The Newsletter of the China-Canada Cooperation Project in
CLEANER PRODUCTION

Taiyuan Chemical Plant— a case study in Cleaner Production

Taiyuan Chemical was selected as a case study for the Policies and Regulations component of the China-Canada Cooperation Project in Cleaner Production. It was selected primarily because it had already completed a cleaner production audit for two of its processes and because the plant is one of the major pollution sources in the city of Taiyuan. Moreover, Taiyuan City has been designated to become one of China's 10 Clean Cities.

The plant has been using processes and technologies dating from the 1950s and 1960s and thus is very inefficient in terms of raw material use and energy consumption. It produces chlor-alkali, phenol, chlorobenzene, polyvinyl chloride, cyclohexane, and hexane di-acid. The Environmental Protection Division of the plant had participated in a Cleaner Production (CP) training course at the National Cleaner Production Center, and conducted an in-house CP audit of the hexane di-acid and chlorobenzene processes in 1994.

In September 1999 a six member China-Canada project study team reviewed the progress by plant personnel in implementing the CP measures identified in the two 1994 audits. The team found significant improvements that are attributable to the audits and their implementation, in the following areas.

Capacity building, training of staff, strengthening the mandate for environmental protection, and improving the management system

Operating procedures, and housekeeping and maintenance procedures have been put under closer supervision. As well, wages and rewards for workers have been tied to performance and the benefits of cleaner production. The Environmental Protection Division has been reorganized into an Environmental and Production Division. It retains the original mandate for pollutant discharges and has added responsibility for providing input to production management.

Helen Wei, Press Gallery, Parliament of Canada

Environment Day activities in Beijing, June 2000.

The plant has also established a 'special task force' system for environmental and production supervision. This structure includes two inspectors and one monitoring personnel for each of the eight hour shifts. Inspectors assume responsibility for overseeing production controls, environmental control facilities, and discharges; while monitoring personnel bear responsibility for issuing orders to correct deficiencies. They have the additional mandate to issue fines and penalties if out-of-order situations are not corrected within a specified time.

Implementation of the audits

Implementation has been based on the no-cost, low-cost and medium cost recommendations, in that order. Investments have been modest and benefits have been substantial, with short term returns on investments. For example, in the hexane di-acid plant an investment of 784,400 RMB for process improvements had a return on investment of 1.37 years. In another example, 877,000 RMB was invested in water recycling in the chlorobenzene plant. In one year, more than one million tons of water was saved, at a net savings of more than 1,300,000 RMB.

While this initial CP effort at Taiyuan Chemical has been successful, staff fully recognize that it is an ongoing effort. They have also identified that resources from outside the plant will be required to implement CP throughout the plant.

Art Fitzgerald

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Summer 2000

Gender Effects in a Changing Economy

China's workplaces are under enormous pressure to increase their efficiency and productivity, in these times of rapid change, decreased state funding, and increasingly intensive competition for markets. This often means layoffs.

This is of particular concern to women, since they generally suffer more from layoffs and cutbacks than men. They are usually "the last hired and the first fired". Women are also particularly vulnerable to cost-cutting measures in areas such as daycare facilities, maternity leave, medical care and improved sanitary facilities.

The Project promotes gender equity among project partners through increased awareness of the benefits of Gender Equity and improving working conditions for women. Gender Equity Working Groups are active at both demonstration plants, helping women address challenges of the workplace.

At Fuyang, improvements have been made in the bagmaking workshop where most of the workers are women. The daycare centre has been expanded to take children from one to three years old. Top managers are very aware of the need to motivate the workforce to improve each person's performance. They see women as an important human resource, but find them reluctant to take on greater responsibilities. They welcome the Project's gender equity support, because they see it as helping female workers improve themselves and their work.

The situation is much more difficult at the Huainan Paper Mill, where production has been cut because of decreasing demand for its products. Only 27% of its total workforce is currently at work on the remaining production lines. Of these, 47% are women, compared with 42% of the total workforce. While solutions are being explored for the factory's future, laid-off workers are being encouraged to find other work. The Gender Equity Working Group is mainly concerned with helping women find new jobs or set up small businesses.

There is a new recognition at both factories that one's job and one's future depend on one's skills and performance – even more so for women. Many women workers are now involved in training programs to be able to compete more equitably with men. They say that if they don't improve their skills, they could be dismissed, which would be very damaging for their own lives, and their families.

There has been significant progress over the last two years in the awareness of the issues, ability to suggest and implement changes, and the ease with which both men and women are discussing problems and proposing solutions. Relatively minor changes have helped women see new possibilities, learn how to make their voices heard, gain confidence in their ability to make changes, and understand their importance.

