

AREVA IN CHINA



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AREVA

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With manufacturing facilities in over 40 countries and a sales network in over 100, AREVA offers its clients technological solutions for nuclear energy and electrical transmission and distribution. The group also provides interconnect systems to the telecommunications, computer and automotive markets.

These businesses engage AREVA's 70,000 employees in the 21st century's greatest challenges: making energy and communication resources available to all, protecting the planet and acting responsibly towards future generations.

For further information: www.aveva.com

INTRODUCTION

During an official visit to China in October 2004, President Jacques Chirac reiterated France's willingness to "become a partner of reference for China" by establishing "exemplary cooperation to meet [the country's] requirements" and to "favour the growth of French companies." China has already imported more than 2,000 added value products from France, worth 10.9 billion US dollars and making the latter the European Union's second largest exporter in terms of technology.

The results achieved in the nuclear energy field illustrate the exemplary nature of the cooperation between France and China. Over 20 years, China has developed the nuclear technology for generating electricity, using the expertise and knowledge of the AREVA Group.

AREVA has been present in China since 1986 and now employs 3,500 staff there. The group supplied the nuclear islands for 4 reactors at Daya Bay and Ling Ao as well as technology and equipment for 4 more reactors at the Qinshan II and Tianwan plants. AREVA has developed an ambitious program for transferring technology to the Chinese industry and developing local skills.

The group's objective is to remain China's partner of choice in terms of its nuclear program. During an official visit to France in June 2004, China's Vice Premier Zeng Peiyan said he was in favor of "overall and long-lasting cooperation between China and France in the field of nuclear energy". AREVA took the opportunity to sign two letters of intent for cooperation over technology from its next generation of nuclear reactors.

Electricity consumption forecasts report a need for 900 GW through 2020 and the country's objective is to increase nuclear-generated electricity from 1% to 4% of its total output (36 GW: the equivalent of around twenty 1,500 MWe reactors). An official decision to build 4 new reactors was announced in July 2004 and a further decision concerning another 4 reactors is expected in the near future. Various construction sites are being considered, mainly along the country's eastern coast.

An official decision to build four duplicate reactors was announced in July 2004. In addition to these four duplicate reactors to be built on existing sites, China has decided to build four 3rd generation reactors at Yangjiang and Sanmen. An international call for tender was launched on September 28, 2004. AREVA will reply to the tender by offering its EPR model.

AREVA also aims to expand its Chinese operations into exploring and extracting uranium ore as well as into waste processing and decontamination.

AN INEVITABLE RISE IN THE DEMAND FOR ELECTRICITY

China has undergone considerable economic expansion in recent years and its demand for electricity has soared. In 2003, the Chinese gross domestic product (GDP) was estimated at 11.6694 trillion yuan, an increase of 9% on the previous year and its highest growth since 1997¹.

The 16th Chinese Communist Party Congress set itself the objective of quadrupling GNP between 2000 and 2020, which means an average growth of 7% per year over a period of 20 years.



The production of electricity is a key factor in ensuring the success and sustainability of economic and industrial evolutions that are currently underway. Official estimates report an average of 4% growth in electricity demand per year through 2025. But soaring industrial development has outstripped the supply of power. In 2003, electricity consumption increased by more than 15% in China and power shortages occurred in a number of regions in summer and winter. The State Electric Power Regulatory Commission attributed the situation to a number of factors which include:

- Many thermal power plants, which constitute the bulk of China's power supply, are operating below their capacity due to the inadequate coal supply.
- Dry spells reducing the water level. As a result, hydroelectric plants were not able to operate at full capacity.

¹ Speech at the press conference on 2003 GDP figures, Li Deshui, National Bureau of Statistics, January 20, 2004

- Energy-intensive industries, including the production of steel and non-ferrous metals, have reported strong growth.
- Use of electricity for heating systems is rising.

