



Guangdong Spotlight--Power Industry To Spend \$28.85 billion

According to a report filed in early September by the U.S. Department of Commerce office in Guangzhou, China, Guangdong Province anticipates spending more than US\$28 billion in the first ten years of the next century.

The amount the power industry plans to spend \$28.85 billion between 2010 and 2010 to be put into the 44,600 mw new capacity will push the province's installed capacity to a total of 80,000 mw (including 5,000 mw of pumped storage capacity) by the year 2010. During the 1991-1995 period, for comparison, Guangdong pumped US\$4.857 billion into the power industry and increased the province's installed capacity by 11,243 mw. Between 1996 - 2000, \$8.22 billion has been allocated to add another 14,533 mw of installed capacity.

Guangdong Province--Increased Installed Capacity

| | 1991-1995 | 1996-2000 | 2001-2010 |
|-------------------------------|-----------|-----------|-----------|
| Total increased capacity (mw) | 11,243 | 14,533 | 44,600 |
| Coal-fired | 9,460 | 11,565 | 25,380 |
| Hydropower | 483 | 588 | 500 |
| Nuclear capacity | 540 | 0 | 12,000 |
| Purchased capacity | 160 | 1,180 | 2,520 |
| Pumped storage | 600 | 1,200 | 4,200 |

As of 1997, Guangdong's installed power capacity totaled 28,000 mw, of which, 21,300 mw is coal-fired; 5,000 mw, hydropower; 1,800 mw, nuclear; and 9 mw, wind power. The total installed capacity will reach 34,050 mw by the end of the century, representing an annual growth rate of 15.25 percent between 1991 - 2000. Guangdong's electric power industry is expected to develop at an annual rate of 9.0 percent between 2001 and 2010. (See table above for increased installed capacity in different periods.)

According to the DOC report, the provincial market demand for electricity continues to grow. Last year, Guangdong witnessed a 10.6 percent GDP growth, with the province alone accounting for approximately 10 percent of China's total gdp. Due to the province's two-digit economic growth, rapid development of export-oriented industries, and improving living standards, electric power consumption province-wide is estimated to

(Continued on page 8)

Debts Continue to Hobble Equipment Manufacturers

Closing Market to Foreign Firms Unlikely to Help

Despite operating in the world's largest market for power equipment, China's major equipment manufacturers continue to pile up large debts, according to recent interviews conducted by CER reporters. Shanghai Boiler Works, for example, has more than 500 million owed to it by customers on sales of 1.7 billion yuan in 1997. Indebtedness runs through entire enterprise groups. For example, Harbin Power Equipment Group, which manufactures turbines and generators as well as boilers, has approximately 1.4 billion yuan owed to it by users annually. These debts carry heavy interest payments. The Harbin Group, for example, has additional annual interest payments of over 100 million yuan that it has difficulty paying.

The problems are caused in large part by nonpayment or only partial payment from customers. As with other state owned enterprises, Chinese power equipment manufacturers are caught in the country's debilitating triangular debt problem. Regional electric power bureaus are often not paid for the electricity they provide so they in turn are unable to pay equipment suppliers for the power plants they order.

These conditions are affecting the enterprises ability to compensate workers. At Harbin Boiler Works, the majority of workers are currently receiving only 70 percent of their pay. It is also negatively impacting the enterprise's ability to undertake R&D activities. At one time Shanghai Boiler Works regularly set aside from one to two percent of revenue for research and development activities.

Now the amount set aside is erratic varying from year to year depending on the enterprises revenue stream and is rarely over one percent. Even in the past when R&D expenditures were more stable they are far below the ratio typically spent by western equipment manufacturers.

Given these financial problems it is unclear if China's

(Continued on page 5)

| | |
|--|------|
| Hawaii Electric Acquires Interest..... | pg.3 |
| Focus on Vietnam..... | pg.4 |
| News Briefs | pg.6 |

Hawaiian Electric Industries, Inc. Subsidiary Acquires 60% Interest In Power Plant

Hawaiian Electric Industries, Inc. announced that its international power subsidiary, HEI Power Corp. (HEIPC), has acquired an effective 60% interest in a joint venture formed to construct and operate a 206-megawatt (net) coal-fired power plant in Inner Mongolia, People's Republic of China (PRC). The power plant is being built "inside the fence" for Baotou Iron & Steel (Group) Co., Ltd. (BaoGroup). Construction has commenced and the first of the two units is expected to be online by mid-2000, and the second by the end of 2000.

