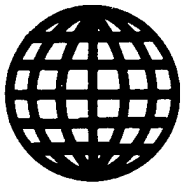


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# ***JPRS Report***

# **Science & Technology**

***CHINA: Energy***

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# Science & Technology

## China: Energy

JPRS-CEN-90-001

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30 January 1990

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### Promoting International Cooperation in Developing New Energy Resources

906B0005A Chongqing XINNENGYUAN [NEW ENERGY SOURCES] in Chinese Vol 11 No 9, Sep 89 pp 1-3

[Article by Shi Dinghuan [4258 1353 1403] of the State Science and Technology Commission Industrial S&T Department: "Reinforce International Cooperation, Strive To Promote Development of New Energy Resource Industries"]

[Text] The "Sino-European Dachen Island New Energy Resource Applications Discussion Conference" was held in Zhejiang from 4 to 6 May 1989 to study principles, policies, and paths for developing new energy resources and solving the energy resource problems of islands, pastoral regions, and other frontier regions in China. It evaluated the development and utilization situation for new energy resources in China and discussed development prospects. It also explored prospects for developing S&T cooperation, joint investment in production, technical transfers, market development, and other areas between China and the European Economic Community [EEC]. I will now discuss some views on principles, policies, and current situations for developing and utilizing new energy resources in China, industrializing new energy resources, prospects for cooperation between China and the EEC related to new energy resources, and other questions.

#### I. Principles, Policies, and Current Situations in Developing and Utilizing New Energy Resources in China

New energy resources have a special role and significance in China. As everyone knows, many nations of the world are developing new energy resources and some have formed a substantial scale, such as the "wind power fields" in California in the United States. However, most of these nations have used universal electrification as the foundation to develop new energy resources with the goal of finding a type of new energy resource technology which can be substituted once conventional energy resources are used up or because they fear pollution of the environment from conventional energy resources. China is a developing nation and 800 million of our population live in rural areas. Our rural areas cannot obtain sufficient supplies of commodity energy resources and they still lack the conditions to use modern civilization to provide mankind with the various types of conveniences. Different national conditions and economic foundations determine that China's goals in developing new energy resources and the technical difficulties we face are different from those in the developed nations.

First, regarding development goals, China's development of new energy resources is not just a question of leading research on energy resource technologies. It is also of extremely important real significance. If we wish to make China's 1.2 billion people relatively well-off by

the end of this century, and calculating at the per capita figure of about 1.5 tons of standard coal/year in energy consumption to achieve a relatively well-off standard of living in modern society, this would require at least 1.8 billion tons of standard coal. Based on China's plans for developing our national economy, the maximum limit to conventional energy resource supplies by the end of this century is just 1.4 billion tons of standard coal, so there is a 400 million ton shortfall that must be made up in energy conservation or other ways. This is particularly true for residents of rural areas, pastoral regions, islands, and other frontier regions. How can their energy resource needs be met? Obviously, it cannot be achieved by relying on conventional energy resources. New energy resources and renewable energy resources should play an important role in this area. Actually, this is exactly the case. Over the past 10-plus years, attention and support of government at all levels in China had led to substantial development of the new energy resource sector in China and some technologies have taken shape as industries in a preliminary way. Energy resource technology policies approved and promulgated by the State Council clearly call for "active development and utilization of new energy resources, reinforcing scientific research and demonstration work, active extension, and gradually establishing new energy resource industries." During the process of practice, they have summarized the new energy resource development principle of "adapting to local conditions, mutual supplementation by multiple types of energy, comprehensive utilization, and concern for results." Statistics show that by the end of 1988, the total installed small-scale hydropower generating capacity had reached 11,700 MW with yearly power output of 31 billion kWh. There were 5 million household methane pits, more than 70,000 small-scale wind-powered generators, over 1,600 wind-powered water lifting machines, 16 MW in installed geothermal generating capacity, 380 MW in heat equivalent in geothermal heat utilization, 5 MW in tidal-powered generators, 300 kW in solar batteries, 1 million cubic meters of solar water heaters, 100,000 cubic meters of passive solar-heated houses, and over 1.6 million mu of solar energy greenhouses. Development and utilization of new energy resources have created economic benefits and enormous social benefits in China's rural areas, pastoral regions, frontier regions, and islands. The pastoral regions of Inner Mongolia, for example, cover a vast area but have a sparse population, so it is hard to supply electricity via transmission in power grids. Small-scale wind-powered generators have already become a major source of electricity for lighting and TV among the scattered pastoralists. It has become known as a "night illuminating pearl" on the grasslands and is playing an enormous role in that region in building material and spiritual civilization. For another example, Tibet is located on the spine of the earth. It lacks coal and oil, and there are climatic restrictions on using hydropower to generate power. It does, however, have rich geothermal resources. The Yangbajing Geothermal Power Station, built through more than 10 years of efforts, now has an installed generating capacity of 16 MW and has become the main

source of power for Lhasa. The Tibet region also has abundant solar energy and wind energy resources and they are now being utilized. Thus, it can be said that development of new energy resources has real significance in China. They play an important compensatory role in solving the energy resource problems of China's vast rural areas and frontier regions as well as some special realms, and they have a vast range of applications and market prospects.

Another issue is that technical problems China faces in developing new energy resources involve different conditions than in foreign countries. The ability of a new technology to develop in a particular region is closely related to the economic and cultural foundation of that region. A substantial portion of new energy resource users in China are peasants, and although their incomes have risen considerably over the past few years, their economic capacity to accept a new technical product is very limited. A technology may be mature, but there may be no way to popularize it if the price is too high. This requires that our new energy resource products be of good quality as well as inexpensive. This requirement is extremely harsh. Demonstrations also are necessary to demonstrate their functions and benefits before they will be accepted by users. At the same time, we also must do good work in technical training, maintenance services, and other areas. From this perspective, this places even higher demands on the S&T personnel in China engaged in new energy resource development.

## II. On the Question of New Energy Resource Industrialization

During China's Sixth 5-Year Plan (1980-1985) and Seventh 5-Year Plan (1986-1990), all state plans for attacks on key S&T problems made development of new energy resources and renewable energy resources one of their main tasks and arranged specific amounts of scientific research expenditures. All levels of government and all departments have given considerable attention to developing new energy resources. To organize China's advantageous forces involved in research, development, production, and other areas related to new energy resources more effectively, the State Science and Technology Commission joined with relevant ministries and commissions and with scientific research and production units to organize several centers for biomass energy, solar batteries, and other areas as well as the North China Geothermal Development Planning Office and a Geothermal Research and Training Center. All these measures served to provide organizational and funding support for R&D work on new energy resources and promoted the conversion of new energy resource technology achievements into products and industries. Reforms in the S&T system over the past few years were done to solve problems of integration of S&T and the economy and to promote the conversion of S&T achievements into forces of production. S&T personnel now involved in applied research and development research have begun to give attention to doing research work on the basis of market demand. However, can a good

scientific research achievement be converted easily into forces of production? This is not necessarily the case. We can summarize experiences during the process of developing and extending small-scale wind-powered generators. I feel that we first must have a mature technology, particularly one that is suited to our national conditions. The State Science and Technology Commission held a conference on attacking key problems with small-scale wind power generators in 1983. Although large-scale wind-powered generators had become the primary direction in the development of wind energy internationally at the time, consideration of our national conditions led us at the conference to continue choosing small-scale wind-powered generators of about 100 W as the goal for attacks on key S&T problems in the short term in organizing staffs composed of scientific research units, plants, and users for attacks on key problems. Subsequently, they produced products of rather high quality. Then, they focused on demonstration and extension work and established maintenance staffs. Wind-powered generators gained respect in farming and pastoral regions and the number of users grew continually. At the same time, it promoted the development of a wind-powered generator industry and the original plants used technical transformation and reinforced management to form the capacity to produce several 10,000 units. Practice has proven that our choice at that time was correct. Here, we can see the entire process of scientific research → production → demonstration → extension → industrialization. In it, every link is indispensable, and it requires support by the corresponding preferential policies. Otherwise, it would be hard to achieve industrialization. At present, work by China and the EEC on Dachen Island is in the demonstration stage and the next step will require cooperation in conversion to commodities and industrialization to form a production capacity with an economic scale to take over markets over a larger range and extend these advanced technical achievements.

To make fullest use of China's rather strong advantages in S&T forces and better utilize our existing industrial foundation to promote commodification of high technology and new technical achievements and to promote development of high and new technology industries, the State Council approved implementation of the "Torch Plan" by the State Science and Technology Commission beginning in August 1988. This plan is first of all a macro guidance-type plan which adopts measures in various areas to create environmental conditions conducive to the development of high and new technology industries. At the same time, it also calls for existing high and new technology realms in which China has definite foundations and advantages to use domestic and international markets as a guide for developing high and new technology products, forming a definite production scale, and striving to enter international markets. New energy resources are one of the main realms it contains. Another main task of the "Torch Plan" is to adhere to the policy of opening up to the outside world, promote the formation of all types of international cooperation, and take an

international road in developing high and new technology industries. I believe that the Sino-EEC Dachen Island new energy resource demonstration project will play an active role in promoting the development of new energy resource industries in China. In the past, the State Science and Technology Commission has supported the development of new energy resource technologies and it should continue to provide support. I also hope that all of society will be concerned for our new energy resource sector and create environmental conditions conducive to the development of new energy resource industries.

### III. There Are Vast Prospects for Sino-EEC Cooperation in the Realm of New Energy Resources

New energy resource technologies are emerging technologies which touch on many disciplines and many fields, and the State Science and Technology Commission has consistently supported and promoted the development of various forms of international cooperation in this realm. Since 1980, China has engaged in S&T cooperation with many nations of the world, particularly members of the EEC, which has played an important role in promoting the development of China's new energy resource sector. The Sino-EEC Dachen Island new energy resource system is one of the biggest cooperative projects among them and both parties have invested large amounts of capital and manpower. Now, through the efforts of experts from both sides, this project is being implemented smoothly. I feel that the EEC, China, and other developing nations will benefit from this project. The EEC has advanced new energy resource technologies but the market for new energy resources in Europe is limited, whereas there are vast market prospects for new energy resources in China. China, for example, has over 6,500 islands but only 400-plus islands are inhabited. Most of our islands are uninhabited. One of the main reasons is that they lack energy resources and fresh water and there are serious energy shortages on some inhabited islands. The State Science and Technology Commission and the relevant departments and areas are now integrating to conduct island survey work and the energy resource question is one of the main prerequisite conditions for island development. Successful demonstration of the Dachen Island new energy resource system project will provide one feasible way to provide energy resources to islands. At the same time, China is a developing nation and if European technical achievements can be applied in China and produce economic and social benefits, they can be borrowed by other developing nations. I hope that the Sino-EEC Dachen Island new energy resource demonstration project ultimately will lead both the Chinese and EEC sides onto the path of cooperative production, joint ventures, and joint development of markets in the realm of new energy resources. I believe that the establishment of cooperation on a foundation of mutual compensation for shortcomings and equal benefit will make fullest use of the advantages of both sides and give our cooperative products stronger competitive abilities in markets. At the same time, broader and more intensive cooperation

by both sides inevitably will lead to greater understanding and friendship between China and the nations of the EEC.

