002. Under a separate 1997 oil-swap deal with Iran, Uzen oil produced by CNPC will move across the Caspian and to a refinery near Teheran, with China receiving an equivalent amount of Iranian crude exported from Iran's Gulf coast.

Beyond that, and more vision than reality at the moment, two pipelines would carry oil and gas eastward into Xinjiang and the Tarim basin. The oil line (3,000 km) would connect Kazakhstan's western producing regions with refineries in its north and south, then extend into western China. The extension would make little sense unless CNPC can use it to revive official interest in its ambition to build a long, internal pipeline from Tarim to the markets in eastern China. The whole would constitute what has been dubbed the "Energy Silk Route". With Tarim showing less than its original promise, and given the likely high real cost of its oil, formidable economic arguments and severe funding problems, now impede the entire affair. The gas line (5,800 km from eastern Turkmenistan through China) faces similar objections and represents an even more distant prospect.

The Chinese enthusiasm for a "continental Bridge" for petroleum supplies from Central Asia seems to have cooled down in comparison with the buoyant mood three years ago. Major reasons for this, in addition to lower oil prices and slackening energy demand, include CNPC's finding new business and investment areas after the March 1998 reforms, particularly in the downstream sector, and the realization by senior leaders that this project would be uneconomical at least in the present circumstances. It should also be noted that new government leaders including Mr. Zhu Rongji, the pragmatic premier, stress economic reasoning as well as political motives when evaluating large-scale projects.

All told, CNPC, CNOOC and the other State companies have a target of 100,000 b/d to 150,000 b/d for shared oil from their foreign ventures by 2000, and that could rise to 400,000 b/d to 600,000 b/d by 2010. While significant, such oil will make only a dent in China's import requirements, accounting for perhaps 20 per cent of total imports, including products. China will have to continue to rely on traded oil, primarily from the Middle East. The State companies' investment activity, however, has an importance beyond its quantitative impact on the composition of imports. It will strengthen the State companies' financial positions and provide them with a presence in the global energy markets (as well as status in the eyes of supplier-country governments) that can pay off in terms of future import reliability.

### **Future Prospects: What Next?**

China crossed a threshold irrevocably in 1993 when it became a net importer of oil. In just a few years thereafter, its policy makers and diplomats have learned rapidly and well both the constraints and the opportunities that accompany a presence in the international energy system. The position of this vast nation in the global energy markets can only grow stronger as time passes. Neither Chinese forecasts nor estimates made outside China suggest any scenario other than one in which China will be one of the world's great importers of petroleum and its products.

The domestic petroleum geography has placed oil resources, for the most part, far from these demand centres, in the northeast and—potentially, but still disappointing in their results—the far-western basins of Xinjiang. Construction of the necessary energy delivery infrastructure lagged, however, and this too stimulated imports. Infrastructure problems not only created physical constraints on getting domestic oil to domestic markets but also raised its real cost (notwithstanding that the pricing regime in effect over most of the period kept this cost hidden). Thus, better delivery infrastructure—and indications are that China is investing more to create it—would better link domestic markets with domestic resources and, on balance, discourage imports to some extent.

On the other hand, much infrastructure (refineries, petrochemical plants, and local delivery facilities) has already gone up in the coastal regions specifically to handle imports, and more is coming. This tends to strengthen the import-oriented bias. An institutional factor enters here as well: much depends on the future behavior and interaction of China's two giant oil State companies, SINOPEC and CNPC. Head-to-head competition, or some version of it, would rationalize the domestic energy markets and subject imports to a strictly economic calculus for the nation as a whole. More collusive behavior would block such rationalization, with imports higher than they would otherwise be. In the interest of keeping its oil imports as low as possible, China has a strong need to improve the efficiency of its domestic energy markets by accelerating pricing, regulatory and other reforms.

For other major energy importers, two messages have become clear. First, China's manner of entry into the global energy markets carries no surprises. Its strategies bear strong similarities to others' and they are equally aggressive. Therefore, and second, it has become clear that China requires a strong place in the system. Other players must make room for it. China is not a marginal but a powerful new force in the international energy markets, and has vast potential over the next decades to affect the regional and global energy markets, linked inextricably in an interdependent world energy sector.

No question exists that energy issues have taken a high priority in Chinese foreign policy. This represents a constraint as much as an opportunity because the drive for reliable energy supplies, now a national imperative, limits increasingly the use of energy policy elements as instruments for other policy objectives. Every evidence points to China's rising awareness that its diplomatic goals with respect to energy, primarily oil and gas, must aim towards participation in the global energy system in a way that maximizes domestic energy security.

Meeting its energy needs in the 21st Century in a secure, efficient and sustainable way is one of the most significant challenges that China faces. The success or failure of this major effort will have a bearing on China's and the world's economic security. Both the short and the long views of China's energy relations with the rest of the world highlight the importance to China of international co-operation. At present China's energy security policies show a synthesis between a drive for a respected place in the system and international co-operation in the forms of trade and investment today and joint energy-resource management tomorrow. International co-operation and dialogue is absolutely essential, especially between OECD countries and such large, new developing entrants as China, in order to avoid misunderstandings and realize large-scale energy projects.

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### **Air Quality Management in Chinese Cities: The Policy Setting for Future Controls**

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### **Introduction**

Chinese cities are routinely identified as being amongst the most polluted cities in the world. Air pollutant concentrations often exceed ambient air quality standards at multiples of acceptable levels, causing significant health and ecosystem damage and very real economic impacts.

The United Nations Development Programme (UNDP) has offered technical and economic assistance to China in recent years to address these concerns, in a number of energy efficiency and pollution control programs. In 1997, a series of five municipal projects was developed in conjunction with the China International Centre for Economic and Technical Exchanges (CICETE), a part of the Ministry of Foreign Trade and Economic Cooperation. These projects were designed to focus on some of the worst municipal air quality situations within the country, including sulfur dioxide and acid rain in Guiyang; particulate in Xi'an; oxides of nitrogen in Guangzhou; traffic management in Beijing; and production technology in Benxi. These projects will be completed early in the year 2000, and individual city reports and a final project document will summarize findings and recommendations.<sup>21</sup>

The nature of the air quality problem in each city is being explored under a wide range of tasks, including ambient monitoring, emissions inventory development, atmospheric modeling, etc. Upon completion, it is expected that these cities will have a much better scientific and technical understanding of their pollution problems. But when the severe air quality problems are understood, the next—essentially axiomatic—step in air quality management is to undertake measures to further reduce that pollution.

This paper outlines the current status of China's municipal air quality situation in two fundamental policy areas: the use of command/control versus economic mechanisms, and the use of end-of-pipe technologies versus pollution prevention measures. The term “versus” is perhaps too strong here, since

<sup>21</sup> For more information about these projects, see <http://www.acca21.edu.cn/uipfpee.html> and <http://cicete-env.chinascape.cn.net>.

an “either/or” policy choice does not truly exist. Not surprisingly, all of these policy components will be required in future control programs in all of these cities. But determining an appropriate future balance will depend upon understanding their existing status in China today.

### Command/Control vs. Economic Mechanisms

Before discussing China's situation, it would be useful to very briefly consider how the Western economies brought pollution issues under control in urban areas. Legal prohibitions designed to minimize environmental degradation have been known throughout human history, and one historian has noted that more than twenty civilizations—many no longer on the planet—have employed such coercive measures.<sup>22</sup> In the West, Britain's Alkali Act of 1863 is often considered the forerunner of modern environmental command/control legislation. It regulated emissions in the so-called “alkali towns” of that country, which marked the birthplace of the modern chemical industry.<sup>23</sup> Over the ensuing decades, a variety of coercive measures were employed to protect air quality in the urban environment, culminating in a series of far-reaching mandates in the 1960s and 1970s.

These commands proved effective, and urban environmental conditions improved. But not all environmental goals were achieved, and even further corrective actions were sought. As the Western economies climbed the marginal cost curve for pollution control, it became more and more expensive to achieve ever smaller increments of emissions reductions. The governmental commands also became increasingly intrusive on smaller and smaller emission sources.

As a result of these impacts, a revolution in environmental thinking occurred, beginning in the late 1970s and early 1980s. Governments began to realize the limits of their command/control

<sup>22</sup> Allison, R.M., “The Earliest Traces of a Conservation Conscience,” *Natural History*, 90, May, 1981.

<sup>23</sup> See Rauber, R.K., *Pollution Markets in a Green Country Town: Urban Environmental Management in Transition*, Westport, CT: Praeger Publishers, 1998.

mechanisms, and began instead to shift towards an economic viewpoint—one in which pollution was recognized as a “market imperfection,” a sign that social concerns are not being properly taken into account in individual market transactions. Correcting such “negative externalities” was recognized as one of the principal roles of government. [It should also be noted that it was in this context—very high marginal costs of control—that the Western economies began to develop “clean production” approaches which sought to eliminate rather than control the emissions. Hence “clean production” in the West usually refers to a *post*-market-efficiency, *post*-end-of-pipe control situation, rather than the *pre*-, *pre*- condition now evident in China.]

Such economic thinking predominates today, and governments now routinely employ mechanisms such as pollution taxes, or markets in pollution rights to achieve their more ambitious goals. Command/control mechanisms have not been abandoned. Indeed, they usually remain the basis for the regulatory infrastructure. But economic mechanisms are now often applied for specific problems. The coercive “control” element is also still readily evident within the economic approach, since the government must still collect the pollution taxes, or ensure that the emission source holds the proper quantity of marketable pollution rights.