"This investment firmly establishes HEI Power Corp.'s presence as an independent power producer in China," said Robert F. Clarke, HEI president and chief executive officer in a prepared statement. "Many independent power producers have tried to develop power projects in China, but results have been mixed. By focussing on niche markets important to China's industrial development and supported by state policy, HEI Power Corp. can participate in the PRC's growing energy market and has the potential to become a significant contributor to HEI earnings in a few years."

"Our efforts to solidify formal ties with key government and business leaders in China and explore opportunities for Hawaii firms are beginning to pay off," said Benjamin Cayetano, Governor of the State of Hawaii. "I applaud HEI for paving the way for other Hawaii businesses to export their services and expertise to Asia and Pacific Rim countries. My administration will continue to open doors to help Hawaii firms like HEI become major players in our global economy."

BaoGroup is a 25% partner in the joint venture and will purchase all the electricity generated. Ownership of the plant will be transferred without charge to BaoGroup 20 years from now. BaoGroup is the fifth largest steel company in China and also controls more than three-fourths of the world's rare earth deposits. The state-owned enterprise is the largest company in the Inner Mongolia Autonomous Region. Its current demand of 400 megawatts for power is expected to exceed 700 megawatts by 2000, following a major plant expansion utilizing state of the art German continuous casting and rolling mill technology.

The remaining 15% of the project is effectively owned by United Power Pacific Company Limited (UPP), a privately held Hong Kong company, whose principals have been involved in processing crude oil in China since 1991. UPP's affiliate, Pacific Point Company Limited, developed the project and was instrumental in securing PRC government approvals and support for the project to bring it to its advanced stage of development.

HEIPC was advised in the transaction by Power Pacific Company (PPC), an independent power development company experienced in the China market. PPC has successfully developed six other Chinese power projects on behalf of other international clients. PPC is unrelated to UPP.

The acquisition is the second power plant project announced by HEIPC. HEIPC completed the refurbishment of the 50-megawatt Tanguisson power plant for the Guam Power Authority and is now operating the plant under a 20-year agreement.

Hawaiian Electric Industries is a diversified holding company that delivers essential services to the people of Hawaii. Its core businesses are electric utilities and a savings bank. Other smaller subsidiaries include maritime freight transportation, residential real estate development and passive investments. HEIPC was formed in 1995 to pursue independent power and integrated energy services projects in Asia and the Pacific.

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China, Myanmar Clinch Power Deal

China has signed an agreement with Myanmar to export US\$250 million in equipment and technology to help Myanmar build its largest hydropower plant. The Paung Laung plant, with total installed capacity of 280,000 kilowatts, is expected to increase the total generating capacity in Myanmar by 30 percent. Under the contract, the Chinese side will provide complete sets of equipment for the power plant, electricity transmission equipment, design and technology know-how and construction machinery to the Myanmar company.

Fujian Mianhuatan Hydropower Project

China has received a loan from the Asian Development Bank towards the cost of the Fujian Mianhuatan Hydropower Project, and it is intended that part of the proceeds of the loan will be applied to eligible payments under the contract for which the following invitation for bids is issued. Deadline for the bid is October 15th.

The China Electric Power Technology Import And Export Corporation (CETIC), acting as the leading company, China National Technical Import And Export Corporation (CNTIC) and Fujian Huafu Project Construction Development Company (procurement agent), authorized by the Fujian Provincial Electric Power Bureau (purchaser), invites sealed bids from eligible bidders from member countries of the bank for the supply of cement, steel rods, diesel oil, hot-rolling steel plate and bearings of gates. Details and specifications are provided in the bid documents, which may be purchased from CETIC, at address below, on submission of written application and upon payment of a nonrefundable fee of US\$300.

All bids, which must be accompanied by a bid security of two per cent (2%) of the total bid price, must be delivered by October 15th to the Fujian Provincial Electric Power Bureau, 264 Wusi Road, Fuzhou / Fujian 350003, People's Republic Of China, Fax: 86 591 7587034, Tel.: 86 591 758 4100. Bids will be publicly opened on the same day.

In the comparison of bids, the ADB's domestic preference scheme will be applied in accordance with the provisions stipulated in the instructions to bidders. Interested bidders may obtain further information from: China Electric Power Technology / Import & Export Corporation / No. 5 Liupukang Street / Beijing 100011 / People's Republic Of China / Fax: 86 10 6237005; 62389399 / Tel.: 86 10 62011904; 64015511-3508.

Guangdong Power Projects

All new power projects scheduled for construction during the coming years in Guangdong Province will be built through nationwide bidding. New projects include the Taishan, Shanwei, Qianwan and Huizhou LNG power plants, the Yangjiang Nuclear Power Plant and the second phase of the Ling'ao Nuclear Power Plant. The total investment for these new plants, which will have a total installed capacity of more than 6 million kilowatts, will outstrip 60 billion yuan (US\$7.24 billion).