### Cooperation With USSR in Energy Projects Planned

40100016A Beijing CHINA DAILY in English 21 Dec 89 p 2

[Article by staff reporter Huang Xiang]

[Text] The Ministry of Energy Resources is co-operating with the Soviet Union in planning China's first pipeline to transport liquefied coal.

The project is believed by experts to be a promising alternate method to solve the country's coal transport problem, CHINA DAILY has learned.

The proposed pipeline is in Shanxi Province.

It will run from coal-producing Bingxian County to Weihe Power Plant, which is 135 kilometres distant, said Wang Jingwu, senior engineer of Beijing Coal Design and Research Institute.

The project is designed to transport 2.5 million tons of special coal slurry every year from Bingxian County via pipelines to Weihe.

Compared with railroad transport, a coal slurry pipeline is cheaper, cleaner, and safer, Wang said. He is deputy chief of engineer in charge of the project. [as published]

Wang said that with new techniques, liquefied coal can be spilled directly into a boiler for combustion, rather than having it dewatered before power generation.

"It is something new. We call it coal-water-fuel (CWF). Compared with ordinary coal, it is easier to transport, store, ignite and moreover it causes no pollution," said Wang.

But a special plant has to be set up to make the fuel, he said.

Wang said that currently Chinese and Soviet experts have finished pre-feasibility studies on the 219-million-yuan (\$55 million) project and these are about to be reviewed by the State Planning Commission.

The Soviet Union has just completed a 270 kilometre pipeline and is planning a 4,000 kilometre line from Siberia to the heavily industrialized Ural region.

According to Wang, the Soviets have extensive records on transporting and combustion of coal slurry but few experiences on making of CWF.

Under the contract, the two sides will submit feasibility studies before June of 1990. If approved by the State Council the project will start by the second half of 1991.

"Everything should be finished within the Eighth Five-Year Plan period (1991-1995)," Huang Yicheng, the minister, told a Soviet energy delegation.

The ministry hopes that a 300,000-kilowatt generating unit will be installed in 1994 followed by another in 1995.

According to the contract, the ministry will purchase from the Soviets valves, control system, generating equipment and pumps.

According to the Ministry of Energy Resources, another coal pipeline is being planned from Yu County of Shanxi to Weifang of Shandong via Hebei Province.

The 602 kilometre pipeline will need an investment of 860 million yuan (\$182 million).

### **China Becoming Major World Energy Player**

906B0011A Beijing RENMIN RIBAO OVERSEAS  
EDITION in Chinese 23 Oct 89 p 1

[Article by Pan Yanxi [3382 5888 5045]: "China Is Becoming a Major World Energy Player: Last Year's Total Energy Production Reached 958 Million Tons of Standard Coal"]

[Text] After 40 years of hard work, the total energy production in our nation has increased from 23,710,000 tons of standard coal in 1949 to 958,000,000 tons of standard coal in 1988, a 40-fold increase. We have now become the third largest energy production country in the world.

In the past 40 years, our coal industry developed quickly. In 1949, our nation's total raw coal production was only 32,400,000 tons. In 1988, total production had increased to 980,000,000 tons. Currently, there are 600 mines mining standard coal with certified production capacity at 44,374,000 tons. There are 16 coal production mega-enterprises in our nation producing more than 10 million tons of coal annually, the total raw coal production comprising about one-fourth of the nation's total. In the eighties, local coal mines have been developing steadfastly. At the end of 1988, there were 2,325 nationalized local mines. Mines owned by cities, towns, and individuals totaled more than 79,000, producing 53 percent of the nation's annual yield.

From 1949 to 1988, the nation's total electrical installed capacity increased from 1,850,000 kilowatts to 110 million kilowatts; annual electricity production increased from 4.3 billion kilowatt-hours to 545 billion kilowatt-hours. At present, there are close to 100 hydroelectric and fuel power plants in our nation that exceed 250,000 kilowatts in electricity production. Thirteen of these produce more than 1 million kilowatts of electricity. Most of these plants were built in the eighties. Also built were 11 electricity networks of more than 1 million kilowatts. Our nation's first super-high voltage line delivering direct current at 500,000 volts (from Gezhou Dam to Shanghai) is already in use. The Taishan Nuclear

Power Plant in Jiejiang Province and the Daya Bay Nuclear Power Plant in Guangdong Province are both under accelerated construction, with completion dates set at 1990 and 1992 respectively. Since the opening of the construction of the Loubuge hydroelectric plant to international contract bidding in September 1982, by 1987, there have been 14 investment contracts signed with borrowed foreign capital, totaling US\$1.98 billion. Projects under construction will provide 7,668,000 kilowatts of power and power lines stretching for 1900.6 kilometers.

Petroleum and natural gas industries are relatively fast-developing ones after liberation. In 1988, the total petroleum production was 137 million tons, and that of natural gas was 13.9 billion cubic meters. At present, our nation has already established 18 oil and/or natural gas refineries on land and four offshore oil drilling enterprises. From 1961 to 1988, the cumulated export of crude and refined oil has reached 320 million tons. In cooperating with other countries in the offshore drilling, we have also achieved great results. We have signed drilling contracts with 45 companies from 12 countries. The contracts covered a total drilling area of 50,000 square kilometers. At present, there are 390,000 kilometers of seismic measurement lines plotted, 153 formations/sites explored, and 51 petroleum and natural gas discoveries made.

### **Energy Industry Expected To Meet Most Planned Targets**

40100015D Beijing CHINA DAILY in English 16 Dec 89 p 2

[Article by staff reporter Huang Xiang]

[Text] China's major energy production targets are expected to be fulfilled this year, CHINA DAILY learned from the Ministry of Energy Resources.

Coal output will top 1 billion tons.

State-run mines had produced 337 million tons of coal by Wednesday, fulfilling the state plan 18 days ahead of time and amounting to 18 million tons more than the same period last year.

China depends on coal for 75 percent of its energy. Other sources are oil, natural gas and nuclear power.

Electricity generation this year will be between 560 billion to 580 billion kilowatt-hours. The figure in 1988 was 539 billion kilowatt-hours, which was 40 billion kilowatt-hours more than 1987.

Crude oil output will be a little over 137.5 million tons, nearly the same as in 1988 but 4 million tons less than the state quota set for the industry this year, according to PEOPLE'S DAILY.

Some experts believe that next year's oil output will only be able to meet 95 percent of the quota set in the state's Seventh Five-Year Plan (1986-1990).

Natural gas output is expected to be 14 billion cubic metres this year, 100 million cubic metres more than last year.

### Energy Minister Settles on Energy Industry Development Plan

40130126A Beijing RENMIN RIBAO [OVERSEAS EDITION] in Chinese 20 Jul 89 p 8

[Summary of article by Wang Gaixian [3769 2395 3807] in ZHONGGUO CHENGXIANG KAIFA BAO [CHINESE JOURNAL OF URBAN AND RURAL DEVELOPMENT] No 56: "China Decides on Development Principles for the Energy Resource Industry"]

[Text] The Ministry of Energy Resources recently decided on basic principles for development of China's energy resource industry in this century: make electric power the center and coal the foundation, major efforts to develop hydropower and nuclear power, active development of petroleum and natural gas, improvement of the energy resource structure, and attention to conservation of power and oil. The relevant experts feel that China's primary energy resources should reach 1.4 billion tons of standard coal by the year 2000, including 1.4 billion tons of raw coal, 200 million tons of crude oil, a total installed hydropower generating capacity of 80,000 MW, power generation of 240 billion kWh, and nuclear power output of 30 billion kWh.

To achieve these goals, the experts suggested development strategies for coal, electric power, and petroleum:

In the coal industry, we should focus first on developing the Shanxi, Shaanxi, and western Inner Mongolia region and the northeast China region, and reinforce development of the east China region. Second, we should adopt support measures to ensure stable development of local coal mines. Third, we should exploit production potential in existing mines. Fourth, we should increase capital inputs. Besides construction capital within China, we also can consider using foreign capital.

In the area of electric power construction, the experts feel that from now on our arrangements should be centered on the two main principles of conserving coal and conserving transport. In the area of thermal power, we should focus on developing mining region and pit mouth power plants, implement joint management of coal and power, and change from shipping coal to transmitting power. The scale of newly constructed thermal power plants should be bigger, and we should adopt high-parameter, large-capacity generating units. In the area of hydropower, we should strive to build several medium-scale hydropower stations and work to add 10,000 MW in installed generating capacity over the next 12 years. Construction of large-scale hydropower stations also should be speeded up.

One can say that nuclear power construction is the source of hope for solving the electric power shortage in coastal regions of China which lack coal. Now under

construction in China are the Qinshan (300 MW) and Daya Bay (1,800 MW) nuclear power plants. The experts suggest that China focus on grasping manufacturing technologies for nuclear power equipment and achieve domestic and batch production of 600 MW nuclear power generators as quickly as possible. We will try to attain 6,000 MW in installed nuclear power generating capacity by the year 2000.

In the area of petroleum development, an urgent task is to find more reserves. The experts feel that deployments for petroleum exploration should be made to stabilize old oil fields in east China and accelerate prospecting in west China to attain the goal of producing 200 million tons of crude oil annually by the year 2000. According to this plan, we must find an average of 1 billion tons in reserves each year.

### State Council Approves 20 Billion Yuan for 27 Energy Projects

906B0021A Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 23 Nov 89 p 1

[Article by Wang Zhenjie [3769 7201 0267]]

[Text] In order to accelerate the build-up of the basic energy industry, the State Council has approved 27 energy projects involving the construction or expansion of coal and electric power capital construction projects.

These projects are: Nei Mongol Jungar strip mine first-stage construction, Ji Xian (Tianjin City) power plant, Heilongjiang Shuangyashan power plant second-stage construction, Guangzhou pumped-storage power station, Shanxi Weihe power plant, Henan Jiaozuo power plant third-stage construction, Jiangxi Jiujiang power plant second-stage construction, Harbin Number 3 power plant second-stage construction, Jiangsu Changshu power plant, Shijiazhuang power plant, Sichuan Fuling and Kai Xian power plants, Nanjing power plant, Shandong Dezhou power plant, Xi'an Xijiao power plant, Jiangsu Qishuyan power plant, the 500,000-volt Beilungang-Xiaoshao-Pingyao transmission and transformation project, the Tianshengqiao 500,000-volt transmission project, the Dongfeng-Changchun-Harbin 500 KV transmission line, the Guangdong Daya Wan 500,000-volt transmission project, Shanxi Jincheng Chengzhuang mining project first stage, Nei Mongol Huolinhe mining project, Shandong Yanzhou Jining No 2, Tianjin Junliangcheng power plant fourth-stage construction, Hebei Xingtai power plant fifth-stage construction, and the power facilities for the Daqing and Shengli oil fields.