In China, environmental management initially seems to have followed a similar path. Since it was previously conducted as one element of the centralized planning process, all traditional measures can be viewed as a command/control measures. It has similarly adopted a regulatory framework which sets ambient air quality standards as environmental goals, conducts dispersion modeling in its cities to estimate the impacts of individual sources, and sets individual levels for specific facilities. It also modified its command/control approach in the late 1970s, adopting a pollution levy system designed to target those organizations not in compliance, and collecting a fee based on each kilogram of pollution above the level targeted by command/control. While not a full-fledged Pigouvian tax (since it is only applied to excess emissions), this might be

viewed as an incremental efficiency movement towards the economic approach.

But these similarities mask important differences. The first, and major, difference was noted earlier: the command/control and economic mechanisms adopted in the West were imposed on economies which had already been subjected to considerable resource efficiency discipline imposed by the market. Thus, they evolved from: A) market economies; to: B) market economies with command/control environmental regulation; and are now making the transition to: C) market economies with market-oriented environmental regulation. China has not yet made a full transition to step A, but it is nonetheless faced with the task of developing appropriate environmental policies in such a setting. Both command/control and economic types of policies will be appropriate, but it is important to recognize that compliance decisions are made within a completely different context.

For example, Benxi looks to today’s Pittsburgh as an example of what can be accomplished environmentally in an iron/steel producing, resource-intensive city. But Pittsburgh steel producers constantly watched the performance of their producing units, and shut them down when they become too inefficient in market terms. They also made pollution control decisions in that context, shutting down units if they decided that capital investment in pollution control equipment on older technology was simply not warranted. Benxi’s State Owned Enterprises (SOEs) are changing and making capital investments, but they are not yet subject to these same market pressures. And their response to pollution control command/control measures is therefore not being made in the same context either. China’s internal growth rates demanding iron and steel, the employment prospects of the hundreds of thousands of employees employed in these industrial complexes, and similar factors all affect investment decisions in Benxi. So does the environment, but not to a comparable extent. Pollution control efforts are therefore being made independent of the pollution control command/control requirements.

Implementation of the command/control approach has suffered from a number of deep-seated problems:

- *Inadequate attention to the “rule of law.”* If everything is negotiable, and competing interests can override environmental regulations, then pollution control suffers. As noted above, pollution control decisions are often made outside the command/control framework.
- *Conflicts with production.* Previous academic studies have found that local municipal officials in China—and even local environmental protection bureau (EPB) officials—are more interested in pursuing production goals and economic development than environmental protection.<sup>24</sup> Since the “rule of law” remains undeveloped, and since environmental damages are not monetized, then production always wins. This does not mean, of course, that the environmental damages are any less real—they are readily evident in the city in the form of bronchial illness, cancer, etc. These too have economic implications, and as noted earlier, it is viewed as one of the principal responsibilities of government to address these externalities. Increasing social welfare requires the recognition that pollution control is a cost of production (or, as economists put it, producers must be required to “internalize their externalities”). While one can recognize the considerable difficulties of public officials in China, it is also worth stating the matter quite bluntly: to the extent that governments pay attention only to the positive economic effects of production and fail to address the negative economic effects of pollution, then they are irresponsibly failing to do their job.
- *Operations as the weak link.* Under command/control programs such as the Three Synchronicities, new pollution-emitting facilities in China are required to undertake a

three step process: design, construct, and then operate pollution control devices to mitigate environmental impacts. On numerous site visits, however, it has become quite clear that while the first two steps receive regulatory attention, operation of these devices is definitely the weak link in this regulatory program. In many cases, the facilities simply shut down their pollution control units to avoid operating costs. In some cases, this may subject them to higher pollution levies on the uncontrolled pollutants—but these levies are usually lower than the operating costs of pollution control, so producers are inclined to take this step anyway. In these cases, the incentive structure can actually be somewhat perverse: the EPBs are pleased to receive higher fees, the producers are pleased to see production costs go down, and no higher governmental authority steps in to ensure regulatory compliance.

- The shift towards economic incentives is sometimes portrayed as a “carrot” alternative to command/control’s “sticks,” but as noted above, it too relies heavily on government coercion. There has been considerable criticism of the pollution levy system in China, based primarily upon observation of environmental conditions in Chinese cities and the tacit assumption that the levy system must not be working. The World Bank analyzed the water pollution levy system, however, and concluded that it was working better than supposed.<sup>25</sup> The problem is that the levies were set far below the levels that would effect change. In one air pollution study, the Bank noted that the levy only made sense if China’s policymakers valued the life of an average urban resident at approximately \$270, a figure it deemed “tragically low.”<sup>26</sup> Pollution levies are typically far below the expected marginal cost of control. In Xi’an it was noted that the accounting system allows the polluter to

<sup>24</sup> Chan, H.S., Wong, K.K., Cheung, K.C., and Lo, J.M., “The Implementation Gap in Environmental Management in China: The Case of Guangzhou, Zhengzhou, and Nanjing,” *Public Administration Review*, 55:4, July/August, 1995.

<sup>25</sup> Wang, H. and Wheeler, D., “Pricing Industrial Pollution in China: An Econometric Analysis of the Levy System,” World Bank, PRDEI, Washington, DC, July, 1996.

<sup>26</sup> Dasgupta, S., Wang, H. and Wheeler, D., “Surviving Success: Policy Reform and the Future of Industrial Pollution in China,” World Bank, PRDEI, Washington, DC, March, 1997.

fully deduct funds paid for the levy from its total tax bill. Thus, any incentive for change in pollution control because of the small fee is effectively eliminated.

- It seems clear then that the principal reasons for collecting the fee lie not with any efficiency gains for pollution control, but rather with their distributional effect. Simply put, pollution fees are a wonderful means of collecting revenue, and such revenue can then be used to support government environmental protection agencies. This is exactly how they are used in many other countries, and collected funds are similarly targeted. But in China, the fees are supposed to go beyond administrative support, to provide funds for additional pollution control at the enterprises. Their low level precludes much additional control. In fact, in many cities, the EPBs have considerable difficulty collecting even the low fees. For example, the Guiyang EPB was only able to collect approximately 25% of the SO<sub>2</sub> fees due from one major pollution source in the city.

Economic mechanisms suffer from the problems discussed above (fees too low to affect behavior, not all fees collected, etc.), but also from other fundamental problems:

- *Inadequate basis for collection.* In order to collect fees on emissions, the EPB has to know what the emissions are. In the West, regulatory agencies try to employ sophisticated technology such as Continuous Emissions Monitors (CEMs) in those cases where economic instruments are employed. Most EPBs still use relatively crude mass balance techniques, emissions factors, and rough estimates for compliance determinations. It is difficult to know how closely these match reality.
- *Availability of fee data.* Reliable information about the pollution levy system implementation and the technical basis for such collections has been very difficult to obtain in these UNDP/CICETE projects, so it is not really clear—at least to outsiders—how such a system actually works. There seems to be little

transparency, even for other interested governmental agencies.

- *Local capacity for economic instruments.* Local EPBs are very interested in such economic mechanisms as Pigouvian taxation and “emissions trading,” and many have attempted to include such mechanisms in their policy development tasks. Such thinking has been spurred by visits from multilateral lending agencies, foreign environmental regulatory personnel, and similar outside influences. The UNDP/CICETE projects similarly introduced these types of mechanisms in a linked training program on Cost/Benefit Analysis and Economic Regulatory Mechanisms. It is, of course, important that Chinese environmental personnel become familiar with such thinking, in order to understand fundamental economic/environmental relationships, the nature of international discussions about global warming, etc. But it is another matter altogether to proselytize about the wonders of emissions trading, and to recommend that such a system be superimposed on the environmental regulatory system described in this paper. Simply put, in its *pre-market-efficiency*, *pre-end-of-pipe* control situation, with fundamental rule of law compliance issues and uncertain property rights, China does not need to be considering sophisticated emissions-trading-type programs in Xi’an or Guiyang—or any other city in the country. The capacity of the local EPBs cannot currently support such approaches.

### End-of-Pipe vs. Pollution Prevention

Two types of technology are typically considered in any control strategy development: a) pollution control devices, such as scrubbers, baghouses, electrostatic precipitators, etc., which are often labeled “end-of-pipe” solutions; and b) pollution prevention approaches, which eliminate the pollution instead of controlling it. Two important forms of this are energy conservation and so-called “clean production” techniques.

In the western economies, urban pollution regulatory agencies traditionally focused on the first

type, end-of-pipe controls, since it was assumed that the market would address the latter. Even today, economists believe that if the damage caused by pollution is properly “internalized,” then the market will do a better job of pollution prevention than any government-organized pollution prevention scheme. But pollution prevention mechanisms in China are different from those in the West, for two fundamental reasons: a) China has not yet captured the resources efficiencies of production inherent in a market economy; and b) China’s environmental status is only now beginning to fully implement end-of-pipe controls.

When the Benxi project began to examine clean production techniques, a conscious decision was made to define “clean production” rather broadly, allowing it to capture management changes, energy conservation, and a host of other techniques that might reduce resource inputs, and thereby reduce pollution. This was an important consideration, since Benxi sought to implement both “no cost” and “low cost” options in order to reduce the dramatically high levels of pollution in the city. “Medium cost” and “high cost” clean production options were identified and evaluated, and it is hoped that these will eventually be implemented as well.

Not surprisingly, virtually all of the “no cost” and “low cost” options identified were management or operational changes that would be routinely employed if these SOE facilities operated under a market economy. These included, for example, meters to measure gas flow for incoming purchased gases, a change in the charging ratio of pig iron and scrap metal in a steel production furnace, etc. As China attempts to wrest efficiencies under production, such efforts are laudable, and will improve environmental conditions. It must be recognized, however, that implementing these measures will ultimately only lead to a situation where the market economies found themselves when they began to worry about pollution (i.e., having already wrung out the resource efficiencies of production).