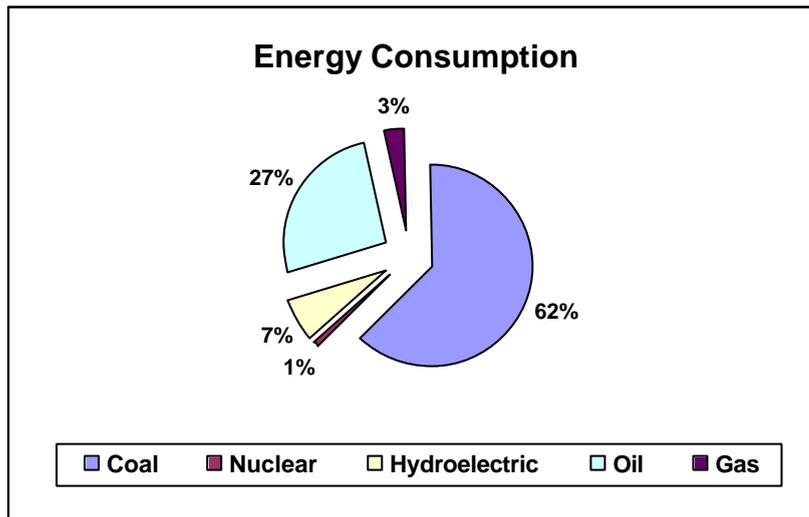
The Chinese authorities have launched a policy to diversify their energy sources, with three major objectives:

- **To improve the security of the energy supply** - China's increasing rate of energy consumption and production will mean importing more oil and gas. From an economic viewpoint, this will be very costly and will put the security of the country's energy supply at risk, given the political instability of hydrocarbon-producing countries.
- **To deal with environmental problems** - China has signed the Kyoto Protocol. It is also committed to reducing sulfur dioxide emissions by 10% (50% are from thermal power plants) by 2005.
- **To secure the country's economic growth** - Power shortages highlighted the weaknesses in China's power grid and the need to renew this infrastructure in order to ensure social and economic growth.

It is in this context that the government recently decided to re-launch the nuclear program.

CHINA AND ENERGY

1 - DOMINANCE OF FOSSIL FUELS



▪ Coal

China has considerable coal resources, which explains why the nation is both the largest consumer and producer of coal in the world. China consumed 1.38 billion tons of coal in 2001: over 26% of the worldwide total.

The country's coal resources are located far from the areas where energy is in demand. More than half of its railway and waterway transport resources are required every day to transport coal for energy production. Railway authorities have increased the volume of coal transported daily from 38,000 to 50,000 loads since November 2003.

China is today preoccupied with reducing its coal production due to its impact on the environment and infrastructure problems.

▪ Oil

China was the world's third largest consumer of petroleum products in 2002, after the United States and Japan, with a total demand of 5.26 million barrels per day (bbl/d). 50% of this oil is imported from the Middle East.

China's oil demand is projected to reach 10.9 million bbl/d by 2025, with net imports of 7.5 million bbl/d.

- **Natural Gas**

Until the 1990s, natural gas was mainly used in China as a raw material for fertilizer plants, but very rarely for electricity generation. Natural gas currently accounts for only around 3% of the total energy consumption in the country.

Given China's domestic reserves of natural gas, which stood at 53.3 trillion cubic feet at the beginning of 2003, China has embarked on a major expansion of its gas infrastructure.

- **Hydroelectric Energy**

There are 20,000 hydroelectric dams in China and a huge untapped potential for development.

The construction of the Three Gorges Dam, scheduled for completion in 2009, is the largest project currently underway. It will include 26 separate 700 MW generators, with a total output of 18.2 GW.

Another large hydroelectric project involves a series of dams on the upper reaches of the Yellow River. Shaanxi, Qinghai and Gansu provinces have formed a consortium to create the Yellow River Hydroelectric Development Corporation, with plans to build 25 generating stations with a combined installed capacity of 15.8 GW.

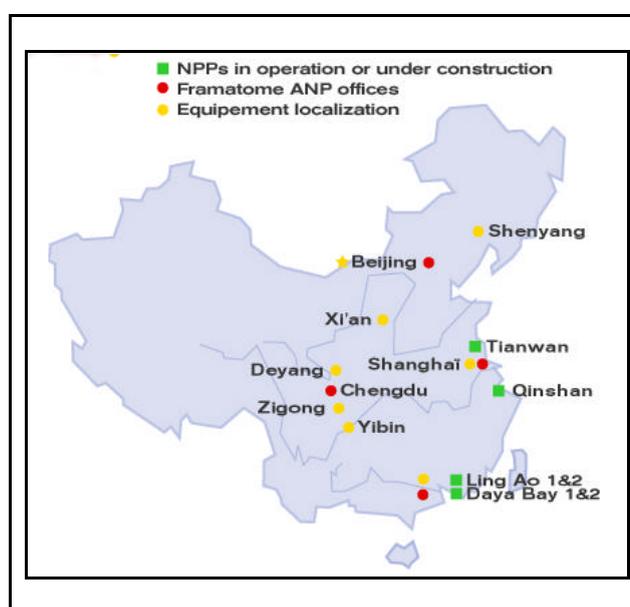
- **Nuclear Power**

China has a global generating capacity of 350,000 MWe. Thermal power plants account for 75% of installed capacity, hydroelectric plants for 24% and nuclear energy for 1.4%.