In order to further alleviate the energy supply crisis, China continues to give priority consideration to the energy industry. In an atmosphere of capital construction projects, we are still investing 20,000,000,000 yuan to guarantee the construction of new large and medium-sized coal-powered power plant projects. The amount of invested foreign capital is about 5,000,000,000 yuan.

According to sources, among the above 27 large or medium-sized projects, total installed capacity of the electric power projects is 9,720,000 kilowatts; the new 500 KV power lines measure 2,425 kilometers in length; total capacity of the transformers is 925 kilovolt-amperes, and the annual coal yield will be 28,000,000 tons.

### **Energy Construction Plans Not Affected by Austerity Measures**

40100018A Beijing CHINA DAILY in English 12 Dec 89 p 2

[Article by staff reporter Huang Xiang: "State Plans 49 Energy Projects"]

[Text] The State Planning Commission says that 49 large and medium-sized coal mines, power generating stations and power facilities are now being planned, CHINA DAILY learned yesterday.

Being planned means that project managers can now start acquiring the land, preparing water and electricity supplies to service the project and building highways, said Wang Xianguang, an official with the State Energy Investment Company.

Most of these approved projects are expected to start construction next year, according to Wang. But he did not say where these projects will be.

The company, established two years ago, is one of the six State companies under the State Council in charge of government investment in various industries.

According to the official, 45 of these projects are funded by the central and local governments. The other four will be built with funds raised locally and run by local governments.

He said that investment involved in the 49 projects makes up 45 per cent of the total investment of the country's 75 capital construction projects of the year.

"As for investment for those which will start construction next year, energy-related projects make up some 60 per cent," Wang told CHINA DAILY. But he refused to make out the exact amount.

Experts believed that the move is a clear manifestation that State Council is living up to its promise that energy industry is not included in the current austerity programme.

Upon completion of all these projects, which takes three to eight years respectively, the annual coal production capacity of China will be expected to increase 49.24 million tons. For power-generating capacity, the increase will be 10.5 million kilowatts. Also 500,000-volt power transmission and transformation lines will be 530 kilometres more.

Three of the projects, with a total power-generating capacity of 4.14 million kilowatts, are partly financed by

World Bank loans, Wang said. Foreign loans amount to 3.2 billion yuan (\$860 million) out of a total investment of 8.1 billion yuan (\$2.2 billion) for the three power projects in Sichuan, Hainan and Henan provinces respectively.

They include a 3.3-million-kilowatt hydropower station in Ertan of Sichuan Province, a 240,000-kilowatt hydro station in Daguangpa of Hainan Province, and a 660,000-kilowatt coal-fired power station in central China's Henan Province.

World Bank loans are thus divided into 2.4 billion yuan (\$64.5 million), 250 million yuan (\$67.2 million) and 600 million yuan (\$181 million) among the three projects. [figures as published]

Wang said that among the total 49 there are two energy-saving projects. One is in the 420,000-kilowatt Zhengzhou Coal-fired Power Plant in the capital of Henan Province. The other is in the city of Tianjin.

"The two projects show that the central government is focusing both on producing and conserving energy," Wang said.

Sources from the State Planning Commission said, the State treasury has now earmarked 700 million yuan (\$188 million) for the preparatory work and more is expected to come soon.

### **Dearth of Energy, Raw Materials Expected To Last**

40100021A Beijing CHINA DAILY in English 5 Jan 90 p 1

[Article by staff reporter Gu Chengwen]

[Text] Shortages of energy and key raw materials will remain the major problem for the national economy in 1990, despite recent increases in coal supplies and a temporary slump in consumer demand, say government officials.

The chronic shortage of power and raw materials, which has plagued the country's economy for many years now, was eased recently by the slowdown of industrial growth and control of over-consumption.

State policies that favour the development of energy and raw material industries had also contributed to the result.

But it is only a temporary situation, said Zhu Liangdong, deputy director of the Department of Resources Conservation and Comprehensive Utilization under the State Planning Commission.

He said in an interview with CHINA DAILY the government expects national industrial growth to hit 6 per cent this year while that of energy would only be 3 per cent.

Figures for 1989 have not been released yet.

The growth of steel, nonferrous metals and chemical products would be even less.

As a result, coal supplies could run 20 million tons short during the year.

Zhu said this situation requires industrial businesses to increase production and improve efficiency by lowering consumption and saving as much energy and materials as possible.

He said Chinese industry squanders energy and materials.

An inefficient business could consume four times as much energy as a well run one in this country, not to speak of a well run one in a developed country.

Zhu said lowering production costs would require improved management, equipment and technologies.

He said specific regulations aimed at small rural businesses engaged in calcium carbide, iron alloy, and fertilizer production or in coking and oil refining were under consideration. These businesses usually consume large amount of energy.

Other operations would be controlled by limiting further expansion and reorganizing to use agricultural products as raw materials.

To ensure a good start for new enterprises or for expansion projects, energy saving and pollution control measures must be included in every design.

Technologies that reduce costs will be required and their use enforced through administrative means.

Zhu said conserving resources and recycling wastes will be backed by a series of rules and policies.

He said he favoured a foundation system to raise money for energy saving projects since "the State cannot provide enough funds for the purpose at present."

Part of the energy and communication funds collected from new construction projects and fines from cost overruns and damage to natural resources could become part of this special fund.

To date, Zhu said, local government and business managers have ignored these problems.

**Solutions to East China Power Shortage Reviewed**  
*906B0021B Shanghai JIEFANG RIBAO in Chinese 25*  
*Oct 89 p 3*

[Article by Zhang Debao [1728 1795 1405] and ZHONGGUO DIANLIBAO reporter Zhong Xiongjiu [6945 7160 0036]: "How To Alleviate Power Shortage in East China: Comrade Shi Dajing [0670 1129 2823], Deputy Minister of Energy Resources, Discusses Possibilities With Our Reporter"]

[Excerpts] How do we solve the power shortage crisis in East China and guarantee the smooth progress of the four modernizations? The reporter interviewed Deputy Minister of Energy Resources Shi Dajing during his tour of East China.

Shi Dajing said that the energy shortage problem in East China has existed for 18 years, the main reason being that the total demand exceeds the total supply. The base that needs building up is too large and economic development is too rapid. From 1986 to 1988, the growth of energy output of the entire nation annually was 10 percent. However, the rate of economic development was between 14 and 15 percent. Electric power was "consumed" by the overheated economy. In terms of normal investment ratios, energy construction should comprise 24 percent of the total fixed capital investment. However, in the past few years, this investment only amounted to a little more than 10 percent. [passage omitted]

Shi Dajing said that the East China region is one of the fastest growing regions economically. Also, in the last decade, local enterprises developed very quickly. Under these conditions, can the electrical supply in the East China region catch up with the demand? He suggested four solutions:

**Thermal power:** Eliminate use of small-scale units, increase use of large-scale units. Eliminate the use of wasteful small-scale units and guarantee the coal needed for large-scale power units. The nation has 15,000,000 kilowatts worth of small-scale units, and these units use 30 percent more coal than large-scale units. If we decide to eliminate the use of small-scale units, the nation can save 15,000,000 tons of coal. This is equivalent to starting up 15 1,000,000-ton coal mines.

**Hydropower:** Develop medium-sized plants. Accelerate the development of mid-sized hydroelectric power plants. According to statistics, the task we face is to develop the first stages of construction of medium-sized hydroelectric power plants. We need to deploy 10,000,000 kilowatt level medium-sized hydroelectric power plants in the whole country. This is also equivalent to saving 15,000,000 tons of coal every year.

**Nuclear power:** the best strategy. Develop nuclear power. The best strategy is to develop nuclear power. From now until the year 2000, China plans to develop 6,500,000 to 7,000,000 kilowatts of nuclear power plants. The Qinshan nuclear power plant in East China is one of the major bases.

Develop 750,000 to 1,150,000-volt long-distance power transmission lines. At this time, the electricity from Gezhouba is flowing continuously into the East China power grid. We have to deliver electricity from Northwest China to East China. We may also consider constructing power plants at remote coal mines and transmit the electricity to East China. [passage omitted]

### Guangdong Energy Output Expected To Grow 10 Percent Annually

40100023A Beijing XINHUA in English 0828 GMT 8 Jan 90

[Text] Beijing, January 8 (XINHUA)—Production of electrical energy in Guangdong Province is expected to increase at an average annual rate of 10 percent in the next decade, according to a plan drawn up by the provincial people's government.

By the end of this century, per-capita annual electrical consumption in the province will be 1,380 kilowatt-hours (kWh) as against 1,000 kWh, the national goal for the year 2000, the overseas edition of today's PEOPLE'S DAILY reported.

Efforts will be made to build some big and medium-sized thermal power plants along the coastal areas of the province. In addition to the nuclear power [plant] under construction at Daya Wan, another nuclear power [plant] will also be built in the province.

Small and medium-sized hydro-electric stations will also be built.

Because of the rapid economic construction of recent years, the province has been suffering from an electrical shortage. It is estimated that 30 percent of electrical demand in the province goes unmet.