The next steps will require considerable capital investment, and these are the types of measures that

Benxi has identified as “medium” or “high cost” options. Not surprisingly, these steps usually incorporate various end-of-pipe controls in the clean production approach. Benxi has already taken some steps in this direction in the past (to install pollution control on a number of especially egregious “dust dragons”), but ambient monitoring has indicated that this has only provided limited improvements in air quality, and the scale of such end-of-pipe controls has been limited.

While the transition to market approaches will decrease the economy’s pollution intensity<sup>27</sup>, and hopefully incorporate “technological leap-frogging,” eco-efficiency, industrial ecology and various other newly espoused industrial design features<sup>28</sup>, it is important to realize that Benxi will still need a lot of old-fashioned, hard-core, fundamental pollution control efforts—based on end-of-pipe controls.

Such an end-of-pipe planning approach is evident in Guiyang. But unfortunately for that city, it also makes clear the existing constraints of such thinking in China. Earlier in the decade, Guiyang had annual average concentrations of SO<sub>2</sub> as high as 468 µg/m<sup>3</sup> (compared with recommended WHO guidelines of 40-60 µg/m<sup>3</sup> and China’s own secondary standard of 60 µg/m<sup>3</sup>). Faced with such high concentrations, the city initially implemented area source controls in the urban core, requiring the increased use of town gas, LPG, coal briquettes, etc. This approach was successful, and these controls dramatically lowered ambient concentrations, to levels below 200 µg/m<sup>3</sup>. Such area sources constituted approximately 25% of the city’s SO<sub>2</sub> emissions, however. Further reductions in ambient levels—still needed because ambient concentrations remain three times the applicable standard—will therefore have to come from stationary sources, and the acid rain problem in the area will not be fully addressed until these point source emissions are addressed.

<sup>27</sup> This is already happening. See Ibid.

<sup>28</sup> See, for example, McDonough, W. and Braungart, M., “The NEXT Industrial Revolution,” *Atlantic Monthly*, October, 1998; and Kaiser, J., “Turning Engineers into Resource Accountants,” *Science*, 285, 30 July, 1999.

Here, there are promising initial efforts underway, based on end-of-pipe controls. Guiyang is one of three cities currently negotiating with the Japanese government to obtain technical assistance and loans for major pollution control projects under the 1997 Sino-Japanese Joint Communiqué on Environmental Cooperation. It is anticipated that this will result in at least seven major projects in the city, affecting an urban power plant, steel mill, cement plant, etc. While negotiations are not complete, Guiyang anticipates reducing SO<sub>2</sub> emissions by approximately 170,000 tonnes/year with these measures.

But even if the Japanese loan program is completely successful, and all of these emissions reduction are fully accomplished, this still addresses less than one-third of the point source problem. Significant additional reductions will therefore be required in the city. It is here where the problem lies. There are 1253 industrial boilers in the city, virtually all of them small and mid-sized units unaffected by either area source requirements or potential Japanese technology loans. In a plan adopted by the municipal government in March, 1999 and submitted to SEPA, Guiyang proposes to take steps at 51 additional point sources in the city, reducing SO<sub>2</sub> by an additional 91,000 tonnes/year.

There are several problems with the city's approach, however. It relies on a questionable technological application of alkaline injection into wet particulate scrubbers on these boilers, and optimistically estimates an average 20% SO<sub>2</sub> emissions reduction. This technology has been problematic in previous NEPA SO<sub>2</sub> control demonstration projects in the city. It creates additional operating and maintenance concerns that are likely to lead to abandonment if not strictly enforced (an unlikely institutional arrangement in Guiyang), and also turns an air pollution problem into a water pollution problem. Further, even with the optimistic reductions envisioned, this strategy would only achieve about 70% of SEPA's targeted reduction for Guiyang.

Peking University's Center of Environmental Sciences has estimated that by applying energy conservation measures to the city's small and mid-size industrial boilers, Guiyang might accomplish a

30% reduction of SO<sub>2</sub> emissions from these units. Energy efficiency measures are readily available, often by installing simple gas-analysis equipment.<sup>29</sup> Like most Chinese cities, Guiyang has estimated some limited savings from energy conservation and restructuring, but such measures have not played a major role in the control program design. Energy efficiency could play an important role in addressing the sulfur dioxide and acid rain impacts, and such an approach would also have the concomitant effect of significantly reducing greenhouse gas emissions in the city. It would not be designed to replace ongoing pollution control efforts, but rather to supplement them and begin to provide the significant reductions that this city will need to mitigate the effects of its energy-intensive, high-sulfur-coal dependent industries.

It is thus apparent that Benxi needs to supplement its pollution prevention strategy with end-of-pipe control mechanisms, and Guiyang needs to supplement its end-of-pipe approach with pollution prevention. Both approaches are needed in China. The exact path to support each approach obviously depends upon numerous technical, economic and political considerations, the pollutant under consideration, etc. But two specific examples of approaches worth considering for further support are also evident in these cities:

➤➤ *Pollution Prevention.* The World Bank and the GEF have supported the development of three Energy Management Companies (EMCs) in China, including one in Liaoning Province. EMCs are more commonly known as energy service companies (ESCO's) in the West. These organizations make a living by identifying and eliminating energy waste. If they see a company using energy poorly, they will offer to make all the investments necessary to make the operations efficient. The operating company continues to pay for energy as it always did, as if it were not changing its operations. After a short period of time, however, the EMC has recouped its investment, and then turns over an

<sup>29</sup> "Better Boilers Could Improve China's Air," *Chemical Engineering Progress*, August, 1999.

efficient operation to the company. Both sides thus gain. The operating company does not have to pay for any changes, makes no capital investment, yet after several years it receives an efficient energy system (and under most deals it has *some* savings in energy costs along the way). The EMC, on the other hand, recoups all of its capital investment, and also makes a profit on its operations and investment. EMCs have the advantage that they can specialize in energy efficiency, and indeed they usually specialize in energy applications in certain industries. The Liaoning Province EMC, for example, will specialize in some heavy industry applications, including electric furnace and boiler renovations. The EMCs in China are designed to be self-sustaining, and are introducing important market-oriented thinking to pollution prevention. Such approaches would be relevant in Guiyang as well.

➤➤ *End-of-Pipe Pollution Controls.* In the past, China was reluctant to require flue gas desulfurization (FGD) systems on power generating facilities and boilers, not only because the technology was expensive, but also because the country had no indigenous FGD industry. The systems all had to be imported, and thus required foreign exchange. Today, such technology is applied for large power generating units, but there are thousands of small and mid-sized boiler units in the cities that remain uncontrolled. Given the magnitude of the problem, China would benefit from the development of a pollution control industry which targeted these types of units. The application of control technology is certainly problematic, and not easily addressed. Much depends upon such factors as the availability of natural gas in individual cities, and the likelihood of obtaining better quality washed coal as an improved fuel for these sources (in addition to the energy efficiency measures discussed above). These are preferable approaches, but resource constraints on natural gas supplies and water available for coal washing may preclude their full-scale application in China. There have been some halting attempts to introduce small-scale

applications appropriate to the country's needs in Guiyang. In the early 1990s, NEPA supported a series of demonstration projects for FGD, furnace injection, fluidized bed combustion and briquette production in the area, and these early efforts led to the point source strategy described above. These early efforts were insufficiently funded, however, and did not fully address the environmental issues (e.g., the resulting water pollution, sludge disposal, etc.). But such efforts are clearly worthy of additional research and attention. If properly developed, they might also lead to regional economic development, since the pollution control industry in China is expected to expand considerably over the next decade.

## Conclusions

China currently has a command/control system which may not affect pollution control compliance decisions, and a rudimentary administrative-oriented (rather than behavior-modifying) economic pollution control system. These are, however, the two types of general policy approaches employed throughout the world, and efforts to address the fundamental problems identified (e.g., the "rule of law" issues, conflicts with production, operating systems, low levy fees, etc.) will be required to ultimately improve air quality in the country's cities. Clean production technological efforts are following a market-driven path, but further development of end-of-pipe controls are still very much needed. The potential for small-scale SO<sub>2</sub> controls appropriate to China—albeit a risky investment—should receive further attention, in addition to the energy efficiency measures that will provide considerable air quality improvements.

## **The Environmental Market in China: Investment Opportunities and Priorities**

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### **Current Situation and Priorities**

The Chinese government at the highest levels continues to stress the importance of environmental protection. The environmental consequences of rapid industrialization and a burgeoning population, are now unavoidable to citizens and government ministers alike. There are three major areas in which this has been manifested, namely, the government restructuring announced in March 1998; the discussion and rhetoric generated in the aftermath of the flood disasters of the summer of 1998; and the continued push for foreign investment in environmental protection projects.

Regarding investment, in July 1999 official media reported that the government plans to invest 18 billion RMB (US\$2.2 billion) by 2010 to build wastewater treatment systems capable of treating 50% of all wastewater in the country. Over the same period, 15 billion RMB (US\$1.8 billion) will be allocated to treat 80% of urban sewage. In August 1999, plans were announced to spend 120 billion RMB (US\$14.5 billion) to combat air pollution in 34 major cities. The State Economic and Trade Commission (SETC) has also announced that it will publish a new list of environmental protection technologies and equipment which it will promote for investment and development.

The need for more spending, greater cooperation between government agencies like SETC and the State Environmental Protection Administration (SEPA) on regulation and enforcement, and greater transparency in the system is clear. However, serious difficulties remain. The source for such massive domestic funding for environmental infrastructure and equipment is unclear. The development of a domestic bond market has yet to reach maturity. Bank credit remains difficult given

the weak structure and capitalization of the banking industry and ongoing state-owned enterprise reform. Many project proponents (enterprises, local and provincial governments and government agencies) are still seeking preferential loans and grants from international donors. And economically viable projects in the municipal and private sectors with reasonable rates of return remain elusive. Uneven enforcement, inadequate tariff and tax structures and a propensity for enterprises and government to review only short term (roughly 2 years) investment considerations make doing business challenging, to say the least.