Nuclear power stations are located in the south and south-east of the country where there is most economic growth and no coal.

China has selected a range of different technologies for its program, some developed by Chinese companies; others imported from France, Canada and Russia.

Reactor	Province	Type	Capacity (each)	Operation
Qinshan-1	Zhejiang	PWR	300 MW	December 1991
Daya Bay 1&2	Guangdong	PWR	1,000 MW x 2	February & March 1994
Qinshan II-1	Zhejiang	PWR	600 MW	May 2002
Qinshan III 1&2	Zhejiang	CANDU	728 MW x 2	2003
Ling Ao-1 & 2	Guangdong	PWR	1,000 MW x 2	June 2002 & January 03
Under construction				
Qinshan II-2	Zhejiang	PWR	600 MW	2004
Tianwan 1&2	Jiangsu	VVER	1,000 MW x 2	2004, 2005



- The two reactors at **Daya Bay**, located in the southern province of Guangdong, were provided by AREVA.
- The two **Ling Ao** reactors also use French technology, supplied by AREVA, and are modeled after the reference nuclear plant, Daya Bay, located nearby.
- **Qinshan-1**, in Zhejiang province 100 km to the south-west of Shanghai; the first nuclear power plant in China to be indigenously-designed and built.
- **Qinshan phase 2** (Units 2 and 3) was locally designed using technology transferred from France.
- **Qinshan phase 3** (Units 4 and 5) use Canadian CANDU 6 technology, supplied by Atomic Energy of Canada.

AREVA, A LONG-STANDING PARTNER OF THE CHINESE NUCLEAR INDUSTRY

Over 20 years, China has developed the nuclear technology for generating electricity, using AREVA's expertise and knowledge. Framatome ANP, an AREVA and Siemens company, played a major role in the construction of the 8 of China's 11 power plants, supplying the nuclear islands of Daya Bay and Ling Ao as well as other equipment for the Qinshan II and Tianwan plants.

AREVA has developed an ambitious program for transferring technology to the Chinese industry. It aims to develop Chinese skills in the design, manufacture, construction, operation and maintenance of nuclear power plants.

- The first milestone was the September 1986 signing of a contract between GNPJVC (Guangdong Nuclear Power Joint Venture Company) and Framatome for the two 1,000 MW PWR units at Daya Bay. Following a call for tender in 1988, the construction contract for the two nuclear islands was awarded to a Franco-Chinese joint venture. In the scope of this contract, CNI 23rd Company carried out a large-scale project. Framatome also provided the customer with technical assistance for starting up the plant.
- The 1992 Cooperation Agreement signed with CNNC (China National Nuclear Corporation) enabled the transfer of nuclear island design technology used to construct the Daya Bay nuclear power plant. The Chinese plants also received the technology for the main equipment of the reactor coolant system. The success of this technology transfer has been demonstrated by the construction of the Qinshan Phase 2 units.
- A further step was the signing in October 1995 of a contract to supply two units to Ling Ao. A technology transfer agreement signed with CGNPC (China Guangdong Nuclear Power Corporation) at the same time gave the Chinese industry full access to technology for the N4 model, the group's newest reactor operating on sites in France (Chooz and Civaux). The group has grown from being a simple supplier into a partner providing the Chinese with data relating to the design, manufacture and maintenance of the nuclear facilities built in France and China.
- In the field of fuel design and manufacturing, AREVA has been working in partnership with the Yibin plant, which is owned by CNNC, for several years now. The first technology transfer program started in 1991 with the AFA 2G fuel assembly. As part of this agreement, which ended in 1994, the Yibin plant has supplied fuel reloads for the two Daya Bay nuclear plant units and also the first cores for Qinshan phase II.

GNPJVC decided to extend the 12-month fuel cycle to 18 months to reduce operating costs for the Daya Bay plant. This extension, which calls for more efficient fuel assemblies, reduces the number of refueling outages, thus improving plant availability. A contract covering the new AFA 3G fuel technology was therefore signed in 1998 and the first AFA 3G fuel reloads were delivered to Daya Bay in 2001.

Yibin now supplies the Chinese pressurized water reactor (PWR) nuclear plants at Daya Bay, Qinshan and Ling Ao with all their fuel reloads.