Xi'an-Xianyang-Tongchuan Improvement

The U.S. Department of Commerce advises that the People's Republic Of China has received a loan from the Asian Development Bank towards the cost of the Xi'an-Xianyang-Tongchuan Environment Improvement Project; of which subproject no. 2, Xianyang Cogeneration Plant is a component, and it is intended that part of the proceeds of the loan will be applied to eligible payments under the contract for which this invitation for bids is issued. The bid deadline is November 16th.

CNCCC International Tendering Co., Ltd. (CNCCC), authorized by Xianyang Heating Power Development Co. Ltd., invites sealed bids from eligible bidders from member countries of the bank for the supply of the following goods:

XY-1-1 Two (2) sets of high pressure, high temperature, solid slag, pulverized coal boiler with capacity of 220 ton/hr and its auxiliaries

XY-1-2 Two (2) sets of extraction, condensating, thermal, steam turbine with output of 25mw and its auxiliaries

XY-4-1 Two (2) sets of turbo-generator with output of 30mw and its auxiliaries

XY-4-3 Two (2) sets of main transformer with related output not less than 37.5 mva, and one (1) set of 8000 kva start-up/stand-by transformer.

All bids must be accompanied by a bid security of two percent of the total bid price, and must be delivered in accordance with the instructions to bidders to the address below on or before 10:00 A.M. on 16 November 1998. Bids will be opened in public immediately thereafter on the same day.

In the comparison of bids, the bank's domestic preference scheme will be applied in accordance with the provisions stipulated in the instructions to bidders.

Interested bidders may obtain further information on the bid form and inspect the bid documents at the office

of: CNCCC International Tendering Co., Ltd. / Qiqu, Hepingli, 100013 Beijing, People's Republic Of China / Telex: 22492 CNCCC CN; 220281 CNCCC CN, Fax: 010-64213854; 010-64215982 / Tel.: 010-64215532; 64283009; 642830017, Cable: CNCCC Beijing

State-Run Engineering Agency Privatized

In July 1998, Taiwan's state-run retired service engineer-ing agency was officially reorganized into a corporate body and renamed RSEA Engineering Corporation. Becoming a corporate entity is the first step toward privatization. RSEA will gradually release more than 50 percent of its shares to private investors within three years and move forward to become a privately owned business group. RSEA's goals are to pursue maximum profit for investors and to maintain its ranking as one of the top international construction companies. Working with RSEA Engineering, according to the American Institute in Taiwan, can facilitate business opportunities for U.S. firms pursuing public infrastructure construction, industrial park development, and construction management projects.

RSEA is the largest diversified construction company in Taiwan, a world recognized group that has played a vital role in undertaking numerous major infrastructure projects around Taiwan including 136 power plants.

Major Power/Energy Related projects completed include:

| Project Name | Contract Amount (US\$Million) |
|--|-------------------------------|
| Tseng-Wen Dam | 94 |
| Nuclear Power Plant I | 20 |
| Nuclear Power Plant II | 88 |
| Mu Kau Hsi Hydraulic Power Plant | 130 |
| Nuclear Power Plant III | 98 |
| Hsing Ta Power Plant | 150 |
| Fei Tsui Dam | 210 |
| Ming Hu Hydraulic Power Plant | 218 |
| Chinese Petroleum Corp. Lng Loading Pier | 137 |
| Min Tan Hydraulic Power Plant | 228 |

Following 42 years of operations, RSEA has grown into a conglomerate with paid-in capital of NT\$ 5.7 billion (about US\$ 173 million) and over 5,500 employees. Its standing contracts have a combined value of over NT\$ 110 billion (about US\$3.3 billion). As the largest engineering consulting firm in Taiwan, RSEA will continue to play a vital role in Taiwan's construction business. For further information, contact: Mr. Y.Y. Tseng, President / RSEA Engineering Corp. / 207 Sungchiang Rd., Taipei, Taiwan, Tel: 886-2-2503-2233 / Fax: 886-2-2503-1113

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Power Project Round-Up

U.S. Department of Commerce advises CER of the status of various opportunities in Vietnam.

Geothermal Power Plant - Central Region of Vietnam

The estimated value of this 50 MW Geothermal, BOT, Power Project is US\$141 million and the expected award date is early 1999. The contracting authority is the Ministry of Industry, Ngo Duc Hanh, Deputy Director, Planning and Investment Department, 54 Hai Ba Trung Street, Hanoi, Vietnam, Tel: 84-4-825-8161, Fax: 84-4-825-0727.