### **Spending on the Environment**

Qu Geping, the Vice Chairman of the China Council for International Cooperation on Environment and Development, and Chairman of the Natural Resources and Environmental Protection Committee of the National People's Congress told the Press in November 1998 that China put 130 billion RMB (US\$16 billion) into environmental pollution control in 1998, an amount over 1% of GNP which means that the 1% target was achieved ahead of schedule. This figure is much higher than the 100 billion RMB investment which was forecasted as late as September 1998. SEPA has said that the investment was allocated to local regions, and that projects were determined by local governments according to various conditions. In general, the money has been invested in air, water and solid waste control and management, and the projects are related to municipal infrastructure development instead of specific industrial pollution control issues.

Previously in 1998, China announced plans to spend RMB 450 billion (US\$54 billion), slightly over 1% of its GNP, on pollution control as part of the country's Ninth Five-year Plan which runs from 1996 to 2000. The government hopes the outlay will bring the country's pollution control expenditures on par with those of developed countries. The expenditures are mainly in the form of bank loans and direct spending by China's central and local governments. The money will go to a wide range of projects, including 15 billion RMB (US\$1.8 billion) from 1998-2000 for the construction of 57 sewage treatment facilities along

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the Huai River, with the goal of cleaning up the river by the year 2000. Additional lake and river clean-up projects for the Tai and Chao Lakes, and

the Hai and Liao Rivers have also drawn significant attention.

### 1998 Funding Targets for Infrastructure (Environmental Projects)

(Unit: US\$ millions; Source: SEPA)

Type	# of Projects	Funding Source		
		Central	Local	Loan
Solid Waste	46	58.625	136.128	21.713
Air	85	41.858	423.040	147.949
Water				
Haihe River	18	80.579	178.770	44.632
Huaihe River	35	39.204	90.470	86.502
Liaohe River	4	14.717	13.872	21.713
Taihu Lake	18	49.337	276.357	16.285
Dianchi Lake	1	9.650	72.376	-
Chaohu Lake	3	8.082	22.919	10.856
Others	124	204.282	457.539	178.898
Total Water	203	405.850	1112.304	358.885
<b>Total</b>	<b>334</b>	<b>506.333</b>	<b>1671.472</b>	<b>528.548</b>

### Implementation of the Ninth Five Year Plan - Environmental Targets

Most Chinese environmental monitoring stations face a serious shortage of funds. China's government is trying to obtain foreign preferential loans for importing monitoring equipment, including from the U.S. In exchange, China often offers a special reduced tariff or duty-free policy on imports of equipment used for environmental monitoring, in addition to the sharp reduction of general customs tariff on October 1, 1997. Despite growing domestic competition, imports of environmental monitoring equipment are expected to grow in the future. Some industry observers see joint ventures with well-connected, price-competitive local firms as a promising strategy which few foreign companies have yet to adopt in this segment of the environmental market.

In 1993, China established the plan for a national environmental monitoring network, consisting of monitoring stations under SEPA, individual industrial ministries and large enterprises. The network is to monitor basic ambient environmental quality, pollution discharge levels, and pollution sources, and SEPA has authority to coordinate this

system. According to the latest five-year plan on environmental monitoring, China hopes to establish automated and continuous monitoring networks by 2000. The following items are to be set up by 2000: a) monitoring networks to support priority environmental protection plans in major water bodies; b) an air quality environmental monitoring

network in major cities, including coastal open cities, directly-administered municipalities, and other key cities; c) pollution monitoring networks in key polluting enterprises, polluted areas and treatment plants to determine progress towards fulfillment of the goals of the Ninth Five-year Plan; d) an ecological monitoring system; and, e) an air quality forecasting system in 47 major cities.

According to SEPA, the project will require importing \$30 million in monitoring equipment, with an average expenditure of \$600,000 per city. Local products can satisfy part of this market, but some equipment with higher quality and more advanced technology needs to be imported – approximately 20%. According to industry contacts, China imported over \$50 million in monitoring equipment and analytical instruments in 1996. Of this market, U.S. exports represented about 10% of

the total, while Japan and European countries each held about 45% of the total.

China will no doubt continue to develop policies and investment incentives to encourage enterprises to use environmentally-friendly technology. The Ministry of Science and Technology (MOST) has set up a foundation for technological innovation in small and medium-sized enterprises (SMEs), which account for over 98% of all industrial enterprises, to place a priority on developing eco-friendly technology for reducing pollution and increasing energy efficiency. MOST also wants to encourage international cooperation to help promote such technology among industrial enterprises through information exchanges, technological collaboration, technology transfers and exchanges of experts. The Asian Development Bank (ADB) is supporting these efforts and has encouraged participation by the UNDP, the World Bank and the UN Industrial Development Organization. In 1997 the ADB established the Center for Environmentally Sound Technology Transfer (CESTT) under China's Administrative Center for China's Agenda 21 to provide information, technology support and consulting services through the Internet, and it has established links with 50 related domestic institutions, and 30 agencies from 28 countries.

### **Growth vs. the Environment**

China is struggling to maintain economic growth in the face of the challenges posed by both East Asia's financial turmoil, which slowed China's export growth, and China's own industrial restructuring and government downsizing. Unemployment concerns and slackening domestic consumption are a major threat to maintaining economic growth (the target for 1999 is just under 8%, slightly shy of the 1998 target which was, according to state statistics, almost met. The government has continued to spend on infrastructure investment. In 1998, it stepped up investment in fixed capital by more than 17%, and it approved a special treasury bond issue of 100 billion (US\$12 billion) for infrastructure construction and rehabilitation of areas that suffered from the severe summer floods; in 1999 another special issue of 60 billion RMB (US\$7.2 billion) was authorized. Approximately 10% of the new infrastructure

spending will be directed to environmental infrastructure facilities according to the ADB. However, increased spending on environmental protection infrastructure could easily be offset by deteriorating economic conditions which inevitably precipitate greater emphasis by Chinese enterprises and local governments on short-term economic gains over environmental protection. In addition, increased restrictions on the control of foreign exchange, continued restrictions on foreign involvement in the service sector (terms for China's entry into the World Trade Organization (WTO) have yet to be finalized, and the impact of any final agreement is still being hotly debated), and increased pressure from the authorities for the collection of tax and fee income means that major concerns do exist for foreign investors as of July 1999.

### **Domestic Priorities**

SEPA has identified several key areas where China is facing severe environmental problems. These include:

- Water pollution
- Water shortages in urban and northern China
- Urban air pollution
- Industrial toxic and hazardous wastes
- Deforestation and soil erosion
- Habitat destruction and species loss

China's total spending on the environment in 1997 equaled 0.8% of GDP, but as noted above 1998 figures were already higher and targets have been set to encourage all levels of government to raise this figure to 1.5% by 2000. SEPA remains committed to the 3-3-2-1-1 campaign, "Three rivers (Huihe, Haihe and Liaohe), three lakes (Taihu, Dianchi and Chaohu), two acid rain control zones (one is a list of cities and the other is a list of non-contiguous areas of land), one municipality (Beijing) and one sea (Bohai)", however it has also admitted that it would like to channel international funds to other regions also in need. With the need for environmental protection so strong and so widespread, this grand plan, along with the list of Agenda 21 and the Trans-Century Green Projects, can only really be taken as a rough guideline for various types of projects, and they may best serve

not as a shopping list but rather as a list of classified ads which interested foreign parties must investigate with a skeptical and sharp yet hopeful eye.

The *State of the Environment 1998* report was released by SEPA on June 6, 1999. It outlines the major environmental issues in China, and usually reflects what the government perceives as the most urgent needs. The topics of particular focus this year were water-body pollution, water resource shortages and flood disasters; coal smoke pollution as the leading air pollution issue; urban environmental conditions such as solid waste, water pollution and noise pollution caused by swelling population densities and auto ownership; and, a decrease in arable land and the lowest per capita forest availability in the world.

### Sources of Spending

Approximately 50-60% of total financing for environmental projects is controlled by city or county governments and is dedicated to basic urban sanitation, recycling, potable water treatment and trash removal. These funds are denominated in local currency, which is still not easily convertible. Domestic firms are well-positioned and able to provide lower cost products and services which do not require sophisticated technologies. However, the more affluent cities along the coast are boosting their environmental spending and are increasingly able to afford some foreign equipment and services for priority projects.

Another 20-25% of total environmental investment is controlled by the central banks, industrial ministries or other central government agencies for factories and installations under their control and certain environmental projects deemed national priorities. All industrial ministries have environmental departments which oversee factories under the jurisdiction of the particular Ministry. Limited hard currency is available to each ministry for priority projects. About 15% of environmental funding in China is from multilateral and untied bilateral lending sources, such as the World Bank and the Asian Development Bank. These monies usually include a foreign currency portion, which is matched by a significant RMB contribution by the

local partner. These projects still offer the biggest source of opportunities for foreign firms to penetrate the Chinese environmental market.

The final 5-10% of environmental spending comes from the thousands of foreign investors already in China. There are over 300,000 joint ventures currently in China, which are usually held to higher environmental standards than their Chinese competition, often by their own internal standards in the case of major multinationals. Foreign environmental service and equipment companies may find that these enterprises offer one of the fastest-growing source of opportunities. Foreign investors in the manufacturing sector are an especially attractive market for environmental consulting firms.