- This cooperation has been extended to companies and research institutes in charge of maintenance services and 10-yearly inspections.
- In 2003, Framatome ANP and CNI 23 created Shenzhen Nuclear Engineering (SNE), a joint venture in which they each own a 35% stake. The aim of SNE is to offer services to the Chinese nuclear power industry using AREVA group's skills and technology.

AREVA has participated in the “localization” program for equipment manufacturing, in particular for the construction of the Qinshan phase 2 and Ling Ao power plants. The aim of this program is to form reliable partnerships to enable complete technology transfer for manufacturing nuclear island equipment.

THE CHALLENGES OF THE NEW CHINESE NUCLEAR PROGRAM

1 - AN AMBITIOUS PROGRAM

As part of its 10th Five-Year Plan (2001-2005), China decided to increase the proportion of its electricity supply generated by nuclear power from 1% to 4%. Forecasts show that 36 GW are needed in the country, which is the equivalent of power output from around twenty 1,000-1,500 MWe reactors.

This market represents between €1.5 and €2 billion per 1,000 MW reactor. The Chinese government plans to implement a single type of technology, in this case the pressurized water reactor, and to increase the number of contracts awarded to Chinese companies for manufacturing large components and engineering.

2 – EIGHT NEW REACTORS ANNOUNCED IN 2004

AREVA signed two agreements of intent on June 11, 2004. The first agreement was signed with China Guangdong Nuclear Power Company (CGNPC) and states that AREVA will share its expertise and provide assistance during phase 2 of the LING AO II plant: two new reactors are to be built at the site. Another agreement of intent was signed with the China National Nuclear Corporation (CNNC) and concerns assistance for the construction of two reactors as part of QINSHAN II phase 2.

In addition to these four duplicate reactors to be built on existing sites, China has decided to build four 3rd generation reactors at Yangjiang and Sanmen. An international call for tender was launched on September 28, 2004.

This call for tender concerns the construction of four nuclear islands and a technology transfer contract. AREVA will reply to the tender by offering its EPR model.

- **The EPR** (European Pressurized (water) Reactor) was developed by AREVA and Siemens in association with the German and French national electricity companies. The safety authorities of the two countries joined forces to bring their respective standards into line and to draw up a set of rules to govern the reactor's design. The EPR has a capacity of around 1,600 MWe. In December 2003, the Finnish electricity company Teollisuuden Voima Oy (TVO) signed a contract for the EPR, which is scheduled to begin commercial operation in 2009.

AREVA's participation in the launch of the Chinese nuclear industry has enabled it to foster close relationships with companies and institutes on the sector. The group is therefore in a good position to respond to calls for tender.

3 - PROSPECTS OF THE FUEL CYCLE

To support its burgeoning nuclear power program, China plans to develop activity at all levels of the fuel cycle, including processing and recycling spent fuel. The similarity of French and Chinese approaches to the industry could open up new prospects for cooperation between the two countries in this field.

AREVA already operates on the Chinese waste processing and decontamination market and is also planning to offer front-end services to Chinese companies, particularly in terms of exploring and extracting uranium ore.

A HIGH POTENTIAL MARKET FOR AREVA T&D

China's intention is to create a unified national power grid and a vast electricity market. This plan requires serious investment in terms of electrical transmission and distribution.

AREVA T&D is one of China's leading international suppliers of this type of equipment, mainly high and medium voltage switchgears and protection and control equipment. To date, AREVA T&D has set up 5 sales offices (Beijing, Shanghai, Guangzhou, Wuhan and Hong Kong), one wholly-owned factory and 4 joint ventures in China. It employs about 820 employees nationwide.

The group has participated in the renovation and upgrading of the country's national and local electric power grids. It has also taken part in some key projects, including the 4 x 360 MVA power transformer and 500kV GIS (Gas Insulated Switchgear) for the Guangzhou pumped storage power plant project; the 220kV and 400/500kV GIS for the Daya Bay nuclear power plant; and China's first high-voltage underground GIS for the People's Square in Shanghai. Recent projects include Tianjin Limindao 220 kV substation and 500kV substations in Anshun, Huishui, WangDian, Yangcheng and Daihai.

AREVA T&D aims to continue to seize on business development opportunities in China via its range of competitive offers that combine its high performance transmission and distribution technology and local manufacturing expertise.