Ormat of the U.S. is the major bidder and the company and Electricity of Vietnam are currently working out an agreement on the price of electricity. Once that price is agreed on, they will send the proposal for a feasibility study to the Ministry of Industry (MOI) for approval. TDA has offered grant in support of the BOT contracts negotiations to MOI. For further information, contact: Ormat, Mr. Daniel Schochet, Vice President, 980 Greg Street, Sparks, NV, 89431-6039, Tel: (702) 356-9029, Fax: (702) 356-9039.

Transmission and Distribution—Central and Southern Vietnam Power

The expected award date of the US\$141 million project for the rehabilitation and improvement of the electricity network for 13 segments in central Vietnam, and five segments in southern Vietnam is June 1999. US\$100 million is being funded by the Asian Development Bank, and US\$41 million will be funded by other sources. The bank loan agreement has been signed, and a call for bids for engineering procurement and construction is expected in the 3rd quarter of 1998. For further information, contact at the contracting authority: Power Company #3, Mr. Nguyen Minh Tien, Deputy General Director, 307 Tran Nu Vuong Street, Da Nang, Vietnam, Tel: 84-511-821-028/9, Fax: 84-511-825-071.

Phu My 1 Power Plant

The expected award date of this US\$400 million project, which is an engineering procurement contract for 900 MW combined cycle gas turbine power plant, on a turn-key basis, is September 1998. The contracting authority is Electricity of Vietnam, Mr. Tran Trong Quyet, Chairman, Phu My Ba Ria Power Complex Management Unit, 72 Hai Ba Trung Street, Ho Chi Minh City, Vietnam, Tel: 84-8-829-9315, Fax: 84-8-829-9654. Bids are under consideration by the Vietnamese government. US TDA has offered a training grant in support of the GE/Sumitomo team. EVN is currently discussing terms and conditions of the contract with Mitsubishi.

Phu My 2.2 Power Project

The estimated value of this BOT 450 - 700 MW gas fired power plant is US\$400 to US\$500 million and the expected award date is December 1998. Bids have been submitted, and are currently being evaluated. Selection is expected in the next three to six months. Other countries

involved include: France, Japan, Germany, Norway, England, Malaysia. The contracting authority is the Ministry of Industry, Mr. Hoang Trung Hai, Vice Minister, 54 Hai Ba Trung Street, Hanoi, Vietnam, Tel: 84-4-824-2420, Fax: 84-4-826-7988.

Soc Trang Power Project

The estimated value of this 475 MW Gas Turbine Combined Cycle Power Project, which is expected to be awarded in early 1999, is US\$300 million. Enron is currently working on the Feasibility Study, and they are reportedly interested in beginning construction in the year 2000. There is no multilateral bank involvement and U.S. Department of Commerce staffers surmise that there are few subcontracting possibilities here. The contracting authority is the Ministry of Industry, Minister Dang Vu Chu, 54 Hai Ba Trung Street, Hanoi, Vietnam, Tel: 84-4-824-2420, Fax: 84-4-826-7988.

Quang Ninh Power Project

The estimated value of this 300 MW coal powered thermal power plant is US\$350 million--a project slated to start later this year. Negotiations are still on-going on four contracts: power purchase agreement; coal supply agreement; land-lease agreement; and BOT agreement. The U.S. TDA has given a grant to Coudert Brothers and Parsons Engineering to advise MOI on these negotiations. Raytheon (engineering procurement construction) is the prime contractor and there are no subcontractors identified yet. The contracting authority is the Ministry of Industry, Minister Dang Vu Chu, 54 Hai Ba Trung Street, Hanoi, Vietnam, Tel: 84-4-824-2420, Fax: 84-4-826-7988.

Power Transmission, Distribution and Disaster Reconstruction Project

This portion of the US\$199 million project, expected to be awarded this month, is to help with rehabilitation from Typhoon Linda. The portion of the project to rehabilitate the Vung Tau network has not yet been bid out. Bids for this World Bank funded project from the major bidders including Agri, Cooper, Stevcoare are currently being reviewed. The contracting authority is the Power Company #2, Ms. Nguyen Thu Huong, International Cooperation Department, 72 Hai Ba Trung Street, District 1, Ho Chi Minh City, Vietnam, Tel: 84-8-823-1303, Fax: 84-8-829-9680.

TIER II--Thac Ba Hydro-Electric Power Rehabilitation Project

The estimated value for this project to supply turbines and generators is US\$35 million. The expected award date is early 1999. The contracting authority is Electricity of Vietnam.