A plan to shift from levying pollution fees to environmental taxation is under discussion between SEPA and the Ministry of Finance (MOF). As part of an overall State Council priority plan to shift from fees to taxation, regulations on shifting to environmental taxation are likely to be promulgated later in 1999 and to come into effect in 2000. SEPA had already started amending the existing *Management Regulations of Pollution Fees* in 1998, but these amendments have never been finalized and it is not clear how they would be affected by any new taxation policies. According to the Supervision and Management Department of SEPA, the key amendments thus far are: an expansion of the items on which fees should be collected; and an increase in the amount of each fee. Current pollution fees cover some air, water and noise pollution parameters, and the Amendment is expected to include solid waste and additional air and water parameters. Another key change apparently included in the Amendment regards collection of the pollution fees. In the past, the fees were collected by local Environmental Protection Bureaus (EPBs). Local EPBs were supposed to keep 20% of these fees for their own operation. Of the remainder, about 50% of the fees was to be used for capability building and the other 50% was to be put toward investment in treatment for various facilities through favorable loans and grants. The State Council is considering making all such control shift to the MOF, whereby local EPBs and industries would

have to apply to State and local MOF departments in order to obtain funds, in theory creating greater separation of enforcement and investment decision-making.

In the summer of 1999, several leading academics as well as the Chinese People's Political Consultative Conference (CPPCC) began suggesting that an environmental protection tax be levied on enterprises to sharpen their awareness of environmental protection and to increase their responsibility in this area. Such a "green tax" system would take into account the damage an enterprise has caused or will cause to the environment. Theoretically, heavier taxes would be levied on those using precious natural resources or causing excessive pollution, and lighter taxes would be levied on those using cleaner technologies. Other measures such as restricting the dumping of industrial pollutants and phasing out obsolete equipment have already been defined, however, local enforcement issues and increased costs for enterprises have prevented successful implementation of these measures.

### **Market Breakdown**

The environmental market is growing and changing rapidly, but only a portion of it is truly accessible to foreign firms due to hard currency constraints, low-cost local competition, and market barriers such as import tariffs. According to reports from the China Market Economic News in the spring of 1999, the market for environmental protection equipment and

technology will be concentrated in the following areas: 1) sewage and wastewater treatment (the greatest source of market demand), including treatment of high-density organic wastewater, heavy metals, recycling and resource retrieval; 2) dust removal equipment (a large industrial market); 3) desulfurization equipment (if 5% of coal-burning plants undertake desulfurization, market demand could be US\$725 million); 4) noise pollution control and vehicle emissions controls (both fast growing markets in growing urban areas with the increase in the number of cars and regulatory restrictions); 5) municipal solid waste incineration equipment and sanitary landfilling (once the economy develops further, municipal waste will no longer be able to simply be dumped); and 6) monitoring equipment for all types of pollution (increased regulation will bring increased monitoring).

However the central government, whose spending accounts for approximately only 6% of GDP, inevitably looks to local governments and foreign lenders to provide the lion's share of investment. Determining which projects will ultimately receive funding and necessary approvals is often a daunting task. Most large U.S. environmental firms have traditionally concentrated on World Bank and Asian Development Bank projects. The future may be brighter as affluent coastal cities begin to dramatically increase environmental spending, multinational investors uncork new sources of demand, and municipalities experiment with new project financing models.

**Market Segment Breakdown (1997) in US\$ million**

(Source: Environmental Business International 1997 estimates)

**Equipment**

Water Equipment & Chemicals	970
Air Pollution Control	390
Instruments & Monitoring Systems	140
Waste Mgmt Equipment	100

**Services**

Solid Waste Management	600
Hazardous Waste Management	120
Consulting & Engineering	150
Remediation	30
Analytical Services	40
Water Treatment Works (Municipal/Industrial)	540

**Resources**

Water Utilities	610
Resource Recovery	10
<b>Total</b>	<b>3,700</b>

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**The First NGO Forum on U.S.-China Environmental Cooperation**

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*Note: The following report summarizes the comments by NGO Forum participants that were of most interest to the author, and should not be considered a comprehensive summary of the NGO Forum. Sinosphere welcomes other participants to submit additional comments on the Forum for posting on the PACE website.*

The first NGO Forum on US-China Environmental Cooperation was successfully held on September 2-3 in Washington D.C. It provided US participants with the opportunity to learn about the achievements of environmental groups in China and the challenges they face. It also gave Chinese participants a chance to learn about the roles that environmental groups play in the United States, from advocate to educator. Perhaps most importantly, the NGO Forum provided

a venue for environmentalists from China and the United States to get to know one another and make contacts that many hope will form the basis of future cooperation.

The four keynote speakers were: Jonathan Lash, President of World Resources Institute; Dr. Changgen Feng, Vice-Chairman of the Chinese Association of Science and Technology; Kathryn Fuller, President of World Wildlife Fund-US; and Sheri Xiaoyi Liao, President of Global Village of Beijing.

Liao noted that Chinese environmental NGOs are developing along two pathways. One type of NGO is independent of the government. Groups in this category have limited funds and are struggling to survive. Examples include Friends of Nature and Global Village of Beijing. The second type of organization is the government-organized NGO (GONGO), which sounds to many like a contradiction in terms. However, many GONGOs are gradually becoming more independent.

Liao sees environmental NGOs in China serving as a link among scientists, the media, and the government. Their functions are to interpret scientific information from researchers, relay that information to the media, and provide proposals to the government. It is also essential for NGOs to educate the public to plant trees, recycle, choose environmentally-sound products, promote enforcement of environmental laws and regulations, and provide input to the government.

The international community can help Chinese NGOs, Liao noted, by demanding NGO participation in aid-funded development programs and establishing mechanisms for such participation. International organizations can also provide training to NGOs in capacity building, assist in the transformation of government-affiliated organizations, and enhance NGO networking and information exchange.

**Panel One: NGO Development—Perspectives from the US and China**

The first panel discussed how US environmental NGOs use legal and political strategies to influence the government and possible lessons for China. The panel also addressed what types of public participation in environmental protection are acceptable in China and how Chinese NGOs can help foster increased participation.

**Durwood Zaelke, President of the Center for International Environmental Law (CIEL)**, discussed his organization's work with NGO partners around the world. He also outlined several roles for environmental NGOs that focus on law, including the following:

- Helping defend the environmental activists themselves, who may be harassed by government, industry, or their neighbors;
- Expanding opportunities for public to participate in environmental law through citizen suits and other means;
- Working to improve environmental law, keeping it ahead of the evolving environmental problems;
- Using law to solve specific environmental problems, e.g., impacts of toxic waste on communities; and
- Expanding the training of lawyers in international and comparative environmental law.

Another role for NGOs is to monitor the environmental performance of the government and shine a spotlight on problems through the media. Zaelke noted that this approach is often safer than lawsuits.

Zaelke advised Chinese NGOs to develop partnerships and collaborative approaches. He noted that the potential strengths of NGOs staff and volunteers are their creativity, personal commitment, and public interest spirit. He encouraged Chinese NGOs to keep their courage and independence, especially intellectual independence, and to be zealous. Zaelke warned

Chinese NGOs to avoid arrogance, and avoid letting money rule them.

Shen Yimin, President of China Population and Environment Society, discussed his seven years of experience in developing an environmental NGO in China. Shen said that CPES was founded in 1992. It has 300 members throughout China, mostly senior experts and scientists in geography, education, and sociology. The group focuses on academic studies of population and environment. Its activities include organizing seminars, publishing a journal and video, compiling an atlas, compiling a series on environmental protection, and participating in international exchange activities. CPES receives support from the European Union, the United Nations Development Programme, the World Bank, and the Ford Foundation. The European Union funded a CPES environmental education project encouraging students to write essays on environmental protection. The 2500 students who responded pledged to become environmental guardians. If the group is able to raise additional funds, CPES will edit the essays, publish them in an attractive format with artwork, and distribute them to other students throughout the country.

**Deb Callahan, President of the League of Conservation Voters (LCV)**, described her organization's role as the political arm of US environmental movement. She said that the directors of several major national environmental organizations founded LCV in 1970. LCV's Board of Directors is composed of the leaders of environmental organizations, such as the Wilderness Society and the Sierra Club, that engage in scientific analysis, lobbying, litigation, and grassroots organizing.

LCV tracks the environmental performance of lawmakers, then works on political campaigns, supporting candidates with good environmental records. Callahan said her job is to make sure those lawmakers who refuse to support environmental goals are not re-elected. LCV's goal is to tell the public what their lawmakers are doing, and let the lawmakers know they are being watched. LCV has 30,000 members, and is funded by members and

foundations. The group does not take government or corporate money.

**Dan Viederman, Vice-President of the International Fund for China’s Environment and former Director of WWF’s China Programme** provided a perspective on public participation in China’s environmental protection. Given the tension surrounding the issue of separating “true NGOs” from “GONGOs,” Viederman chose to focus on discussing types of participation rather than types of organizations.

China needs broader participation in environmental protection because the problems are so large, Viederman said. Current NGO efforts to involve the public are primarily aimed at educated people in urban areas, with a focus on the issues of recycling, wildlife, and environmental awareness. Viederman noted that Chinese NGOs are growing faster in sectors other than environment, e.g., in the areas of social welfare, education, and poverty alleviation. Several conditions suggest the potential for NGOs in the environmental sector to grow, too.

- People are already concerned about environmental issues that affect their quality of life, such as pollution and erosion.
- The media are very receptive to environmental stories.
- The government supports some types of public participation in environmental protection, such as tree planting, recycling, and reporting polluters to the authorities.
- China’s openness is attracting overseas students back to China to work on environmental issues.

In order to realize their potential, Chinese environmental NGOs need more institutional development, to move beyond the stage of being a small group of volunteers. Given their minimal funding, Chinese NGOs need to be careful in accepting corporate money, ensuring that they adopt safeguards to prevent polluters from using “green” donations to improve their environmental image.