However, improving working conditions is only the beginning of a deeper process of change. Women now feel that their suggestions are valuable and they are ready to become more active in larger arenas of change, such as decision-making positions.

Dorothy Lele

For more information on Gender Equity, please contact Dorothy Lele, email 5dl4@qsilver.queensu.ca

Highlight - Policy Development

SETC and the State Taxation Agency produced a joint circular on taxation incentives for CP equipment, stimulated in part by contacts made during a Policy Study Tour of Canada.

Implementation: Fuyang Plant

No and low cost ammonia measures (initiated late 1997)	
Reduction in losses of ammonia	1,400 tonnes per year
Recovery of hydrogen in equivalent NH_3	4,500 tonnes per year
Net revenues generated	1.8 million RMB* per year
Increase in production	+3% per year

* RMB = Renminbi = 0.18 Canadian dollars

Medium cost measures (initiated late 1999)	
Ammonia Recovery Unit	
Ammonia recovered	2,700 tonnes per year
Reduction in water consumption	8,400 tonnes per year
Money saved (net)	1.9 million RMB* per year
Sulphur Recovery Unit	
Ammonia recovered	270 tonnes per year
Sulphur recovered	550 tonnes per year
Reduction in water consumption	20,000 tonnes per year
Money saved (net)	0.34 million RMB* per year
Oil Recovery Unit	
Oil recovered	120 tonnes/year
Money saved	0.20 million RMB* per year
Cost of "medium cost" measures:	appx. 1.666 million RMB* (for 3 CP solutions)
Time to recover cost:	less than 1 year

Project Update

The project reached the 3½ year mark at the beginning of a new fiscal year (April 1, 2000). Work continues on the four CP elements: policy, implementation, training, and information technology.

CP policy development is enhanced by, and contributes to, the emergence of Cleaner Production as a major policy option for China's industrial development. Seven new case studies have been completed, and "lessons learned" were disseminated at workshops in December and January. The team of domestic experts has been expanded to nine people: five from universities, two retired government officials, and one from each of the two demonstration industrial sectors, Petrochemical and Chemical Industries and Light Industries. The work team is well balanced and represents all the interested parties. It is the nucleus of a growing cadre of experts within various ministries to deal with CP policy, regulatory and legislative issues. The team has translated a number of key international documents and participated in workshops. Evidence of its growing ability is a recent circular issued by SETC that provides investment guidelines for CP promotion and implementation with detailed recommendations and solutions. SETC and the State Taxation Agency also produced a joint circular on taxation incentives for equipment, including CP equipment. The concept was stimulated by meetings with Canadian Ministry of Finance personnel during a project-sponsored study tour.

Implementation is progressing at the two demonstration plants. Audit manuals and guidelines are completed for the pulp and paper, and fertilizer sectors. The capability to measure performance through environmental monitoring has been put in place in both plants.

The Fuyang Plant continues to implement no and low cost solutions with ongoing environmental and financial benefits. In addition, in the fall of 1999 CP equipment was installed and commissioned, at a cost of approximately 1.67 million RMB ($300,000 Can). Monitoring showed that ammonia recovery increased by 50%; while 550 tonnes of sulphur and 120 tonnes of waste oil can now be recovered annually. The equipment paid for itself in less than a year. At the Anhui Paper Mill, the past four months have seen the installation of a black liquor press and new pulp washers, funded by CIDA to the amount of $400,000 Can. This equipment is presently being tested and debugged. Over the coming months, production of pulp will resume. Further, testing of the CEpH bleaching process has been completed. Results are presently being analyzed and it is hoped that, should the prove the environmental and economic benefits of CEpH bleaching, this technique will be quickly implemented.

The focus of implementation in these Sectors is now on disseminating the information and lessons learned more broadly. Technical information has been shared with eight fertiliser and five pulp and paper factories. A technical workshop in December 1999 introduced CP principles to the designers of chemical plants.

Meanwhile, work is beginning in a new sector—chlor-alkali/PVC—with the selection of a new demonstration factory in Zhejiang Province. A pre-audit was completed in March.

These advances involved training at every level: managers, technicians, and decision-makers. Courses in computer training, Process Improvement, and a workshop on Sustainable Development provided a range of skills. Three study tours to Canada were also completed; and awareness-raising materials such as newsletters and a video provide ongoing support for the SETC's efforts to raise understanding of CP.

Gender Equity is being advanced through a number of efforts. Gender Equity working groups at each demonstration plant are developing work plans and assisting women to resolve issues; a Canadian study tour in October included three sessions on Gender; and the Women and Environment Network is developing a website. Participation targets have been met or exceeded: more than 30% of trainees in China are women, while 15% of the Canadian project team is women.