FCI IN CHINA

- More than 2,000 people work in China for AREVA's connector subsidiary, which generated revenues of around €52 million in 2003.
- China is one of Asia's largest producers of cell phones; FCI's main customers are either directly or indirectly involved in the manufacture of cell phones or accessories. Furthermore, as the leading company on the hard disk drive segment of the market, FCI has benefited from more opportunities than its competitors.
- A large proportion of FCI products sold in China are manufactured in the country for companies such as Huawei, Xin Huang, Quanta, Lucent, Nokia, Ericsson, Philips, Alcatel, DELL, Motorola, Siemens and Nortel.
- FCI began operating in China in 1995 with the construction of a state-of-the-art manufacturing plant in Nantong for the IT and telecommunications markets. It expanded its local presence in 2000 when it set up plants in Qingdao and Dongguan. In 2004, FCI Nantong began producing airbag connectors and cable harness assemblies for the automotive market.

Appendix

- CNNC: China National Nuclear Corporation
- CGNPC: China Guangdong Nuclear Power Holding Company Ltd
- GNPJVC: Guangdong Nuclear Power Joint Venture Company Ltd
- CNEIC: China Nuclear Energy Industry Corporation
- NPIC: Nuclear Power Institute of China
- BINE: Beijing Institute of Nuclear Energy
- JNPC: Jiangsu Nuclear Power Corporation

Press Release from June 8, 2004

CHINESE VICE PREMIER VISITS COGEMA USED FUEL TREATMENT PLANT AT LA HAGUE

Chinese Vice Premier ZENG Peiyan, who is currently on an official visit to France, was today shown round COGEMA's used fuel treatment plant at La Hague. He was accompanied by Anne Lauvergeon, the Chairman of AREVA's Executive Board.

The Vice Premier and the Chinese delegation of officials and industrialists visited the main workshops in the UP3 plant including the transport cask unloading bay, the used fuel storage pools, the control room and the vitrified waste interim storage hall.

Mr. ZENG Peiyan stated that he was highly impressed by his visit to La Hague and that he was fully in favor of overall, lasting cooperation between China and France in the nuclear field.

Anne Lauvergeon expressed her delight at the "rewarding, long-standing cooperation between China and AREVA in the nuclear field". "Our group aims to take this partnership even further, and will be focusing on mining, engineering, and reactor component manufacture."

AREVA has 3,000 employees in China where it has been present for almost 20 years.

The group, through its subsidiary Framatome ANP, supplied the four reactors for the DAYA BAY and LING AO nuclear power plants, as well as equipment for the QINSHAN II and TIANWAN plants. AREVA has also successfully completed numerous technology transfers to Chinese industry. AREVA is now preparing to meet the country's new requirements as it pursues its nuclear program.

At the back end of the nuclear fuel cycle, China's used fuel management policy is tending towards treatment and recycling, and the vitrification of final waste. The similar approaches between the two countries could augur well for Sino-French cooperation in the future.

AREVA is also continuing to expand its activities, opening several plants in China in the field of electricity transmission and distribution, through AREVA T&D, and in the connectors business through FCI.

About AREVA

AREVA is a worldwide expert in the energy field, with a strong industrial presence in over 40 countries. The group provides its customers with technological solutions for nuclear energy production and electricity distribution. AREVA also offers interconnect systems, principally in the telecommunications, computer and automotive markets. The 70,000 AREVA employees are thus committed to the major challenges of the 21st century: access to energy for everyone, preservation of the planet and responsibility toward future generations.

Press Release from June 11, 2004

CHINA: SIGNATURE OF TWO AGREEMENTS OF INTENT TO COOPERATE IN THE NUCLEAR FIELD

In the presence of the French Prime Minister Jean-Pierre RAFFARIN, the Chinese Vice Premier ZENG Peiyan, and Anne Lauvergeon, Chairman of AREVA's Executive Board, two agreements of intent to cooperate in the technology used in the future reactors to be built in China were signed on June 11, 2004.

An agreement of intent was signed with Mr. Wang Yumin, President of the electric company China Guangdong Nuclear Power Company (CGNPC). AREVA, through FRAMATOME ANP, its joint subsidiary with SIEMENS, will share its expertise and provide assistance during phase 2 of the Ling Ao-II nuclear power plant in the Guangdong province: two new reactors will be built at Ling Ao, where two 1,000 MWe units were already commissioned in 2002 and 2003.

Another agreement of intent was signed with Kang Rixin, President of the China National Nuclear Corporation (CNNC) and relates to assistance in constructing two reactors for Qinshan II-phase 2 in the Zhejiang province.

These letters of intent were signed at Matignon during Zeng Peiyan's official visit to France. The Chinese Vice Premier visited COGEMA's used fuel treatment plant at La Hague on June 8, 2004. He stated that he was fully in favor of overall, lasting cooperation between China and France in the nuclear field.

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