Viederman stressed the importance of partnership between US and Chinese NGOs. In order to build successful partnerships, US NGOs need to understand what is happening in China at local levels, not just the national level. Chinese organizations need to find ways to benefit from technical assistance, as well as funding, from US NGOs. Another challenge for Chinese NGOs will be to develop projects that combine environmental protection with economic, labor, and health issues. The challenge for US NGOs is to develop project-specific international partnerships on an equal basis, based on a mutual agenda.

The Question and Answer period raised an issue that came up repeatedly over the two days of the Forum: how applicable is the US experience to China, considering the major differences in the legal and political situations in China and the US?

Hu Tao, of the Policy Research Center for Environment and Economy at the State Environmental Protection Agency (SEPA), noted that NGO participation is weak in China because of China’s political structure. However, individual participation is significant. For example, local environmental protection bureaus receive many calls from citizens complaining about noise pollution. Individual participation can even influence policy. For example, the new Air Pollution Act includes dust control because of all the complaints from citizens.

Callahan noted that, in the US, organized groups are more effective than individual citizens at goading the government to do its job because they represent a large group of constituents.

Liu Chuang, Director of the Center for Environmental Science Information Network at the Chinese Academy of Sciences, said that US and Chinese NGOs have to communicate, but need to recognize their differences. She asked about the relationship between NGOs and the government in the US.

Viederman noted that there is great variety among US NGOs. Some are cooperative with government and/or corporations and some are critical. Callahan

added that NGOs like The Nature Conservancy can safely take money from corporations because the funds will be spent on land purchases, not political campaigns. A political NGO like LCV can't take money because there are potential conflicts of interest in their work.

### **Panel Two: Development of Community-based Environmental NGOs**

#### **Joel Levin of Counterpart International**

spoke of strengthening the NGO sector through strengthening the “enabling environment” for NGOs. Counterpart International has worked extensively in other societies in transition, particularly in Central Asia and elsewhere in the former Soviet Union. Levin emphasized that the enabling environment can change over time, becoming more amenable to the growth and development of an independent NGO sector. Key questions in assessing the enabling environment for NGOs include ease of registration; clarity and overall burden of taxation; willingness of the government to cooperate with NGOs; access of NGOs to the media.

Of fundamental importance to the enabling environment is the attitude of government officials towards NGOs, according to Levin. Often governmental opposition is caused by lack of familiarity with or understanding of NGOs roles. This can be addressed with workshops and, most importantly, when NGOs demonstrate programmatic success. Regulation and taxation of NGOs is another vital aspect of the enabling environment, and also amenable to improvement through long-term, patient efforts by the NGO community. The support of the public and the media is a third key aspect of the enabling environment. A fourth is the degree to which NGOs are organized among themselves. These latter two issues are related: public and media support is greatly facilitated by unity among the NGO community, just as it is harmed by public disagreements. Levin also suggested that NGOs identify ways in which they can recruit government-organized NGOs (GONGOs) to their cause. GONGOs often have the benefit of strong infrastructure already in place.

Levin also introduced several types of organizations which provide services to NGOs, like the locally-focused Support Center of Washington, and the International Center for Not-for-Profit Law which has worked on NGO sector law around the world.

**Steve Viederman, President of the Jessie Smith Noyes Foundation**, discussed different types of environmental organizations in the US. Land conservation organizations, like The Nature Conservancy, are apolitical, he said. They take money from corporations, in some way legitimizing corporations that may be polluting. National environmental organizations, such as the Natural Resources Defense Council and the Environmental Defense Fund, operate in an atmosphere of political compromise, and focus on getting the best deal for the environment. They are composed of experts. Grassroots, community-based, environmental justice organizations are often composed of people of color who are being affected by environmental pollution in their jobs and communities. They are not always highly educated, but have their own areas of expertise. Viederman noted that an anti-environmental movement has also developed in the US. It is often driven by corporations, and results from the failure of national environmental organizations to pay attention to needs of working people, especially in communities that rely on logging and ranching.

Viederman encouraged Chinese NGOs to consider equity as well as efficiency. We need to think about how change occurs, he said, and how we can be most effective. Viederman said he believes community work is essential, and that an critical environmental NGO community is needed even when government is supposedly pro-environment (e.g., the Clinton administration).

**Alex Watson, Vice President for International Conservation at The Nature Conservancy** provided a perspective on what works in NGO partnerships, based on TNC's experience working with local partners in Latin America.

Watson outlined the strengths and weaknesses of NGOs. He noted that NGOs are good at generating and disseminating new knowledge about

relationships between people and nature. They can be independent and innovative, and are increasingly sophisticated in their technical and managerial skills. They can deliver services to the grassroots better, and are sometimes more flexible, efficient, better managers, and have more credibility than government. They effectively draw the public into project implementation, and are better at project evaluation and assessment. They can hold non-partisan forums. A weakness of NGOs is that they can marginalize themselves, failing to address complex issues, or failing to engage government effectively. NGOs are sometimes uncritical of themselves, and can sometimes exaggerate claims of accomplishments.

Watson advised US NGOs to seek partnerships with Chinese counterparts because local NGOs have a better understanding of local problems and the local government, a better capacity to engage the public, and they legitimize the US NGO's work.

Watson recommended working with NGOs that have charismatic leadership and innovative approaches, but that also have a sustainable structure, including plan for succession. US NGOs should seek partners with the capacity to achieve the project's objectives, or help build that capacity through training. The partners need to jointly establish goal and objectives, and do joint fundraising. US NGOs can help their partners develop a board of directors that allows them to reach different segments of society and fundraise. For example, TNC produced publications in Spanish on NGO fundraising and setting up board of directors.

The Q&A period focused on the practical aspects of NGO survival, both political and financial. Jian Xie of the World Bank and the former president of the Professional Association for China's Environment asked if some local NGOs doing well without foreign support. Levin replied that, in countries where the economy is doing well, NGOs can support themselves with fees for services and other means.

Xie asked if TNC has a political agenda. Watson responded that TNC would like to see a political environment that enables conservation, such as that

in Costa Rica. Changes in legal and tax structure can enable conservation easements. However, TNC's political efforts are very focused, and are not partisan. Chinese NGOs can avoid the appearance of being politically manipulated by outsiders if they broaden the number and type of groups with whom they collaborate.

Hu noted that because GONGOs are a financial burden on the government, they are getting their funding cut and are becoming more like real NGOs.

Su Liying, a Research Associate at the International Crane Foundation, said that the survival of Chinese NGOs depends on changing Chinese people's values, i.e., increasing public support for saving nature and cleaning up the environment. This can be accomplished by cooperation among scientists, NGOs and the media to get the message out to television audiences. Su noted that people spend lots of money on nutritional supplements to improve their health, but don't spend any money on supporting efforts of environmental NGOs to clean up the air in order to reduce their respiratory problems.

Judith Shapiro, Associate Professor at American University, raised the issue of NGO cooperation in the context of globalization. Steve Viederman warned that international cooperation threatens to homogenize NGO community. Joel Levin countered that local NGOs can fight globalization by forming links with international partners while still retaining their national identities.

### **Panel Three: Funding Sources, Fundraising, and Legal Issues**

**Richard Ferris, an attorney at Beveridge & Diamond**, discussed laws governing NGOs and environmental protection in China. Ferris noted that registration requirements for "social organizations" came out in October, 1998. They specified the required number of members, amount of money, and oversight for such organizations.

China has a large body of environmental, safety and health laws, Ferris said, but there are problems with access to information about the law, understanding

the law, and implementing the law. NGOs face the challenge of researching the law, and keeping up to date. The Chinese Academy of Sciences is putting environmental laws and regulations on the Internet.<sup>30</sup> They are also available on CD. Some laws have been published in the *People's Daily* for public comment. More work is needed on how to incorporate those comments.

Zhang Jiqiang, Program Officer at the W. Alton Jones Foundation, discussed what he and his colleagues look for in a funding proposal. Foundations are looking for the best ideas and smartest people, Zhang said. They need a matchmaker to help funders find good candidates, and sometimes the internet can help.

Zhang noted that US foundations have become more specialized in their donation strategies. In fact, NGOs often complain about the difficulty of obtaining grants because foundations are too focused, and their focus is always shifting. NGOs need to understand that foundations are driven by white papers defining their view of a problem. The website only gives very generally indication of the foundation's focus; NGO staff members need to talk to program officers to get more details. Grantees must also become specialized, Zhang said, because people who work on one issue for a long time are more attractive to funders.

Foundations recognize that their funds are small compared to government funds, Zhang said. Rather than try to usurp the government's role, foundations try to leverage larger sums of money from government and multilateral sources. Foundations like to fund projects that will be self-sustaining and multiply after foundation funding is used up.

Zhang noted that lack of good accounting is a barrier to giving to some grantees in China. Chinese NGOs need to increase their transparency and accountability, and work on building the donor-grantee relationship. He also noted that foundations look for a diversified funding base for a grantee and

even within a project, to reduce foundation's risk and responsibility.

**Marc Brody, President of the US-China Environment Fund (USCEF)**, discussed ways to generate more funding for environmental projects in China. Brody said that USCEF, which set up its Beijing office in 1995, was established to integrate environmental protection and sustainable economic development. USCEF would like to provide funding for environmental protection in China, but has had trouble raising money. China is becoming a very prosperous country, Brody said, and needs to fund its own environmental protection. In order to motivate donations and grants, Chinese NGOs need to define what services they provide and what role they play in decision making processes.

Brody noted several barriers to NGO development in China.

- NGOs represent the grassroots, or the bottom up approach. Since China has traditionally been a hierarchical society, it will take time for people to accept this approach.
- NGOs try to form partnerships and leverage resources, but China has most recently been organized around the danwei, isolated units that often fail to cooperate.
- NGOs tend to rely on philanthropy, but China doesn't have a tradition of giving to abstract public interest causes.