Vietnam - Energy and Power

TDA is exploring the option of providing a technical assistance package to Electricity Vietnam for procurement advisory assistance and a Desk Study to evaluate the transmission, distribution, and disaster reconstruction project funded by the World Bank which has been approved. Contractor selection for the Desk Study is in progress.

Calendar

- Sept. 22-25 Saigon Electricity Expo '98** **Saigon**
Conference organizers, CP Exhibition, predict that the demand for electricity in Vietnam will grow by at least 11.6% a year in the coming years and is projected to be 90 billion kwh in the year 2010. This 7th annual electricity Expo provides foreign companies opportunities to set up and maintain relationships with Vietnamese officials, managerial and technical people. For further information contact CP Exhibition, Room 1703, 109 Gloucester Road, Wanchai, Hong Kong, Tel: (852) 2511-7427, Fax: (852) 2511-9692.
- Sept. 24-25 Natural Gas in Asia** **New York City**
Conference organizers, IBC Group plc, say that energy demand in Asia will more than double by 2020 making Asia the largest energy market in the world. Natural gas demand is forecasted to grow faster than any other energy source. This conference, say the organizers, will present cutting-edge strategies to profit from the booming energy markets of the retracted Asian economies. For further information contact IBC, Tel: (508) 481-6400, Fax: (852) 481-7911, Email:inq@ibcusa.com.
- Sept. 30-Oct. 2 Seventh Annual World Economic Development Congress** **Washington, DC**
This annual conference, presented in partnership with Grant Thornton, convenes over 1200 of the world's premier decision makers including government ministers, industry leaders and key international investors with a focus on international investment for the development of infrastructure in emerging markets. This year's conference includes a special session on "*Infrastructure Project Finance and Efficiently Closing the Deal in China.*" For further information, contact: Customer Services Administrator, World Economic Development Congress, 500 West Cummings Park, Suite 5200, Woburn, MA 01801-6503, Tel: 800-767-9499, Fax: + 781-939-2505, E-mail: registrar@worldcongress.com, On-line: www.worldcongress.com.
- Oct. 6-9 IMI Power Supply Expo 1998** **Dalian**
Dalian will host the 4th International Electric Power Supply Equipment Exposition. The show was previously held in Shanghai, Guangzhou and Xi'an. This is the first time that this show will be held in northeastern China, which is well-known for its well developed heavy industries. The Expo is organized by the China Electric Power Supply Entrepreneur Association/China Council For The Promotion Of International Trade, Dalian Sub-Council/Coastal International Exhibition Co, Ltd and supported by China Electricity Council/Dalian Municipal Government/Northeast China Power Administration. The show is sponsored by 171 large and medium sized electric power supply enterprises. For further information, contact: Andrew Chau, Project Manager, Coastal Int'l Exhibition Co, Ltd., Room 3808, China Resources building, 26 Harbor Road, Wanchi, Hong Kong, Tel: (852) 2827 6766, Fax: (852) 2827 6870, E-mail: general@coastal.com.hk, Web:www.coastal.com.hk.

Equipment Manufacturer Debts

(Continued From Page One)

major power equipment manufacturers will be able to fully capitalize on the protection against foreign competition provided by Vice Premiere, Zhu Rongji recent order limiting procurement of subcritical power plants 600 MW and below to domestic enterprises. Many in the domestic industry welcomed the relief the order will provide from competition from foreign vendors and ease the pressure to lay off workers. It is also seen as a boost to China's drive to acquire more advanced technology and management systems by potentially spurring the formation of alliances with foreign vendors looking to keep from being totally excluded from the market by establishing or expanding local production.

However, the order may have significant negative effects. Foreign vendors bring external financing from export credit agencies and multilateral banks to finance the foreign exchange portion of their equipment. By restricting procurement to local suppliers, Zhu Rongji's order runs afoul of international bidding rules for multilateral banks as well as domestic content rules of export credit agencies. The order could make it increasingly difficult for some local governments and power bureaus to raise sufficient financing to build plants in the future

and could reduce the total number of power plant orders. It will also reduce pressure on China's major equipment suppliers to overhaul their management systems and become more competitive.

Much will depend on the ability of the domestic Chinese banking system to finance power sector investments. However, a banking system that has long been suspect is currently facing even greater scrutiny.