The role of information technology in support of CP is growing. Computers are being used increasingly at all participating sites. The Beijing Project Office is managing the project website, and staff there are developing expertise in software procurement and installation. Information is being added to the website (**www.chinacp.com**); website use is increasing, particularly in China; and materials are being translated. Databases for project management and effluent monitoring data are being developed.

Mary Ellen MacCallum

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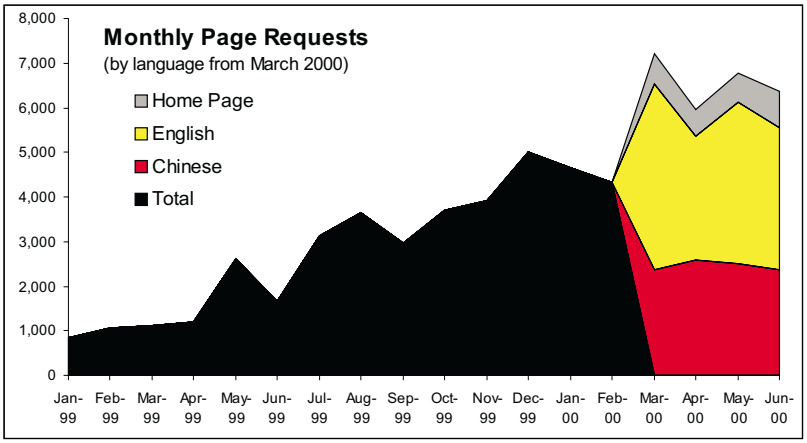
Highlight - Website use

The number of pages requested has risen consistently from about 850 in January 1999 to approximately 6,400 in June 2000. Since the Chinese website was launched, the proportion of requests for information in Chinese has risen to over 2000 per month, accounting for between 35% and 45% of total requests.



Learning from Canadian Experience

Study Tours are a highly visible aspect of the Project. They provide an opportunity for Chinese delegates to meet with Canadian counterparts, to learn about different approaches to CP, to see CP technologies for various sectors, and to learn about Gender equity in Canadian government and industrial sectors.

Between October 1999 and March 2000 a total of 30 Chinese delegates participated in three study tours, each lasting two weeks. The tours had different objectives, with different highlights. The CP Technologies tour also emphasized gender awareness for a delegation from Beijing. The Awareness tour brought together delegates from several provinces in China; and the tour in March spent three days at Globe 2000, Canada's major biannual Environmental Technologies Trade Show and Conference. Tours were hosted by a broad range of agencies and companies, and delegates learned about every aspect of Cleaner Production in Canada.

Study tour delegates met with staff of all levels of government — municipal, regional, provincial and federal — in four provinces: British Columbia, Alberta, Ontario, and Nova Scotia to hear about the different approaches used across the country. They were interested in learning about the important role multi-stakeholder and non-government organizations play in preventing pollution in Canada. They learned about initiatives including the Fraser River Action Plan; the Georgia Basin Initiative; BC's approaches to Pollution Prevention and Demonstration Projects; Alberta's fledgling PP Program and multi-stakeholder CASA (oil and gas sector) program; Ontario's Green Industries approach and non government organization, Pollution Probe; Nova Scotia's Eco-Efficiency Centre; and integrated planning for industrial parks. They saw Vancouver's regional water/wastewater control centre and state of the art Transit and Solid Waste Management facilities in Vancouver and Edmonton respectively, learned about Toronto's Equal Opportunity Program and non profit WEED foundation, and toured the Alberta Research Council and Burnside Industrial Park in Nova Scotia.

Utilities and private sector companies were generous hosts, and provided many opportunities for first hand, on-site experience. Tours included B.C. Hydro's Burrard Power Station, Tilbury Cement, Mohawk's Used Oil Facility, TransAlta's Lake Wabamun Power Station and Mine, Agrium Fertilizer (Carseland and Redwater), Alberta Pacific Pulp and Paper, Dow Chemical (Fort Saskatchewan), Global Dewatering (for industrial and municipal sludges), Thermo Tech Technologies (converting bio-sludges to fertilizer), Nova Chemicals, and Minas Basin Pulp and Power. Delegates appreciated the opportunities provided and are eagar to apply what they have learned to their work in China.

Mary Ellen MacCallum
Gordon Chiu

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Check out the China-Canada Cooperation Project in Cleaner Production web site at:
www.chinacp.com

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Published by the China-Canada Cooperation Project in Cleaner Production

Produced by ESSA Technologies Ltd.

Funded by the Canadian International Development Agency (CIDA)