### Big Ningxia Project Has National Significance

906B0011B Yinchuan NINGXIA RIBAO in Chinese 15 Sep 89 p 2

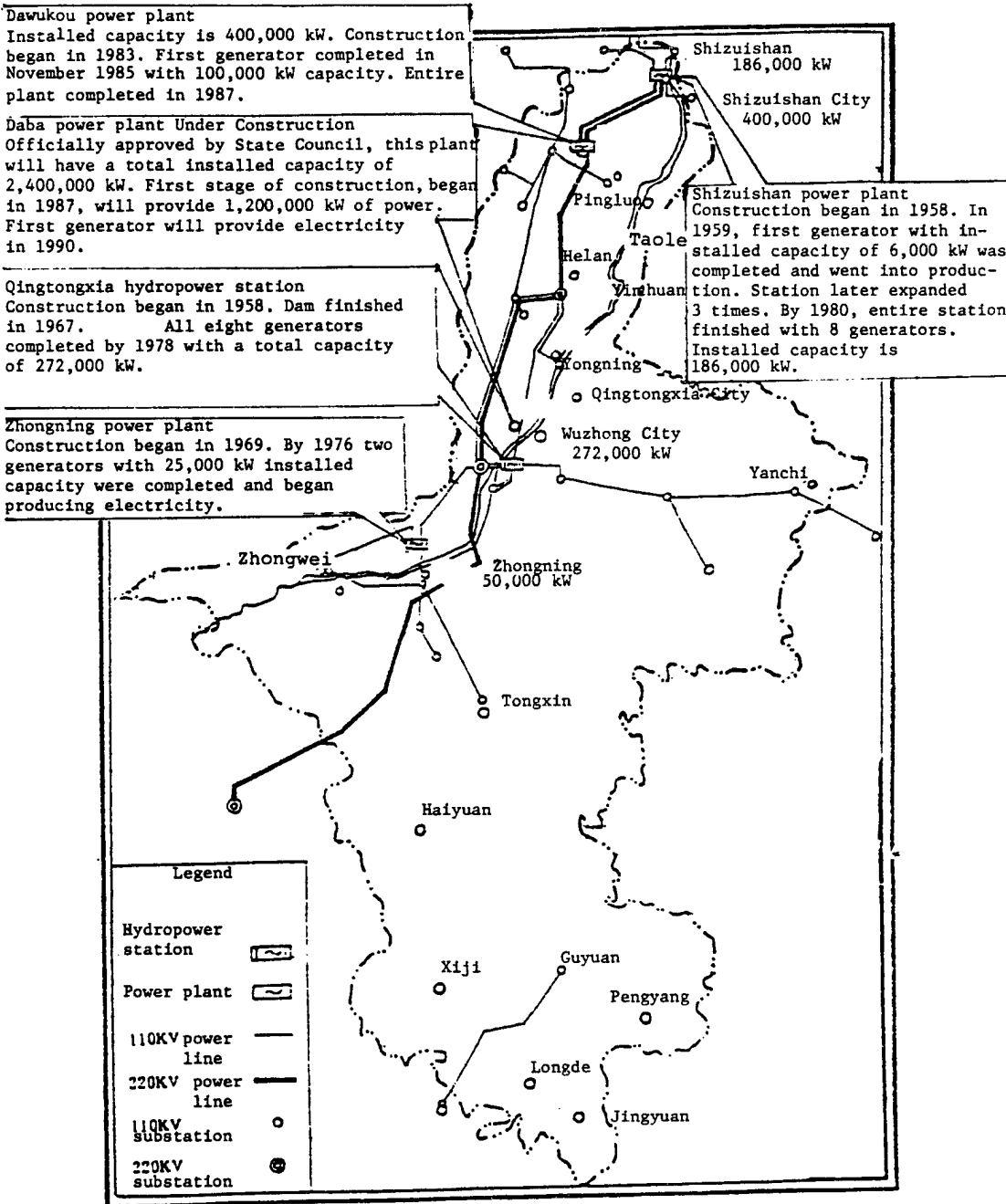
[Article by Li Yongze [2621 3279 3419] and Yu Guangren [0152 0342 0088]: "Reporters Visited Ren Qixing [0117 0796 5281], Vice Chairman of the Autonomous Region and Committee Chairman of the Ningxia Daba Electrical Plant"]

[Text] Recently, we visited the vice chairman of the Ningxia Autonomous Region, Comrade Ren Qixing, regarding developing energy sources and long-term economic planning in the region. Comrade Qixing talked to us excitedly about the strategic meaning of building the Daba power plant to our region's economic development. He said that the insufficiency of electricity is the limiting factor to our region's all-out improvement of our economic development. How can this passive situation be turned around? After research and debate by the party committee and people's government of the autonomous region, and consideration of all results, we decided in 1987 to meet the problem head-on and race against time to build the Daba power plant. The correct decision was based on extremely careful scientific dialectics, and reflected the bravery and far-sightedness of the party committee and the people's government of the autonomous region.

To illustrate the above point, let us consider the selection of the plant site. Daba power plant is on the Guobi

Beach, 18 kilometers west of the city of Qingtongxia. The site provides the best conditions for the production of electrical power from fuel. First, transportation is convenient. The plant is only 4 kilometers from Daba station on the Baolan railroad. The supply rail connects directly with the Baolan line. In between there are highways crisscrossing the two locations. Second, water supply is abundant for production needs. The Yellow River is 18 kilometers east of the plant, and purified water from the river is an unlimited source of water needed during production. Third, fuel is abundant. Daba plant is only 70 kilometers from Lingwu coal field. The total supply of high quality coal comes to 27.3 billion tons, and can be used as fuel to generate electricity. Fourth, ash fields are vast, and do not overlap with agricultural land. Ash field selection has historically been a difficult problem in the building of a fuel-powered electricity plant. The site fringes on the barren east slopes of Helan Mountain, with a vast area of waste land that can be used as an ash and waste dump site. There is an ash field 13 kilometers from Daba power plant that can provide a dump site for the following 40 years. This is an excellent condition unmatched at other power plants in the interior of our nation. For the above reasons, the State Council decided to put Ningxia Daba power plant on the list of new and significant projects amidst an atmosphere of reduction in building projects in the nation.

Daba power plant is the largest single unit fuel-powered electricity production project in the nation's northwest region. There are three stages in the project. The total storage capacity is 2,400,000 kilowatts. The first stage will see an investment of \$950 million, delivering installed capacity of 2 x 300,000 kilowatts. Plant number one is projected to generate power in the third quarter of 1990; while plant number two is projected to generate power in the fourth quarter of 1991. At that time, the plant's total electrical power will reach 4 billion kilowatts, which will fundamentally change the outlook of power supply in Ningxia and greatly ameliorate the tight industrial power supply situation in Ningxia and the rest of the northwest region. Proceeding at this pace, the project can be completed with 2 to 3 more years of hard work. Combined with the electricity produced by the two 50,000 kilowatt plants, Ningxia's total electricity capacity will reach 10 billion kilowatt hours! Contemplating this future, Comrade Ren Qixing said excitedly: "Of course, the implications of the Daba power plant are not limited to the above gains. Building this plant will promote development of coal mining in Ningxia. In a situation where railroad delivery is difficult, we can turn our rich coal mines into electricity right here. This will in turn promote the economic development of the Yinnan Huangguan region. It will also supply fairly adequate energy to high energy demand industries in the entire region as well as to the aluminum plant at Qingtongxia. In addition, it can be considered a solution to the problem of electricity supply for the people in the Yinchuan and other towns and cities."



Map of Ningxia Electricity Distribution System

When the reporters asked about financial sources, Vice Chairman Ren showed a little bit of concern. He said, executing the Daba project is like ants tackling a bone. At present, our nation's financial resources are tight. Even though it is a magnet project we often have to pray and beg for support. In order to begin production at the earliest moment, the authorities in the autonomous region are trying their best. Of course this is a self-paying project. A plant can generate 2.1 billion kilowatt hours of

power annually, and yield an annual profit of \$200 million. This is a promising future. It is exactly because of this that the project is put forth with high-interest loans. We dare to tackle this bone, reflecting a great degree of determination in the decision. The construction staff has also provided a great deal of effort and hard labor. At present, the entire project is proceeding cautiously and smoothly.

**Heilongjiang Becoming Important Energy Player**

40130133C Beijing RENMIN RIBAO in Chinese 30  
Aug 89 p 4

[Article by reporter Li Lihua [2621 4539 5478]:  
"Heilongjiang Is Becoming an Important Energy  
Resource Base Area—Power Output in Heilongjiang  
During 1988 Is 116 Times That Shortly After Libera-  
tion"]

[Text] From 1988 to the eve of China's National Day [1  
October] 1989, Heilongjiang Province placed a total of  
eight large thermal power generators into operation with  
a total installed generating capacity of 1,075 MW, among  
China's leaders in construction scale and speed.

After 40 years of construction, Heilongjiang Province  
has become a major state energy resource base area.  
Besides the large amounts of petroleum resources and  
products it provides to the state, Heilongjiang also  
produces over 70 million tons of coal annually and  
provides over 24 billion kWh of electric power to the  
state. These are several tens of times and over 100 times  
the amounts shortly after liberation.

On the eve of liberation, coal output in Heilongjiang was  
just 4.6 million tons, its installed power generating  
capacity was 171, and it produced no petroleum. After  
liberation, the state made Heilongjiang a focal area of  
construction and development and allocated substantial  
funds to develop coal and power production, and it  
began developing and building Daqing Oil Field in the  
late 1950's.

Over the past 40 years, coal industry construction in  
Heilongjiang Province has adopted the principle of  
"walking on both legs" and joint development of large,  
medium, and small scales. A focus on development of  
state unified distribution coal mines was combined with  
active development of local coal mines. The state  
focused on developing and building the four large Wuxi,  
Hegang, Shuangya Shan, and Qitai He coal base areas  
and added 45.2 million tons in coal extraction capacity.  
Yearly output from local coal mines has now reached 20  
million tons.

Heilongjiang's rich coal resources have provided deci-  
sive conditions for developing electric power produc-  
tion. After liberation, with state investments as the main  
aspect, capital was raised from many sources to build 15  
large and medium-scale power plants and add more than  
4,000 MW in power generation capacity, equal to 80  
percent of the newly added capacity in Heilongjiang.  
Heilongjiang Province as a whole generated 24.68 billion  
kWh of power in 1988, a 116-fold increase over the  
period shortly after the nation was founded.

After the 3d Plenum of the 11th CPC Central Com-  
mittee, electric power development in Heilongjiang  
entered a "golden era." From 1981 to 1985, investments  
in electric power exploitation and development reached  
1.31 billion yuan. The amount for 1986 to 1988 was 2.2

billion yuan. Heilongjiang has a total of nine electric  
power construction projects in 1989 for a total invest-  
ment of 880 million yuan.

**Guizhou To Be Major Energy Base by Year 2000**

40130133B Beijing RENMIN RIBAO in Chinese 28  
Aug 89 p 4

[Article: "Energy Resource Industry Developing Grand  
Plans"]

[Text] Officials in the Guizhou Provincial Electric  
Power Industry Bureau revealed this information on 6  
June: Guizhou will become south China's energy  
resource province around the year 2000.

This is a grand plan for Guizhou's invigoration of the  
energy resource industry.

At the end of 1988, Guizhou Province had proven coal  
reserves of 79 billion tons and preserved reserves of 48.8  
billion tons, with 74 of Guizhou's 86 counties (cities)  
having coal. This has made Guizhou special in the area  
south of the Chang Jiang and people call it the "coal sea  
of Jiangnan." After 40 years of development and con-  
struction, a coal industry system formed of state unified  
distribution coal mines, provincial coal mines, prefec-  
ture and county coal mines, and township and town coal  
mines has now attained a definite scale. A large coal  
army of hundreds of thousands of employees with pros-  
pecting, design, construction, excavation, processing,  
machinery manufacturing, and service departments has  
become the central force for continued expansion and  
intensified development of the modern coal industry in  
Guizhou. Raw coal output in Guizhou reached 32 mil-  
lion tons in 1988. Over the past few years, Guizhou has  
provided almost 6 million tons of commodity coal to the  
provinces of Jiangnan and it has become Jiangnan's  
biggest coal shipping province.