Brody also pointed out several hopeful signs for NGO development. The Chinese government's decision to cede control of businesses, institutes, and a range of social services has created opportunities for NGOs to deliver new services. This may increase the value of NGOs in the eyes of the Chinese public. Environmental NGOs can also benefit from focusing on issues that affect people in their daily lives, such as agriculture, and air and water quality.

The Q&A period covered a range of topics related to funding and environmental law.

<sup>30</sup> Contact Liu Chuang <lchuang@cisnar.ac.cn> or check the Center for Earth Science Data and Information Network (<http://cesdin.ac.cn>) for more information.

In response to a question from Liao about Chinese NGO accountability, Zhang described an NGO survey on which he recently worked. Many NGOs surveyed were unable to provide their financial statement, and most lacked independent auditing systems. Some had management problems beyond financial management. For example, few had hands-on boards of directors. In other cases, Chinese government agencies set up GONGOs simply to channel funds, including state funds.

**James Rocco of the Alliance to End Childhood Lead Poisoning** asked about the feasibility of suing the Chinese government to enforce environmental laws. Ferris noted the first step is to exhaust one's administrative remedies after petitioning SEPA for enforcement of environmental laws. Then one can bring a case to the courts. Recipients of environmental damage have sued for redress under civil law, not criminal law, Ferris said. The Ford Foundation has established a fund to help pay for these cases.

**Jeanny Wang, Program Director of the China Biodiversity Network at Earth Island Institute**, noted that some international NGOs are doing "sub-granting" to Chinese colleagues. For example, the foundation Global Green Grants has provided funds to Chinese environmental groups and individual activists through the Pacific Environment and Resources Center and Earth Island Institute. ECOLOGIA has also facilitated small grants to Chinese environmental volunteer groups. Zhang said that the W. Alton Jones Foundation has not used this approach yet. However, W. Alton Jones is starting to give small grants for information technology support in the US, and is now expanding that program to South America.

**Daniel Miller, an independent consultant**, gave a slide presentation on conservation and development in the Upper Reaches of the Yellow, Yangtze, and Salween, and Brahmaputra Rivers in Western China. Miller formed an organization in collaboration with nomads in Tibet. He and his colleagues were told not to call their group a "pastoral association" because it sounded too political. Instead, they called it a "poverty alleviation working group." The Tibet Poverty Alleviation Project involved improving

livestock operations. Miller noted that one has to be careful in China about criticizing official programs. He advised US NGOs to be diplomatic in order to be effective, and to make sure local leaders do not lose face.

#### **Panel Four: Public Education and Outreach**

Sherri Liao discussed raising public awareness through the media in China. She described the environmental television programs produced by her group, Global Village of Beijing. She also noted that GVB works with a network of 500 journalists that report on environmental issues. In response to the earlier discussion of environmental litigation, Liao commented that environmental groups have to help SEPA, not sue them.

**Joan Haley, Acting Executive Director of the North America Association for Environmental Education**, discussed moving constituents from environmental awareness to action. She noted that environmental education is about giving people tools to think about environmental problems, not telling them what to think and what to do. She advised Chinese NGOs to check out the environmental education website <http://eelink.net>.

**Jim Harris, Deputy Director of the International Crane Foundation (ICF)**, discussed outreach efforts to promote crane conservation. Harris said that ICF tries to involve people from Wisconsin in their programs overseas. He noted one has to develop different messages for different audiences in the US and China. For example, if you want to work with poor farmers in Guizhou on preserving wetlands, you have to listen to what their wants and needs are. You have to sell them on protecting their resource base, not on saving cranes, Harris said. It is also important to link people in the US and China who care about the environment through personal and participatory activities. Exchanging artwork can bridge the language barrier, and the internet is another important tool.

Harris said that involving farmers in designing and implementing projects is the most rewarding part of the job. ICF brings journalists out to talk to the

farmers and see the project. Their message is about farmers and conservationists working together to solve environmental problems. Unfortunately, journalists tend to want to focus on conflict and even try to generate conflict.

During the Q&A period, Liu noted that all Global Village of Beijing's money comes from foreign sources, but it is not practical to an NGO movement in China using foreign funds.

Hao Bing of Friends of Nature (FON) said that her group is working closely with local people on preserving the Tibetan antelope and can introduce journalists to these people. FON can also provide journalists with the scientific information about the antelope. Hao said that FON will send a group of journalists to Hamburg, Germany to learn from journalists there.

*Jessica Hamburger is a Project Coordinator at the Pesticide Action Network, North America Regional Center (PANNA). She is investigating opportunities for PANNA to collaborate with a Chinese partner organization to promote ecological pest management and local participation World Bank agricultural projects China.*

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## Development and Role of Chinese Environmental NGOs

*Sheri Liao*

President and Founder, Global Village of Beijing

Non-governmental organizations, otherwise known as “NGOs,” are familiar institutions in the United States. In China, however, they are a new phenomenon, particularly environmental NGOs. This recent emergence of NGOs in China is the result of the last two decades of economic reform and is absolutely necessary if China seeks to address its enormous environmental problems and develop into a modern legal society.

### I. NGO Development

Chinese NGOs are being developed through two pathways: 1) government affiliation and 2) independent establishment.

The first form of NGO development is through government affiliation in which an organization is established by having a government agency supervise and fund them. Chinese law requires that a non-governmental organization must register with the Ministry of Civil Affairs and have a supervising agency. The supervising government agency is known as the “mother in law” to the organization, thus hindering the organization’s non-governmental status. Non-governmental organizations, which have “mother in law” agencies, are known as “GONGOS” or governmental non-governmental organizations. In recent times, the GONGOS have become increasingly independent from the government as a result of social-economic reforms. As the Chinese government seeks to reform its organizational structure and relieve its debt burden, GONGOS are becoming less government controlled and more like true NGOs. This is similar to the privatization of state-owned enterprises over the last 20 years.

The second form of NGO development is the establishment of the NGO without any direct government relationship and is independent in form and function from the government. Very few of these exists in China with the two most recognized being “Friends of Nature,” which was founded in 1994, and “Global Village of Beijing,” which was founded in 1996. The organizations are independent from the government because they do not receive any financial support from the government. Also, the Ministry of Civil Affairs does not regulate some of them because they are registered as private businesses. This is what was done by Global Village of Beijing, World Wide Fund for Nature China and Wetland International. However, because of their independence, these NGOs are struggling for survival.

### II. Function of Chinese NGOs

NGO development is crucial for China’s environmental protection because they: 1) foster public awareness, 2) influence government policy, and 3) establish public participation mechanisms.

NGOs foster public awareness by encouraging the public in an organized structure to: 1) monitor enforcement of environmental laws, 2) participate in environmental policy-making, 3) choose an environmentally friendly lifestyle, and 4) teach others to be environmentally active. Since they are independent of government, NGOs are innovative and creative in public outreach approach and scope.

NGOs influence government policy by organizing news media campaigns, creating public demand, and establishing an NGO dialogue with the government. In China, government officials are more attuned to the media and public opinion than laws and regulations. NGOs help the media and public focus on a specific issue, which will in turn encourage the government to take action on it.

NGOs establish public participation mechanisms at the local, national and international levels. Since the Chinese social structure is based on a hierarchical work unit system at every level, NGOs are able to encourage and organize public participation in environmental protection at all levels of Chinese society.

### **III. Elements of Chinese NGO Success**

Chinese NGOs can succeed only if they operate under basic NGO principles. They must be non-profit, non-governmental, highly efficient, and financially transparent. For successful program implementation, the projects must: seek partnerships with the government, attract media support, apply cultural heritage, and develop international cooperation.

### **IV. How to Improve NGO Functioning in China**

The current legal and financial system does not encourage the development and function of NGOs. Legal and tax reform can allow for NGO development and success. The most important areas of reform include the legal institutionalization of NGOs in which NGOs are governed by laws and not by agencies. Also of critical importance is tax system reform such as the creation of tax exemptions and deductions for donors who support

NGOs. With these two reforms, the NGOs in China can be legally protected and financially independent.

### **V. How can the International Community Help Chinese NGOs?**

The international community has a vital role in NGO development in China because the Chinese government needs international support for its reforms. They can convince the Chinese government why NGO development is a necessary component of its reforms. The international community can demand NGO participation at all levels of program exchanges, which would establish mechanisms for NGO participation. The international community should provide sustainable training for the NGOs, particularly in organizational development and information exchange. This would not only support the current NGOs but assist in the transformation of GONGOs into NGOs.

### **Conclusion**

The future holds much promise for NGO development in China. However, there is still much lacking in linkages between the US NGOs and Chinese NGOs. Since China's Open Door Policy, the United States and China have established many avenues of cooperation, particularly in the environmental sector. Most of the current cooperation is implemented through either the government and/or between businesses. China needs a third channel that is between NGOs and people. China is in an era of social-economic reform. If the development of NGOs is a major component of the reforms, it will not only lead China to achieve environmental sustainability but also to become a modern legal society.

**Field Notes****25 Factories and the Fortune 500:  
Environmental Protection Issues as  
China Enters the New Millennium***Jim Stover*ERM and China Correspondent,  
jstover@ermchina.com

China recently celebrated the 50<sup>th</sup> anniversary of the People's Republic with a grand parade lauding the country's achievements and projecting its arrival on the world stage. Beijing authorities shut down 25 major polluters for two weeks, including Shou Gang Steel (Capital Iron and Steel), to remove the smog from the air over Tiananmen Square.

A week before the anniversary celebration, leaders from many of the world's largest corporations convened in Shanghai for the Fortune Global Forum to hear China's most powerful leaders speak about future economic growth and policies. Qu Geping, the Chairman of the Environmental and Resources Protection Committee of the National People's Congress, delivered a speech at the conference on the status of China's environment and international cooperation. He mentioned that although the Chinese economy has expanded six-fold over the past 20 years, environmental quality remains at the same levels of the early 1980's largely as a result of increased energy consumption. Overall, he noted, environmental investment increased dramatically to 0.93% of GNP in 1998 from only 0.3% of GNP in the early 1990's.