Moody's Investors Services Inc. recently selected nine Chinese banks for a downgrade review including China Construction Bank, Industrial and Commercial Bank of China and CITIC Industrial Bank. If Chinese domestic banks are unable to fill in the financial gap, closing the domestic power market may not ultimately benefit China's domestic manufacturers as much as anticipated. The overall reduction in competition by closing out imported equipment could also significantly prolong the much needed industry rationalization and management reform at Harbin, Shanghai and other major equipment manufacturers. ☹

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Ivo Power Signs District Heating Contract

IVO Power Engineering Ltd has signed up to now the largest district heating system delivery contract in China with Qinhuangdao, a city of over one million inhabitants in Hebei province about 300 km north east from Beijing, the company reported early September.

The project consists of large piping system, heat exchanger stations, special valves, control automation and monitoring systems, design, installation supervision, commissioning and training. The value of the contract is about US\$10 million.

The project will be financed by the Finnish concessional credit (mixed credit) and a credit of Nordic Investment Bank. The credit agreements will be finalized in few months. The main subsuppliers to IVO are IVO Power Engineering's old partners LPM Group from Leppavirta and KWH Pipe from Vaasa. The district heating pipe factory Dalian JV, the Chinese joint venture of IVO Power Engineering, KWH Pipe and Finnfund, will participate in deliveries and pipeline installations. The deliveries will be made mainly in 1999. For further information, contact: Antti Ahti, IVO Power Engineering, phone +358 9 85612123.

Alstom Helps Develop Infrastructure

ALSTOM, a French-based company involved in global energy generation, transmission and distribution and rail transport, will continue to strengthen its presence in China by participating in the development of China's major infrastructure projects, according to reports published early August in the *China Business Weekly*.

"China is the most important market in Asia for Alstom," said Pierre Bilger, Alstom's chairman and chief executive officer, following the late July signing of a memorandum of understanding with Shanghai Electric (Group) Corp on establishing two joint ventures to manufacture subway traction equipment.

Alstom, which has been operating in China since early this century, has supplied equipment for power stations with capacities over 30,700 megawatts (mw), and remains China's leading foreign supplier of power generation equipment, providing equipment for major fossil fuel, hydroelectric, natural gas and nuclear power projects, according to the *Chinese Business Weekly*.

Strong Hydro, T&D, Thermal and Nuclear Presence

In 1997, Alstom won an order to supply eight hydraulic turbines, each with a power generating capacity of 700 mw for the Three Gorges Project. The company also hopes to be selected to supply the power transmission and distribution equipment for the project.

Together with Electricite de France (EDF), Alstom was selected in late 1996 to build and operate the first Chinese power plant under BOT (Build-Operate-Transfer) conditions financed entirely by foreign capital. This is the Laibin B power plant which, incorporating two 360-megawatt generators, is located in South China's Guangxi Zhuang Autonomous Region.

Alstom is constructing conventional islands for the second 1,970 mw nuclear power plant in Guangdong Province, the Ling Ao Nuclear Power Plant. Previously, Alstom provided similar equipment for the Daya Bay Nuclear Power Station, also located in the province.

As part of Alstom's strategy for long-term development in the world's most populous nation, the company is committed to transferring technology and managerial expertise to its Chinese partners. Alstom is working with Dongfang Electrical Machinery Group Corp on an equipment localization project for the Ling Ao Nuclear Power Plant. Since 1991, Alstom has trained a large group of Chinese engineers and technicians in local power plants and institutes through its overseas facilities.

MOU Extends Sino-US Nuclear Cooperation

Westinghouse Electric Co and China National Nuclear Corp (CNNC) signed a memorandum of understanding (MOU) last week to co-operate in the area of advanced passive pressurized water reactor (PWR) nuclear power projects and technical services, according to Chinese press reports.

Under the MOU, Westinghouse and CNNC will work together to develop advanced passive PWR nuclear power technology. The two parties will also explore co-operation in several other areas, including nuclear power technology services and nuclear power plant projects, in China and around the world.

In addition, Westinghouse and CNNC will pursue and support advanced light water reactor programmes to be implemented under agreements recently signed between the United States and China.

"The MOU will make Westinghouse and CNNC partners in providing technology of passive PWR in both China and outside of the country," said Charles Pryor, president and chief executive officer of Westinghouse.

He said the MOU signals the beginning of a new era of co-operation between China and the United States in the peaceful use of nuclear power technology. "We are now ready to work to win nuclear power contracts in China," he said. He added that Westinghouse has mapped detailed localization plans for nuclear projects in China.

Meanwhile, Michael Jordan, chairman and chief executive officer of CBS Corp, said the recent announcement that CBS — the parent company of Westinghouse — will sell Westinghouse to Morrison Knudsen Corp and British Nuclear Fuels Limited will not affect Westinghouse's long-term development strategy in China.