Guizhou has 13,250 MW in developable hydropower  
energy resources, seventh place in China, and it holds  
third place in developable hydropower resources on the  
trunk and tributaries of the Chang Jiang. Its superior  
comprehensive development conditions have given it  
the reputation of being China's third "coal and power  
motherlode." Completion of the Wujiangdu Power Sta-  
tion on the trunk of the Wu Jiang with an installed  
generating capacity of 630 MW and six cascade power  
stations with an installed generating capacity of 239 MW  
on the Maotiao He will accumulate rich experience for  
hydropower development in the karst regions of China.

Guizhou is located in the region of the divide between  
the Chang Jiang and Zhu Jiang [Pearl River]. Construc-  
tion of the Dongfeng Hydropower Station with an  
installed generating capacity of 510 MW on the Wu  
Jiang is now being speeded up. The second level  
hydropower station at Tianshengqiao on the Nanpan  
Jiang will be completed in 1993. Several large and  
medium-scale thermal power plants will be completed  
and begin operating over the next few years. With a

development principle of combining coal and power and combining hydropower and thermal power, an energy resource industry deployment for compensated regulation of electric power crossing river basin boundaries is now taking shape.

**Huang He: Hydropower in Upper Reaches, Coal in the Middle, Oil in the Lower Reaches**

40130130A Beijing RENMIN RIBAO in Chinese 31  
Aug 89 p 2

[Article by reporter Yang Yinglan [2799 5391 5695]: "Energy Basin Formed Along Both Banks of the Huang He With Hydropower in the Upper Reaches, Coal in the Middle Reaches, and Petroleum in the Lower Reaches, Rapid Development After 10 Years of Reform, Energy Resource Industry Emerges in the Loess Region"]

[Text] Accelerated development and construction during 10 years of reform have turned the Huang He Basin, the birthplace of China's history and cradle of ancient culture, into one of China's three decisive energy resource base areas. People call it an "energy basin."

At present, the upper and lower reaches of the big river have gradually formed an energy resource industry deployment. The upper reaches are a hydropower base area, the middle reaches are a coal base area, and the lower reaches are a petroleum base area. According to incomplete statistics, these base areas provided 32 percent of China's coal, 29 percent of our crude oil, and 10 percent of our hydropower in 1988.

Since the founding of the nation, control of the Huang He has brought gradual prospecting and development of underground mineral resources in the basin to serve economic construction. Prospecting data announced by relevant departments indicate that the basin's proven geological energy resource and mineral reserves account for 46.14 percent of the national total for coal and 25.6 percent for petroleum. Moreover, the developable installed generating capacity in hydropower resources exceeds 28 million kW.

Development and construction of the energy resource base area in the Huang He Basin began with hydropower. Shortly after the nation was founded, the state made utilization of hydropower resources in the upper reaches of the Huang He a development focus and successfully carried out hydropower cascade development and construction on the trunk of the Huang He. All of the four hydropower stations at Liujia Gorge, Qingtong Gorge, Yanwo Gorge, and Bapan Gorge were completed before the 1970's, with a total installed generating capacity of 1.96 million kW. This includes Liujia Gorge Hydropower Station, which can produce more electricity in one year than China's total electric power output in 1949. Since the 1980's began, we built Longyang Gorge Hydropower Station, known as the "first dam on the 10,000-li Huang He," and we began building Lijia Gorge Hydropower Station. Indications are that several more hydropower stations will be built for cascade development of the upper reaches of the Huang He.

The petroleum base area in the lower reaches of the Huang He sprang up in conjunction with scientific and technical progress in China. The first well was drilled at the Shengli Oil Field in 1964. Oil field exploration and development have continued to advance since the 1980's, with yearly crude oil output in 1988 of 33 million tons, equal to 24 percent of China's annual crude oil output and second only to Daqing Oil Field in output. In 1983, the State Council decided to accelerate exploration, development, and construction of Zhongyuan Oil Field and it may become another natural gas production base area in east China.

The coal base area in the middle reaches of the Huang He includes the Junggar, Shenfu Dongsheng, Shanxi, and Yuxi [East Henan] coal fields. Some experts feel that exploitation of the large coal fields on both banks of the middle reaches of the Huang He indicate that the focus of coal extraction in China will make a strategic shift from east to west China. Projections are that during the 2030's, the area may provide China with about 600 million tons of coal.

**Sichuan Seeks Overseas Investors in Hydropower***40100013D Beijing XINHUA in English 1531 GMT 12 Dec 89*

[Excerpt] Beijing, December 12 (XINHUA)—Ma Lin, vice governor of Sichuan Province, announced here today that Sichuan will develop a preferential policy and other measures to seek domestic and overseas investors to jointly exploit the hydropower potential of three river valleys—the Jinsha, Yalong, and Dadu.

Ma said Sichuan has the largest hydropower resources of China's provinces. The province boasts exploitable hydropower resources of 91.66 million kW. That could yearly produce 515.3 billion kWh of electricity.

The Jinsha, Yalong, and Dadu river valleys hold the province's main hydropower resources, the vice governor said. [passage omitted]

**500 MW Dongjiang Station Nears Completion***40130126C Beijing RENMIN RIBAO [OVERSEAS EDITION] in Chinese 15 Aug 89 p 1*

[Article: "Large-Scale Dongjiang Hydropower Station Is To Be Completed, Investment Costs 1.1 Billion and Takes 11 Years, Installed Capacity To Be 500 MW"]

[Text] The No 4 generator at the Dongjiang Hydropower Station has undergone 72 hours of trial operation and was connected to the grid to generate power on 14 August. This was the day of final completion for this key state energy resource construction project involving investments of nearly 1.1 billion yuan (renminbi) and an 11-year history.

The Dongjiang Hydropower Station is located in the middle reaches of the Lei Shui, a tributary of the Xiang Jiang in Hunan. It has four generators with a total capacity of 500 MW and will generate 1.32 billion kWh of power annually. The pouring has been completed for the 157-meter high large dam to block the river for the Dongjiang Hydropower Station. It is 35 meters wide at the base and 7 meters wide at the top. It is the first dual-arch high arch dam designed and built by China itself. It shows that China has entered advanced international ranks in dam design and construction technologies.

Dongjiang Hydropower Station has a high dam and big reservoir with a maximum water storage capacity of 9.1 billion cubic meters. It is an extremely ideal peak regulation power station for the central China region.

**Batch of Medium-Sized Hydropower Stations Planned***40130126D Beijing RENMIN RIBAO [OVERSEAS EDITION] in Chinese 11 Aug 89 p 1*

[Article: "China Will Build Several Large and Medium Scale Hydropower Stations, the Ministry of Energy

Resources Drafts Ideas for Hydropower Development Over the Next 10-Plus Years"]

[Text] Lu Youmei [7120 0147 2812], vice minister of the Ministry of Energy Resources, revealed on 10 August that over the next 10-plus years, China will concentrate forces to build several large and medium-scale hydropower stations to satisfy the demands placed on the electric power industry by development of the national economy during the first part of the 21st century.

In reporting this bit of news, JINGJI RIBAO said that the Ministry of Energy Resources had drafted preliminary ideas for hydropower development in China over the next 10-plus years. The main aspects are: the focus of hydropower construction in China over the next 10-plus years will be on developing hydropower stations on the upper reaches of the Huang He, the trunk and tributaries of the middle and upper reaches of the Chang Jiang, and the middle and lower reaches of the Hongshui He and Lancang Jiang. At the same time, we will carry out intensive development of hydropower energy resources, expand and transform existing power stations, and integrate with water conservancy projects in building power stations in economically developed but energy-short regions of east China, northeast China, central China, and other areas. In energy-short and power-short regions which lack coal resources and have communications difficulties, several medium and small-scale hydropower stations with good construction conditions will be built. Several high dam large capacity pumped storage power stations will be built in the east China region to meet the need for peak regulation in power grids.

On the basis of these ideas, information provided jointly by the Ministry of Energy Resources and Ministry of Water Resources indicates that the main projects in the group of large and medium-scale hydropower stations China plans to build in the near term are: Longtan at Tian'e in Guangxi, Laxiwa at Guide in Qinghai, Baobugou at Shimian in Sichuan, Dachao Shan at Yunxian in Yunnan, Pengshui at Fuling in Sichuan, Wanjiashai near the border between Junggar in Inner Mongolia and Pianguan in Shanxi, Tankeng at Qingtian in Zhejiang, Mianhuatan at Yongding in Fujian, Hongjiadu at Qianxi in Guizhou, Lianhua at Hailin in Heilongjiang, Daxia at Gaolan in Gansu, Jiangya at Cili in Hunan, Linjiang at Hunjiang in Jilin, Jilintai at Yining in Xinjiang, and others. Projections are that the scale of construction to begin each year will be about 5,000 to 6,000 MW.

**Shaanxi's Biggest Hydropower Project Begins To Impound Water***40130010A Beijing RENMIN RIBAO [OVERSEAS EDITION] in Chinese 26 Dec 89 p 1*

[Text] The Ankang hydropower station—the largest in Shaanxi Province—recently closed its sluice gates and began to impound water. The Ankang hydropower station is located on the upper course of the Han Jiang [Han

Shui] and has a total installed capacity of 800,000 kilowatts for a yearly output of 2.8 billion kilowatt-hours. The project's reservoir has a capacity of 2.58 billion cubic meters. The hydropower station's No 1 generator is scheduled to become operational in the third quarter of 1991.

**Parties Agree on Dadu He Development Scheme**  
*40130009A Chengdu SICHUAN RIBAO in Chinese 5*  
*Nov 89 p 1*

[Text] The Dadu He Mainstream Plan Review Meeting, sponsored jointly by the Ministry of Water Resources, the Ministry of Energy Resources, and Sichuan Province, was concluded on 4 November in Chengdu. The meeting agreed in principle on the Dadu He mainstream cascade development plan as set forth in the plan report.

Before the meeting, experts had organized on-the-spot survey teams to conduct systematic investigations focused on hydraulic resources of a dozen or so cascades on the mainstream of the Dadu He, 20 or so selected dam sites, some of the tributaries, and parts of the Min Jiang. The Dadu He is the main tributary of the Min Jiang river system, with hydropower reserves of 31.23 million kilowatts. It is also one of 10 huge hydropower bases being planned in China. The plan recommends that Dusong, Jinchuan County, be the site of the "spigot" reservoir, that the 593 kilometers from there to Tongjiezi, which is downstream, be developed in cascade fashion, and that first-stage development be focused on the stretch of river between Tongjiezi and Dagangshan (in Shimian County). The plan further recommends that first-stage work on the enormous Pubugou hydropower station (installed capacity: 3.3 million kilowatts) be started in the near future.