Qu reviewed progress achieved in the past 20 years regarding legislation, management systems, agriculture, clean energy research, and environmental quality maintenance in the special economic zones. He also noted that the international community could play a larger role in response to China's desire for advanced environmental technologies and research.

As China enters the new millennium and a period of continued modernization, many of the Fortune 500 companies in China ask just how serious the

Chinese leadership is regarding environmental protection. Most indications are that the government is serious about it at the highest levels. Laws and regulations continue to be passed or upgraded, new tax and tariff structures will be developed, and the domestic environmental protection industry will likely be consolidated and directly supported by central efforts to establish domestic capacity for all types of pollution control and waste treatment. However, enforcement at local levels will remain a serious problem as the balance of power--vertically between local and national officials and horizontally in different regions and among different ministries--often creates conflicts of interest among enforcers and checks the smooth implementation of comprehensive policy initiatives.

Currently, the Air Pollution, Water Pollution, and Marine Pollution Laws as well as the Implementation Guidelines to the Solid Waste Law, which should also include key provisions on hazardous waste, and a new Chemical Management Law are all under review by the State Council or the National People's Congress and will be promulgated this year or next. The first soil standards for determining site contamination have just come into effect as of August 1, and represent a big step towards regulated industrial site clean-up. Vehicle emissions and fuel standards will be raised to meet Western levels from the early 1990s by January 1, 2000 and July 1, 2000 respectively, and Beijing Municipality is planning to reach Euro II standards by 2004. An Environmental Impact Assessment Law and a Cleaner Production Law are both waiting in the wings. Although only in the discussion stages, both Laws would hopefully bring forward environmental considerations on industrial facility and infrastructure project development timelines.

Much of the problem regarding investment in environmental protection lies in the fact that tariff structures remain prohibitively low, denying national and municipal authorities the revenue they would need to take on new infrastructure projects, either independently or with foreign participation. If rates of return can not comprehensively be created through changes to the regulatory and policy framework, long-term strategic investments will remain elusive.

However, this is beginning to change. Following the leads of Zhuhai, Nanjing, Chengdu and Shenyang, Beijing will be the fifth city to establish a sanitary waste disposal fee collection system for residents as of October 1999. Local families will be required to pay three RMB (US\$0.361) per month and those without permanent Beijing residential registration will be required to pay two RMB (US\$0.24) per month. This policy is similar to the effort behind the *Management Regulation for Urban Supplied Water Price*, passed in 1998 by the Ministry of Construction (MOC) and State Development Planning Commission (SDPC) with the assistance of the Asian Development Bank, which detailed a more comprehensive pricing scheme to be implemented by municipalities. According to the MOC, they are still struggling to implement the policy and are in the process of promoting trial cities. The success of both programs will be important indicators for long-term investment and development.

The Chinese economy will continue to grow and, according to some estimates, become both the world's largest economy and biggest polluter within the next 20 years. The legislative efforts mentioned above will go a long way if proper mechanisms for enforcement are developed. Aggressive targets for spending have recently been set (during discussion of the Air Pollution Law in August, the NPC discussed plans to spend 120-150 billion RMB for air pollution in 34 major cities, 30 billion RMB for Shanghai air pollution, and 180 billion for areas suffering from acid rain), and industry will no doubt modernize. Shou Gang Steel has actually limited production to lower its air emissions, but limiting production or temporarily shutting some factories down is different from converting them to new sustainable practices.



## Pace Distinguished Speakers' Program

*Lanqing Jia*

*August and September*

During August and September, 1999, four seminars were coordinated through PACE Distinguished Speaker's Forum, which is becoming more regular in a manageable manner. The working procedure of the Forum is under drafting so that whoever the coordinator will be in the future, the Forum still fits its original objectives: practical, participatory and sustainable. The brief hereby is to keep those PACE members who could not physically participate the Forum.

### Green Education in China

On August 3, 1999 at the World Bank, Mr. Jia Feng, Deputy director of Environmental Education and Communications Center (CEEC) under the State Environmental Protection Administration of China (SEPA), gave a presentation on Green Education in China. The contents in details include, a) The Power of Green Media; b) Children, the Future of Our World; c) Environmental Education in China; d) Capacity building of Green Education in China

About thirty people attended the seminar from the World Bank, the Chinese Embassy, World Resources Institute, China Central Television (CCTV), the US EPA, the International Monetary Fund, Environmental Media Services, and Resources for the Future. A CCTV video program entitled China Green Business Review was shown during the seminar. Q&A sessions focused on lessons learned from past experiences, indicators for green education program, NGO's role in green education, the environmental courses in universities and colleges and so on. A five page handout is available electronically upon request.

Several meetings with staff from the World Bank Institute followed the seminar for further discussion and exploration of cooperation for China's green education. Mr. Jia Feng can be contacted directly, at: Tel/Fax: 86-10-64966351

Email: fengjia@midwest.com.cn

### **SEPA Restructuring**

On August 25, 1999 at the World Bank, Dr Qingfeng Zhang, former deputy director of SEPA's Foreign Economic Cooperation Office and currently working through a staff exchange program at the Bank, provided an informative talk on the recent restructuring of SEPA and its consequences. The talk focused on: a) main principles and outcomes of SEPA's 1998 restructuring; b) the changes in SEPA's responsibility; c) SEPA's cooperation with other government agencies; d) SEPA's institutional weakness and strengths; and e) partnership with international organizations.

The seminar attracted around thirty participants from the multilateral agencies, non-governmental organizations, universities and several private sector manufacturing and consulting companies. Q&A sessions covered the impact on provincial and local EPBs, the new process of decision making on environment protection, technical and financial capacity for challenges ahead and so on. A 14-page handout is available electronically upon request. With further questions, please contact Dr. Zhang at: Tel: (202)473-0097; Fax: (202) 522-1666; Email: qzhang1@worldbank.org.

### **SEPA Tenth Five Year Plan on China's Environment**

On September 17, 1999 at the World Bank, Mr. Shoumin Zou, Chief of the Planning and Statistical Division of SEPA, presented SEPA's Tenth Five Year Plan for China's Environment. Mr. Zou provided intensive information on the Plan's preparing process, major content, and principles by which challenging issues have been prioritized.

Follow-up discussions focused on the timetable of the plan's preparation, the role of NGOs in the Plan, cooperation with the World Bank, economic

implications and the coordination with other central government agencies. A 9-page handout is available electronically upon request. With further questions please contact Mr. Zou at: 86-10-6615-5647 (phone) or 86-10-66159813 (fax).

### **China's New Policy on Sulfur Control**

China has recently passed legislation for the nationwide control of sulfur emissions in an attempt to minimize acid rain and other impacts associated with increasing sulfur dioxide emissions from energy use. On September 30, 1999 at the World Bank, Dr. Yifen Pu, air pollution specialist of China Academy of Sciences, presented an overview of China's sulfur control policy and the results of her research conducted while with the East Asia Environment and Social Development Unit over the past two months.

The presentation attracted the energy, environment, urban, and legal groups of the World Bank, as well as others from research and government agencies. An in-depth discussion followed the twenty minute presentation. Several questions were raised by the audience about the application of RAINS-ASIA Model, economic implications of adopting the two-control-zone policies, cost-effectiveness of technical options, and so on. A 20-page handout is available electronically upon request. Dr. Pu can be reached at 86-10-6262-6057 (phone); 86-10-6256-8628 (fax); or puyf@hotmail.com (email).

With any further questions about the Forum please contact:

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### **PACE Internet Strategy Task Force**

PACE is increasingly becoming a web-based community. To capture the rapid Internet revolution, PACE has established a task force to study its short-term and long-term Internet strategies. In the short term, the goal is to improve PACE Website, especially its presentation and functionality. In the long term, we need to focus on how to expand our service, outreach, membership base and financial self-sufficiency. The Task Force will be led by Dr. Nianjun Zhou (Joe) of IBM and Dr. Feng An of Argonne National Laboratory. The following PACE members have volunteered to serve the Task Force:

Joe Zhou (IBM)  
Feng An (ANL)  
Bin Wang (NIH)  
CHRISTIANA LAWSON (EPA)  
Changhua Wu (WRI)  
Hua Wang (World Bank)  
Jian Xie (World Bank)  
David Wang  
Jie Zhang (Commonwealth of Virginia)

At this stage, we are still looking for more volunteers to participate this important task. If you have any suggestions regarding PACE future Internet development, please let us know. You can contact either Nianjun Zhou (Joe) [jzhou@us.ibm.com](mailto:jzhou@us.ibm.com) or Feng An [fan@anl.gov](mailto:fan@anl.gov)

### **Next issue: A Call for Submissions**

Sinosphere has enjoyed great support from our readers. The journal has covered topics including transportation, energy conservation, US-China relations, and water resources.

Sinosphere welcomes contributions that provide new information or unique perspectives. Sectoral focus is not as important as the provision of practical, policy-oriented analysis and interpretation; and the description of unique outputs from international cooperation and cooperative products.

The Editorial Board is especially interested in contributions that offer constructive ideas, analysis,

and experience from hands-on projects and research. Sinosphere welcomes articles that discuss these issues in new and imaginative ways, and in particular those that identify reform and policy recommendations for China.

The next issue of Sinosphere will be in Winter 1999. If you are interested in contributing, or have an idea you would like to explore, please send your article to the Sinosphere Editorial Board no later than 15 December 1999. Feel free to contact the Editorial Board prior to submission with any questions or need for clarification.

In addition, and equally as important, please let us hear your comments on and reactions to the five issues of Sinosphere we already have under our belt. The continued success of this journal depends on your continued interest and support.