Westinghouse will retain its name and leadership structure after the conclusion of the transaction before the end of this year. "The sale of Westinghouse will be beneficial to the development of the worldwide nuclear power industry and will make Westinghouse more competitive in all markets in which it does business," Jordan said. He said Westinghouse will continue to provide cutting-edge nuclear power technology, equipment and services to clients in China and worldwide.

Guangdong

continued from page 1

rise from 85.8 billion kilowatt hours (kwh) in 1996 to 281.6 billion kwh by 2010. Industrial usage remains the largest consumer, accounting for approximately 60 percent; the tertiary industry is the second, 20 percent; followed by residential consumption, 16 percent; and all other uses, 4 percent, the report states.

The following information was compiled from U.S. Foreign Commercial Service staff interviews with GDPB, the 1997 Guangdong statistical data year book, *Guangdong In 2010* (provincial planning document), and planning research in the Pearl River delta economic region. The table that follows lists Guangdong's planned power plant projects through 2010. All are super large power projects and will require foreign equipment and engineering services according to DOC.

Planned Power Projects Through 2010 (unit: mw):

| Fossil projects | Projects size | 1996-2000 increased capacity | 2001-2010 increased capacity |
|---|---------------|------------------------------------|------------------------------------|
| Total | | 14,532.50 11,565 | 44,600 24,380 |
| 1. Zhangjiang power plant | 4x300 | 600 | |
| 2. Zhujiang power plant | 4x300 | 600 | |
| 3. Shantou power plant | 4x300 | 900 | |
| 4. Mawan power plant | 6x300 | 1,200 | |
| 5. Meixian power plant | 2x50+2x125 | 125 | |
| 6. Zhuhai power plant | 2x660+4x600 | 2,520 | 1,200 |
| 7. Taishan power plant | 2x660+6x600 | 2,520 | 2,400 |
| 8. Huidong power plant | 8x600 | | 4,800 |
| 9. Shanwei power plant | 8x600 | | 4,800 |
| 10. Shenzhen east power plant | 3,000 | 1,000 | 2,000 |
| 11. Panyu power plant | 4x600 | 660 | 1,980 |
| 12. Huilai power plant | 8x600 | | 4,800 |
| 13. Zhanjiang east sea plant | 8x600 | | 3,000 |
| 19. Local diesel units | | 4,190 | 1,340 |
| 20. Maoming kerogen shale plant | 500 | 100 | 400 |
| | | 1996-2000 increased capacity | 2001-2010 increased capacity |
| Hydropower | size | 587.50 | 500 |
| Pumped storage power stations (psps) | | | |
| Total | | 1,200 | 5,200 |
| 1. Guangzhou psps phase ii | 4x300 | | 1,200 |
| 2. Shenzhen psps | 4x300 | | 1,200 |
| 3. East guangdong psps | 1,800 | | 1,800 |
| 4. West guangdong psps | 1,000 | | 1,000 |
| Purchased capacity projects | | | |
| Total | | 1,180 | 2,520 |
| 1. Tianshengqiao second grade | | 220 | |
| 2. Tianshengqiaofirst grade | | 600 | |
| 3. Xiaowan hydro-power station | | | 2,520 |
| 4. Qu jin power plant | | 360 | |
| Nuclear power | | | |
| Total | size | | 12,000 |
| 1. Yangjiang nuclear power plant | 6x1,000 | | 4,000 |
| 2. North guangdong nuclear power plant | 4x1,000 | | after 2010 |
| 3. Taishan nuclear power plant | 4x1,000 | | 4,000 |
| 4. Daya bay lingao nuclear power plant | 4x1,000 | | 4,000 |

| Statistical data | (unit: million US\$) | | |
|--|----------------------|------|------|
| | 1995 | 1996 | 1997 |
| Import market | 644 | 50 | 500 |
| Imports from U.S. | 350 | 20 | 150 |
| Exchange rate: rmb 8.30 = US\$ 1.00 | | | |
| Estimated future inflation rate: 3 per cent | | | |
| Information source: Guangdong Provincial Electric Power Bureau (GDPB). | | | |

The consulate office report suggests that the best sales prospects include the following:

| | |
|------------|---|
| 8401100000 | nuclear reactors |
| 8401300000 | nuclear fuel |
| 8406191060 | turbine island |
| 8406191060 | turbine by-pass system |
| 8411828000 | gas turbine |
| 8502200040 | electric & generating island |
| 8428900095 | coal handling system |
| 8422309060 | ash disposal system |
| 8537109050 | distributed control system |
| 8481809025 | high temperature and high pressure valves |
| | desulfurization devices |
| 8474200070 | coal pulverizers |