**Second-Phase of Harbin Power Plant Begins***40130008B Harbin Heilongjiang Provincial Service in Mandarin 2200 GMT 17 Dec 89*

[Text] The second-phase project of the Harbin No 3 power plant was officially begun a few days ago. The second-phase project of the No 3 Harbin power plant, which is one of the state key energy construction projects, includes the installation of two 600,000-kW Chinese-made power generating units, which, under the plan, will be completed and put into production by 1993 and 1995. By that time, the total power capacity of the Harbin No 3 power plant will reach 1.6 million kW and the annual power output will reach 10 billion kWh. This will enable the Harbin No 3 power plant to enter the rank of China's large thermal power plants, and will play an important role in alleviating the tense power supply situation in the northeast power grid, particularly in Heilongjiang and Harbin City.

**Haikou Power Plant's First Stage Finished Ahead of Schedule***40130133A Beijing JIEFANG RIBAO in Chinese 12 Jul 89 p 1*

[Article by reporter Li Shangzhi [2621 1424 2535]: "First Stage of Haikou Power Plant Project Completed Ahead of Schedule, Shanghai Municipality Has Contractual Responsibility for the First Foreign Investment Electric Power Project, Installation of No 1 Generator Completed and Conditions Ready for Startup"]

[Text] Several thousand crack troops in Shanghai have worked hard to push forward with equipment manufacturing and speeded up construction of the first 125 MW generator project at Hainan Province's Haikou Power Plant, for which Shanghai Municipality has contractual responsibility and which was funded by investments by Hong Kong's Hong Kong and Macao International Investment Co., Ltd. Installation of the No 1 generating unit was completed on 11 July and the conditions now exist for startup. It may be connected to the grid and generate power ahead of the original plan.

The two 125 MW generating units installed at the Haikou Power Plant were the first large-scale thermal power project whose construction was under contractual responsibility by Shanghai and the Hong Kong and Macao International Investment Co., Ltd., and it is the first "turnkey" foreign investment electric power project for which Shanghai Municipality had contractual responsibility.

In February 1988, Jiang Zemin [3068 3419 3046], then-mayor of Shanghai Municipality, convened a mobilization conference and called on people in Shanghai involved in construction to fire the first shot in the Hainan project with a spirit of seizing the hour. In March 1988, the Shanghai Municipality Government established a special Shanghai Municipality Foreign Electric Power Project Leadership Group and approved establishment of the Shanghai Foreign Electric Power Project

Contractual Responsibility Company, composed of five units, the Shanghai Electric Power Construction Bureau, the East China Electric Power Design Academy, the Shanghai Electricity Integrated Corporation, the Shanghai Foreign Economic Company, and the Shanghai Electric Power Industry Bureau to form an integrated group. They assigned over 2,000 technical personnel and workers to undertake design, civil engineering, manufacturing, installation, debugging, and production training for this project. This project had a short construction schedule, strict limiting regulations, a substantial amount of earthworks and excavation, and difficulties in materials and equipment transport. For this reason, the Shanghai Municipality People's Government reinforced its leadership and support of this project and the vast number of employees overcame all types of problems and fought day and night. Coordinating with the relevant departments in Hainan Province, they successfully fired the first 125 MW generator boiler on 31 May 1988. Debugging of 120 pieces of auxiliary equipment ended in mid-June. It is expected that the project which was to have taken 18 months to complete may now take just 15 months to finish. After three inspections by the state Ministry of Energy Resources' East China Power Management Bureau's Quality Supervision Center Station, it was felt that the project basically met ministry standards and was of superior quality.

Shanghai personnel involved in construction are now busy with design and manufacture of the power plant's No 2 generator. When Haikou Power Plant is completed in March 1990, it will substantially reduce the energy shortage in Hainan Province and create favorable conditions for the investment environment of Hainan Province.

**Zhejiang's Beilungang Plant Could Be Operational in 1990***40130126B Beijing RENMIN RIBAO [OVERSEAS EDITION] in Chinese 16 Aug 89 p 3*

[Article: "Zhejiang's Beilungang Power Plant May Generate Power in 1990"]

[Text] Construction of the Beilungang Power Plant, a key construction project in the state's Seventh 5-Year Plan, is now proceeding apace. Full installation of equipment in the main plant building is now starting.

Beilungang Power Plant is being built in the Beilun area at Ningbo. It will have a total installed generating capacity of 2,400 MW and is being built in two stages. About 2 billion yuan was invested in the first stage of the project, which is composed of two coal-fired generators, each with a 600 MW capacity, 500 kV and 220 kV power transmission and transformation projects, 35,000-ton grade coal shipping pier, ash spreading reservoir, dedicated fresh water reservoir, and other associated projects. Among them, the primary equipment for the No 1 generator and associated facilities were purchased and imported through international bidding with a World Bank loan of \$225 million. The plan is to put it

into operation to begin generating power in the second half of 1990. The No 2 generator will be connected to the grid and generate power in 1991. After the first stage of the project is completed and goes into operation, projections are that it will generate 7.8 billion kWh of power annually, which will alleviate the power shortage in the East China region.

**Shidongkou Adds Third 300 MW Unit**

*40130133D Shanghai WEN HUI BAO in Chinese 2  
Aug 89 p 1*

[Article by reporter Lu Pusheng [7047 5543 3932]:  
"Shidongkou Power Plant's Third 300 MW Generator  
Connected to Grid, Generates Power"]

[Text] The third 300 MW generator at Shanghai's Shidongkou Power Plant was connected to the grid and generated power for the first time at 1035 hours on 1 August. The Shanghai No 1 Electric Power Construction Company was responsible for installing this generator.

After going into full load trial operation, this generator can be placed into trial production. After the No 3 generator begins operation, Shidongkou Power Plant will have an installed generating capacity of 900 MW, making it Shanghai's largest power plant in terms of power output at the present time. It is capable of providing Shanghai with 20 million kWh of power daily and provides "timely rain" for the power needed for high summer loads, which will alleviate the electric power shortage in Shanghai to a substantial degree.

### Energy Ministry Promotes Gangue-Fired Power Plants

906B0019C Beijing JINGJI RIBAO in Chinese 30 Aug 89 p 2

[Text] Today, China's exceedingly tight energy supply is restricting the development of the national economy. Within the energy industry, the contradiction of power plants lacking coal and coal mines lacking power is very prominent. In order to alleviate the power shortage, apart from working hard to increase production and strictly enforcing energy conservation, the Energy Ministry has recently been promoting the generation of power with coal gangue. Those regions with the requisite conditions will implement thermal electric co-production. Based on the views of the State Council leadership, this ministry is formulating short-term plans and relevant policies for coal gangue power plant construction.

As is known, the coal gangue removed from state-controlled coal mines nationwide totals about 100 million tons yearly. Of this, 30 million tons of combustible gangue with a caloric value of around 1,500 kilocalories per kilogram is removed each year.

The construction of coal gangue-fired power plants near coal dressing plants would yield very good social and economic benefits. First, it increases power generation, alleviating the shortage of power supplied by the power grid to the coal mines and ensuring the mines' normal production. Second, it conserves coal. One 24,000-kilowatt gangue-fired power plant can generate 150 million kilowatt-hours per year utilizing 500,000 tons of coal gangue and saving 150,000 tons of coal. Today, the combustible coal gangue extracted in China annually can supply fuel for coal gangue-fired power plants with a total of 1.5 million kW in capacity. Third, it reduces the land occupied and environmental pollution. Adoption of fluidized-bed boilers to burn coal gangue to generate electricity can keep the emission of sulfur and nitrogen oxides and other harmful materials below the environmental protection standards regulated by the state. Fourth, it invigorates the economy of the coal mine. Fifth, the implementation of thermal electric co-production concentrated heat supply can also take the place of, and make obsolete a group of scattered, low efficiency small boilers and is of greater energy conservation effectiveness.

According to investigations, prior to 1988, China's state-controlled coal mines had built 14 coal gangue-fired power plants for a total installed capacity of 146,000 kilowatts and an accumulated generation of 3.2 billion kilowatt-hours. Thirteen million tons of coal gangue were used, saving 3 million tons of coal while the profit of the enterprise was 50 million yuan.

In order to encourage power generation with coal gangue, the state has formulated a supporting policy of providing low interest loans and reduced or eliminated taxation. Moreover, it is studying the formulation of a

future policy of construction of coal gangue power plants to complement new coal mine construction projects.

### Railways Fulfill Coal Shipping Quota

40100017A Beijing XINHUA in English 1231 GMT 20 Dec 89

[Text] Beijing, December 20 (XINHUA)—Chinese railways fulfilled this year's coal transportation quota 18 days ahead of schedule by moving a total of 580 million tons, a spokesman for the Ministry of Railways announced here today.

This has helped ease the strain on China's coal supply, the spokesman said.

He said that now ample coal is being supplied to major users like electricity-generating networks and iron and steel plants.

According to the spokesman, Chinese railways expect to have moved a total of 610 million tons of coal by the end of this year, an increase of 44 million compared with last year.

### Progress at Huge Shenfu Fields Reviewed

906B0019B Xian SHAANXI RIBAO in Chinese 13 Oct 89 p 1

[Text] At the Shenfu coal fields, currently China's largest verified coal reserves, since initially entering development in the 80's and through several years of rigorous start-up work, some scale has been achieved in coal field transportation, electric power and coal mine construction. The primary construction projects of the project's first phase have basically been completed. One after another work on the main construction projects of the second phase large-scale development of the coal field has also begun.

—Transportation requirements are already fairly well developed. The coal field's first route for outward transport—the Baotou to Shenmu railway, begun in 1986, was completed in March of this year. Its annual transport capacity is 10 million tons. The entire eastern leg of the railway from Shenmu to Shuoxian in Shanxi, upon which the coal field relies for large-scale development, is a controlled project. This year, work on it also got under way. Plans call for its opening in 1992. Simultaneous with this, the radiating network of highways going through to each mining district for mass coal transport will be basically completed and transport will commence.

—Electric power construction. The mining district's first pit-mouth power plant—the Huaneng Dianta power plant—lit off its first 12,000-kilowatt unit this September. The second generating unit could also come on line within the year. The Guantong mining district's two northern and southern 110-kilovolt alternating-current transmission lines can basically fulfill short-term developmental needs. Construction of the

two 50,000-kilowatt generating units of the power plant project's second phase will commence soon.

—Results of coal development are already to be seen. Since 1986, along the rail line from Daxiaota in Shenmu to the Getai mining district, a focus of development, there are over 80 coal mines on which construction has begun. According to statistics, more than 400 small coal mines have been set up around the large coal pits and fields in Shenfu's two counties. Since 1984, almost 2 million tons of coal have been sold and transported to other areas. Dressed coal exports totaled 1 million tons, yielding US\$27 million in foreign exchange.

### **Yima Output Hits 10-Million-Ton Mark**

*40100015B Beijing XINHUA in English 1128 GMT 22 Dec 89*

[Text] Zhengzhou, December 22 (XINHUA)—With its production of 10 million tons this year, the Yima coal-mining area in Henan Province has become China's 17th superlarge coal field.

Thousands of coal miners and their families have celebrated the achievement with singing and dancing and general festivities.

The Yima coal field was only a coalpit with an annual output of 300,000 tons 40 years ago. But in recent years new mines have been added, raising the productive capacity of the old.

In fields, which employ more than 50,000 miners, excavation mechanization has reached 66 percent.

At a ceremony held Wednesday at Yima, Yu Hongen, president of the China National Coal Corporation, said the Yima coal field had set an example for others in improving the production capacity of old mines.

According to the China National Coal Corporation, the output of another coal field in northeast China's Heilongjiang Province will also hit 10 million tons by the end of this year and become the 18th superlarge field.

Tan Enli, senior economist at the China National Coal Corporation, said the 18 superlarge fields have produced 250 million tons this year, representing a quarter of the country's total output of coal.

### **Big Panji No 2 Mine in Anhui Begins Operation**

*40100013C Beijing XINHUA in English 0910 GMT 2 Dec 89*

[Text] Hefei, December 20 (XINHUA)—The Panji No. 2 Coal Mine, a new modernized mine with an annual production capacity of 2.1 million tons in south Anhui Province, east China, started production today.

With an extraordinarily-low content of sulphur and phosphorus, the coal of the new mine is of fine quality and suitable for the coking, power-generation and chemical industries.

It is believed that construction of the mine at a place of geological complexity will not only help to ease the strain on the energy supply in east China, but also provide new technology for coal mine construction.

The South Anhui Coal Mine, to which the new mine is attached, is one of China's 10 major coal mines under construction. There is a proved reserve of 14.3 billion tons of coal.

The development program of the South Anhui mine calls for four pairs of large and extraordinarily-large mines with a total annual production capacity of 13 million tons of coal. The Panji No. 1 Coal Mine went into operation in 1983. It is expected that the Panji No. 3 Coal Mine will be built before the end of 1991.

### **Work on Jidong Coal Field Begun**

*40100015C Beijing XINHUA in English 1504 GMT 24 Dec 89*

[Text] Jinan, December 24 (XINHUA)—Construction of a pair of shafts began today at the Jidong coal field in Yanzhou, Shandong Province.

The shafts will have an annual production capacity of four million tons.

Covering an area of 350 square kilometers, the Jidong coal field in southwestern Shandong has verified reserves of 2.44 billion tons of quality coal.

The construction of the shafts marked the beginning of the exploitation of the coal field.

The state plans to build four pairs of shafts in the coal field in the next 15 years, with a combined production capacity of 12 million tons.

### **Xinjiang Described as 'Sea of Coal'**

*906B0019A Guangzhou NANFANG RIBAO in Chinese 29 Oct 89 p 2*

[Text] According to reports of relevant ministries, the newest survey data of the Xinjiang Coal Field Geological Exploration Company indicates that Xinjiang's estimated coal reserves approach 1.6042 trillion tons, accounting for 35.7 percent of estimated reserves nationwide. With its abundant petroleum reserves added to this, Xinjiang will become China's critical energy base for the 21st Century.

Xinjiang is well endowed with coal reserves. North and south of Tian Shan, over one-half of the counties and municipalities have coal reserves. Particularly well endowed is the area to the north of Xinjiang along Tian Shan. The coal bearing area of the entire region exceeds 80,000 square kilometers, equivalent to most of Zhejiang or Jiangsu provinces. The quality of Xinjiang coal is

good. It has low sulfur, phosphorous, and ash content, and its caloric value is high. The proportion of high quality coal reserves is large. Another feature of Xinjiang's coal reserves is that there are many coal layers;

they are thick and the resources are at shallow depth. In some coal regions of eastern and northern Xinjiang there are 30 to 40 layers, with thicknesses of 50 to 100 meters. This is not often seen in China proper.

### Oil Production Fails To Meet Target

40100015A Beijing CEI Database in English 19 Dec 89

[Text] Beijing (CEI)—China produced a total of 125.79 million tons of crude oil in the first 11 months this year, 0.6 percent more than that of the same period last year, but its daily oil output failed to meet the planned quota, informed sources from the department concerned said here.

The Daqing oil field, the largest in China, decreased 0.3 percent in oil output, 3.7 percent in crude oil processing, 3.5 percent and 4.2 percent in gasoline and diesel oil output respectively compared with the same period last year. However, its gas production registered an increase.

### Oil, Gas Corporation Seeks To Exploit Untapped Resources

40100013E Beijing XINHUA in English 0658 GMT 11 Dec 89

[Text] Beijing, December 11 (XINHUA)—The China Oil and Gas Corporation is striving to enter a new era by surpassing its annual quota of 962.5 million bbls of crude oil this year, the PEOPLE'S DAILY says today.

The results obtained by China's oil industry over the past 10 years are obvious. However, it is also experiencing difficulties as most of the oil fields are getting old and can hardly maintain their annual quota or increase output.

To boost production, the corporation has decided to tap its potential by steadily developing production in the east while speeding up prospecting in the west.

An official of the corporation said it will transfer skilled workers and technicians across the country to help to prospect for oil and sink wells in the west. It will also launch a drive to increase production while practicing economy.

### Big Oil Fields Found in South China Sea

40100014A Beijing CHINA DAILY in English 5 Dec 89 p 1

[Article by staff reporter Li Zhuoyan]

[Text] Guangzhou—The northern South China Sea is poised to become another of China's major oil and gas production centres, a leading provincial official told an international meeting in Guangzhou.

Twenty oil and gas fields have so far been discovered in the Pearl River Estuary, where some 38 oil firms from 12 countries are currently involved in exploratory ventures, according to Vice Governor Lu Zhonghe of Guangdong Province.

The United Nations-sponsored Marine Engineering Geological Meeting on Petroleum Survey for Developing Countries is one of a series of international meetings the

UN Department of Technical Cooperation for Development has organized this year on various issues related to global energy resources. It is co-sponsored by China's Ministry of Geology and Mineral Resources (MGMR).

The meeting, which will continue through tomorrow, is the first being held in Guangzhou, capital of Guangdong Province.

Speaking at the opening ceremony of the meeting, Xie Qimei, Under-Secretary-General of the United Nations, said that the theme of this meeting is marine engineering geological survey with particular reference to the development of oil in developing countries.

Fifty marine geoscientists and engineers from 18 developing countries and 8 developed countries joined 60 others from China to discuss the issue. Over 50 theses will be presented.

"Oil demand in developing countries maintains an upward trend," said Xie. "They have more than doubled their oil consumption in the last 20 years."

However only a few of them have abundant oil resources, and for the rest of them, high oil prices have added to their already excessive foreign debts.

Since half of the world's undiscovered oil is most probably beneath the sea, marine engineering geological surveys should be undertaken to explore for oil and gas in deeper waters.

In this regard, it is essential that technology be transferred to the developing countries.

In China, as reviewed by Xia Guozhi, Vice-Minister of MGMR, in the past ten years, geohazardous events in offshore China seas have followed the undertaking of marine resources development.

Chinese government has put more and more emphasis on the study and research of this issue, and good results have shown.

Also at the opening ceremony, Lu Zhonghe, Vice-Governor of Guangdong Province, reviewed a series of discoveries of oil and gas in the South China Sea.

He said that at the end of 1970's, the Guangzhou Marine Geological Survey's discovery of high-yield commercial oil flow in the Pearl River Mouth Basin attracted attention from oil industries at home and abroad.

Since then, international oil companies have been actively involved in the exploration of the northern part of the South China Sea.

So far, 38 oil companies from 12 countries are exploring the ocean floor and have found more than 20 oil and gas fields, of which three are big and three medium-sized ones.

"The northern South China Sea will become a new oil and gas production base of our country," predicted the vice-governor.

The meeting will have 5 days of technical sessions covering development of offshore oil and gas resources, high resolution geophysical surveys and some other topics.

#### **Jilin Oil Field Output Up**

*40130008A Changchun Jilin Provincial Service in Mandarin 1030 GMT 12 Dec 89*

[Summary] The Jilin oil field has prefulfilled its annual production plan by 19 days. Its crude oil output has reached more than 3.23 million tons, an 8.8 percent increase over the same period of 1988, topping its previous peak.

#### **Oil Field Discovered in Shaanxi**

*40100023B Beijing XINHUA in English 1036 GMT 5 Jan 90*

[Text] Xi'an, January 5 (XINHUA)—An oil field with a verified reserve of 70 million bbl has been found at Nanniwan, an agricultural area in northwest China's Shaanxi Province.

The oil deposit lies at a shallow depth.

To date, seven test wells have been sunk, and three of them are expected to be high-yielding.

#### **Natural Gas Field Verified in Henan**

*40100023C Beijing XINHUA in English 1505 GMT 10 Jan 90*

[Text] Zhengzhou, January 10 (XINHUA)—A gas-bearing belt with a reserve of 100 billion cubic meters has been verified in the Zhongyuan oil field in central China's Henan Province, according to an oil field official.

The belt, covering an area of 72.7 square kilometers, is believed to be the second-largest natural gas deposit in China. It is expected to produce 1.2 billion cubic meters of gas annually, the official said.

The Zhongyuan oil field was developed 14 years ago. It covers an oil-bearing area of 268.4 square kilometers and has a verified oil reserve of 4.46 billion bbl.

**Control Rod Systems Accepted at Qinshan**

*40100013B Beijing XINHUA in English 1518 GMT 2  
Dec 89*

[Text] Shanghai, November 2 (XINHUA)—A consignment of 40 control rod systems for China's first nuclear power plant, Qinshan, were checked and accepted by the government here November 30.

The systems were developed by China over the past 15 years.

China started to build the Qinshan nuclear power [plant] in Zhejiang Province in 1984, and it is expected to go into operation in 1990. It will have a generating capacity of 300,000 kW.

**Plants Could Dot Coastal Areas by Year 2000**

*40100013A Beijing CEI Database in English 1 Dec 89*

[Text] Chengdu (CEI)—Construction of nuclear power facilities will be gradually spread throughout east China's coastal areas in the 1990s, an official from the China Nuclear Industry Corporation said here Wednesday.

By the year 2000, the coastal areas will have a total generating capacity of 6 million kW of nuclear power and facilities with a total capacity of another 6 million kW will be under construction.