U.S. Firms Leading Suppliers

According to the Guangdong Electric Power Bureau (GDPB), U.S. firms are the leading power generation equipment suppliers in Guangdong Province, taking a 40 percent market share, followed by domestic suppliers due to Chinese government policy restrictions on importation of power equipment. Mitsubishi of Japan and Siemens of Germany have 20 and 10 percent market shares, respectively. U.S. Department of Commerce reports that power equipment manufactured in the U.S. is highly regarded locally for quality and good after-sales service, and that the new power plants on the project list present "very good opportunities" for U.S. suppliers, especially for generating units above 300 mw.

Heading the list of U.S. companies doing business in Guangdong Province is General Electric and Westinghouse which are the leading turbine and generator unit suppliers to the province. Bailey Controls provides Guangdong with distribution control systems (dcs); Foster Wheeler, a longtime boiler supplier, which has also set up a joint venture with the GDPB producing boilers in Xin Hui City; Caterpillar, Fisher, Glanssy, and Raytheon are also key suppliers of accessory equipment.

Although Japanese and German companies have a share of the market, this poses no major competitive threat to U.S. firms at this time, says the DOC report, "as the local end-users believe that U.S. made power equipment is of the best in the world." Competition from domestic equipment manufacturers is also moderate because they mostly produce generators at or under a capacity of 200 mw. Power generation equipment with a capacity at or above 250 mw are subject to procurement using international tendering practices. Accordingly, generation equipment of those listed power projects are mostly to be imported in the next 10 years.

The Upcoming Decade—What To Expect

Within the next 10 years, U.S. suppliers will find the majority of sales opportunities with GDPB, the sole such equipment end-user, power plant planner, owner, designer and bid evaluator. The state-own GDPB, the only power utility in Guangdong, employs 400,000 workers province-wide, and is the monopoly for the whole industry and market in the province. GDPB had fixed assets valued at \$1.45 billion as of 1997. The foreign economic relations division of the GDPB is in charge of

(continued on the following page)

Guangdong

continued from page 7

any business associated with foreign firms. According to the Commerce report, U.S. firms should note that the Guangdong power industry is less tightly controlled by the central government in terms of power equipment procurement, especially importation from foreign countries, because GDPB funds most of its own projects. Because GDPB uses fewer central resources it has more autonomous rights in decision-making concerning equipment purchase.

Market Access—1999 EPC contract bidding list

The Guangdong Provincial Electric Power Bureau (GDPB) will invite domestic and international bids for EPC (engineering, procurement and construction) contracts in 1999 for the following new power plants:

| Project | size | investment |
|-------------------------------------|---------------------|----------------|
| Huizhou lng power plant | 2000 mw combined | \$2.42 billion |
| recycle gas turbine units | | |
| Shanwei coal-fired power plant | 2 x 600 mw | \$1.33 billion |
| Taishan coal-fired power plant | 2 x 660 mw | \$1.2 billion |
| Qianwan power plant | 3 x 340 mw combined | \$846 million |
| recycle gas turbine units | | |
| Yangjiang nuclear plant (1st phase) | 1000 mw | \$484 million |
| Ling ao nuclear plant (2nd phase) | | \$423 million |

B. Financing: estimated investment and financing sources
exchange rate: rmb 8.3= usd 1.00

| Projects | 1996-2000 | 2000-2010 |
|---------------------------------|-------------------|------------------|
| 1. Coal-fired projects | \$5.67 billion | \$9.16 billion |
| 2. Hydropower projects | \$389.15 million | \$331.32 million |
| 3. Pumped storage projects | \$320.48 million | \$1.88 billion |
| 4. Purchase from or | \$271.08 million | \$ 2.22 billion |
| Investment into other provinces | | |
| 5. Nuclear power projects | \$783.13 million | \$1.175 billion |
| 6. Transmission & distribution | \$ 768.67 million | \$3.43 billion |
| Projects | | |
| | \$8.15 billion | \$18.20 billion |
| Total | | \$ 26.35 billion |
| Central investment | \$156.62 million | \$301.20 million |
| Guangdong provincial | \$2.91billion | \$14.34 billion |
| Electric power fund | | |
| locally raised funds | \$2.18 billion | \$2.13 billion |
| Foreign investment | \$2.96 billion | \$12 billion |
| | \$ 8.20 billion | \$28.78 billion |
| Total: | | \$36.98 billion |

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China Energy Markets CD-ROM

Produced and Published by Emerging Markets
Online and Strategic Marketing

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