China started research and planning of nuclear power facilities in the 1970s. In 1985, China started construction of its first nuclear power station, the Qinshan nuclear power [plant], which has a generating capacity of 300,000 kW.

In 1987, construction started on the Daya Bay nuclear power [plant] in Guangdong Province. It will have a capacity of 1.8 million kW.

The Qinshan nuclear power [plant] is expected to go into operation by the end of next year and the second phase of the project has already been approved by the State Council.

Liaoning, Guangdong and other coastal provinces as well as Shanghai, where coal and electricity are in short supply, are preparing for the construction of nuclear power plants.

Meanwhile, China will cooperate with other developing countries in building nuclear power stations.

**Developing Alternative Energy Sources in Eighth 5-Year Plan**

906B0012A Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 12 Sep 89 p 1

[Article by Guo Yichun [6753 2011 2504]: "Experts at Conference on Alternative Energy Sources Policies and Planning Urged To Develop New Energy Sources in Executing the Eighth 5-Year Plan"]

[Text] Over 100 experts at the national new energy sources policies and planning conference called for placing top priority on the development of alternative energy sources in the execution of the Eighth 5-Year Plan in the area of scientific and technological advancement. This is especially important since available traditional forms of energy are in such short supply in China, where 200 million people do not have electricity. The experts recognized the predicted decline in the earth's traditional forms of fuel, of which fossil fuels constitute a major part. They suggested that given the nation's situation, energy from the sun, biomass, the wind, the ocean, geothermal heat and hydrogen should be major sources of alternative energy.

At the moment, energy produced by solar cells is nearly 4.5 million Watts. There are 100,000 hectares of solar heating units in existence. In addition, there are 4,600,000 methane tanks. At the end of 1988, the number of mini-generators producing electricity had reached nearly 80,000 units and total installed capacity had reached 8,000 kilowatts. Eight tidal power stations have been built with a total installed capacity of 12,000 kilowatts. The total generated from direct geothermal conversion reached 380,000 kilowatts.

However, generally speaking, our expertise in the use of alternative forms of energy is still far below international standards. Experts in the conference hoped that in the Eighth 5-Year Plan, we can bring together our limited financial and material resources to establish corresponding policies. We must organize specific projects in science and technology. It is especially important to achieve, by 1995, sound approaches in the research of materials and techniques in the production and use of alternative forms of energy.

This conference was co-hosted by the State Planning Commission, the Chinese Academy of Sciences, the Ministry of Energy and the Ministry of Agriculture. The conference was held from 6 September to 9 September in Fuhahaote. The conferees made many comments on the article titled "Suggestions on Plans and Policies in Developing Alternative Sources of Energy in the Eighth 5-Year Plan" which was drafted by the Professional Subcommittee on Alternative Energy of the Chinese Energy Research Council.

**Exploitation of New Energy Sources Urged**

906B0012B Beijing GUANGMING RIBAO in Chinese 9 Oct 89 p 2

[Article by Liu Sa [0491 7366]: "About 100 Experts Called Attention to the Importance of Exploiting Alternative Forms of Energy at the Conference on Policies and Planning on New Energy Sources"]

[Text] About 100 experts recently attended a conference on developing alternative energy planning and policy held in the city of Fuhahaote. The experts urged that special attention be paid on the development and utilization of alternative energy, so that our nation's rich sources of energy from the sun, wind, biomatter, the ocean, the earth's heat and other forms of recyclable energy can be parts of our nation's arsenal of energy resources. This can be achieved with the principles of local and complementary use of available energy in mind. This will in turn affect our nation's development and research on alternative energy to a similar magnitude.

The experts pointed out that traditional energy sources such as fossil fuel, coal, petroleum, natural gas and other non-recyclable forms of energy are limited in supply. Authorities estimate that in 80 years, the world's supply of petroleum and natural gas will be depleted. Coal will only last for another 200-300 years. The supply of petroleum and natural gas identified in our nation will only last us till around 2057-2065. Coal will be more and more difficult to mine 40 years from now.

Also, countries that use coal and petroleum as their major energy sources are facing severe problems of environmental pollution. Fossil fuel generates large amounts of carbon dioxide and sulfur dioxide, hence creating the greenhouse effect, which has become the gravest problem facing the entire world. Not only is our nation the most populous one in the world, we also burn the greatest amount of coal and generate more carbon dioxide. We should therefore work with other countries in the prevention of the worsening of the greenhouse effect. Developing and utilizing alternative energy is an effective strategy.

The experts pointed out that many countries in the world are paying much attention to this matter. For example, the Central Committee of the Soviet Union held an expanded conference on the energy problem in June of 1988. During that conference, they criticized the human dependency on the use of coal, petroleum and other traditional forms of energy. They demanded putting great emphasis on new research approaches and methods to increase productivity. A research institute in the United States reported that by 2010 the United States will enter the era in which all of the energy used in the nation comes from recyclable sources. By 2010, its recyclable energy will generate 140 million kilowatts. By 1995, Denmark plans to produce 10 percent of its electricity by harnessing wind energy. India plans to obtain 15 million kilowatts of electricity from recyclable

energy sources by the year 2000. This is equivalent to 250 million tons of standard coal, which is one-fifth of India's energy sources.

In recent years our nation's use of alternative energy sources has produced tremendous results. For example, in Yangbajing, Tibet, geothermal energy production has generated 19,000 kilowatts of power. The energy generated is half that of the city of Lhasa. In terms of oceanic energy, we have built eight tidal generators, with a total installed capacity of 11,000 kilowatts. In terms of wind power, there are more than 70,000 small-scale wind-powered generators and a number of medium-sized wind-powered generators and water pumps. Significant progress has also been made in the areas of energy for the sun and biomatter.

However, generally speaking, the amount of alternative energy harnessed is still extremely small. For example, we can develop tidal generators with 21.58 million kilowatts of total installed capacity; this would account for one-fifth of our nation's current total energy production. However, we only generate 7,000 kilowatts of power. This is only 0.03 percent of the total installed capacity we can generate. Other alternative energy sources are showing similar trends. Faced with the problem of 250 million people in our nation without

electricity, the experts suggested that appropriate authorities should emphasize and put into practice the development and utilization of alternative forms of energy. Toward this goal, they made the following suggestions:

1. Recognize the importance of alternative energy. Obtain a macroscopic evaluation of its usefulness, so that developing and utilizing alternative energy receives at least the same degree of priority as that of ordinary energy. This item should be written into the science and technology section of the Eighth 5-Year Plan.
2. Current hierarchy and administration are fairly unorganized, and chains of command are not clear. Given the above situation, appropriate authorities should heed the premise of enlisting the proactivity of various sources in order to centralize organization and regulations, divide responsibilities fairly, and streamline leadership. This should prevent low quality repetitive research, production, and merchandising.
3. Establish fiscal policies in the utilization of alternative energy technology. For example, establish alternative energy development foundations and support key R&D areas. Investment institutions should lower interest rates when providing loans to alternative energy work and extend loan periods and lower or exempt taxes on alternative energy products.

**Shanghai Conservation Effort Termed a Success**

40130126E Shanghai JIEFANG RIBAO in Chinese 3  
Jul 89 p 1

[Article: "Obvious Achievements in Energy Conservation in Shanghai, Energy Consumption During the First 4 Months of 1989 Down by 4.2 Percent From the Same Period in 1988, Waste Still Exists, Extremely Substantial Potential for Conservation"]

[Text] Shanghai has made considerable progress in energy conservation work over the past few years. Statistics show that the gross value of industrial output in Shanghai during the first 4 months of 1989 was 36.054 billion yuan, up by 10.1 percent over the same period in 1988, while total energy consumption in the city was 7,989,400 tons of standard coal, down by 4.2 percent from the same period in 1988. This included industrial energy consumption of 6,863,100 tons of standard coal, a decline of 4.4 percent from the same period in 1988. At the same time, there is extremely substantial potential for energy conservation in Shanghai. Materials consumption has risen and waste of energy and raw materials persists.

Data provided by relevant departments in Shanghai show that energy consumption per 10,000 yuan in value of industrial output during 1988 was 2.21 tons of standard coal, a decline of 1.3 percent from 1987. Total conservation and reduced utilization in Shanghai from 1986 to 1988 amounted to 1.81 million tons of standard coal. During this 3-year period, Shanghai conserved, substituted for, and recovered for utilization 1.506 million tons of various types of materials. In 1988, Shanghai carried out comprehensive utilization of 4.77 million tons of blast furnace slag and raised the utilization rate to 79 percent.

One thing that is hard to ignore is that materials consumption in Shanghai has risen and the phenomenon of waste of energy resources and raw materials persists. During 1988, there were 18 plants in Shanghai which exceeded coal consumption quotas by more than 1,000 tons for a total of 27,000 tons of coal consumed in excess of quotas. They included the Shanghai Dafu Rubber Mill with excess consumption of 2,458 tons, the No 10

Chemical Fiber Plant with excess consumption of 2,346 tons, and the Shanghai Soft Drink Plant with excess consumption of 2,024 tons. Electricity consumption rose for 61 products in Shanghai during 1988, with 269 million kWh of electricity being consumed compared to the same period in 1987. Unit electric power consumption for 120 products inspected by the Shanghai Municipal Economic Commission during the first quarter of 1989 showed increases for 61 products compared to the same period in 1988 which consumed an additional 72.65 million kWh of electric power.

There is very substantial potential for energy conservation in Shanghai.

Potential for power conservation: Shanghai has 283 major users of power which consume over 5 million kWh and 32 of them began power equilibrium work during 1988, saving 210 million kWh of electricity, a power conservation rate of 5 to 7 percent. If all the other major users did power equilibrium work, they could conserve at least 560 million kWh annually.

Potential for coal conservation: Shanghai has 1,073 major coal users and 265 of them exceeded consumption quotas in 1988 for excess consumption of 54,900 tons of coal. Enterprises which focus on heat supply systems (boilers, heating networks, etc.) usually can have coal savings of 5 to 6 percent. Measurements show that a 1 percent increase in the thermal efficiency of boilers can produce coal savings of 1.3 to 1.5 percent. Raising the thermal efficiency of all of Shanghai's industrial boilers by 5 percent could save 200,000 tons of coal. Every 2.5 percent reduction in the carbon content of coal slag can save 1 percent of coal. Shanghai's industrial boilers now produce over 1 million tons of coal cinders with a carbon content in excess of 15 percent. Reducing the carbon content by 2.5 percent could save 25,000 tons of coal. Finding leaks is a rather serious problem in many plants now, and a conservation of 10 percent could save 350,000 tons of coal in Shanghai as a whole. Comprehensive technical transformation of a 4-ton rapid-setup boiler can conserve more than 100 tons of coal yearly. Over 1,000 boilers in Shanghai have now been transformed, which can save 100,000 tons of coal a year, but some have not been transformed and continue to waste coal.

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