

# The New Characteristics and Trends of China's<sup>1</sup> Main Nuclear Power Companies' Strategy Development



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The 12th five-year plan is the comprehensive construction of a well-off society but also the key period of China's nuclear engineering, especially the nuclear power industry, to speed up the development of an important opportunity period. As the China National Nuclear Corporation (CNNC) and China Guangdong Nuclear Power Corporation (CGNPC), China's main nuclear power generation enterprises, completed their respective "11th five-year" overall planning objectives and main tasks, the core competences of the two enterprises were enhanced markedly. In the face of the new situation and new opportunities, as well as the five-year development plans and ten-year development strategies of CNNC and CGNPC, some new trends and new characteristics are apparent.

## CNNC Pays More Attention to the Independent Innovation leading the Development of the Nuclear Power Industry

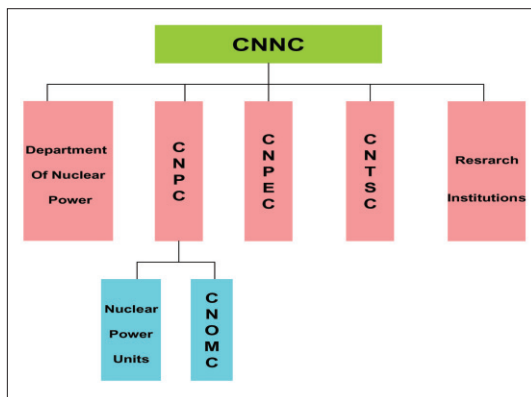
By 2010, the nuclear power industry as its CNNC will "2 + 6" industry is one of the two main plate (the other is China's fuel industry), put forward by 2015, fully realize the five "1" development goals: business income will exceed 100 billion RMB, profits will exceed 10 billion RMB, per capita worker income will be more than 1000 thousand RMB, nuclear technology innovation will make ten breakthroughs, and more than ten overseas trading platforms will be built. An enterprise vision is proposed: "do optimal stronger, the international first-class." A concept of development is proposed: "open and inclusive, cooperation, and win-win," and operating principles are proposed: "group operation, professional management, science and technology and nuclear science, talent-thriving enterprise, lean management, and double endowment push."

CNNC in the nuclear power field exerts itself and pursues nuclear power technology R&D, investment, construction, operation management, and technical service of professional operation and development platforms, intensive and integration in the system resources, successively set up a form

<sup>1</sup> China refers to mainland China here and in what follows.

professional company, such as the China Nuclear Engineering Co., LTD. (CNPEC), CNNC Nuclear Power Co., LTD. (CNPC), CNNC Nuclear Operation Management Co., LTD., (CNOMC), and CNNC Nuclear Technology Service Co., LTD. (CNTSC). By 2010, the nuclear power industry CNNC realized business income of 25.699 billion RMB, to complete annual task grown, and total profit 5.993 billion RMB, to complete annual task pre-vaccine period. During the 12th five-year period, the annual growth rate will strive to advocate business income of 20%, eight pedestals running nuclear power units of CNNC smooth over fulfilled generating tasks, has been completed 41.134 billion kwh.

[Figure 1] Organization System of the CNNC Nuclear Power Industry



### Ensuring Nuclear Safety based on Accelerating Nuclear Power Plant Construction Pace

Nuclear safety is the lifeline of nuclear power plant construction and development. During the 12th five-year period, the CNNC will pay more attention to the overall coordination of nuclear safety work and will conscientiously implement the relevant government

departments for nuclear power plant construction safety deployment and requirements, strengthen its nuclear safety related system and system construction, make prominent nuclear safety culture construction, and constantly improve the staff, especially nuclear power plant construction unit personnel involved in the safety culture consciousness. It will also take effective measures to increase the nuclear security level and to ensure nuclear power plant construction safety controls.

As China's nuclear power development and nuclear power plant construction, the mainstay of the CNNC has always been based on the existing nuclear industry base and mastery of the technology, strengthening international standards, and actively introducing advanced technologies and engineering management experience, as well as ensuring the safety of nuclear power based on accelerating the construction pace and satisfying national energy demand.

### Takes Nuclear Technology Innovation Leading Role

During the 12th five-year period, the nuclear power technology of the CNNC will insist on recent with PWR technology as the main line, metaphase development fast neutron pile of technology, and adhere to the strategy of "two legs, implemented in stages." Namely, it insists that national independent innovation be given priority, combining the introduction of foreign technology, digestion, and absorption, according to the technology and the basic laws of development, adhering to "application generation, R&D generation, pre-research generation."

The CNNC will continue to ascend Generation II+ improved nuclear power

technology based on CP600, CP1000 series, and it will continue to intensify research and development has three levels of ACP600, ACP1000 nuclear power units and module type ACP100 small pile. ACP100 to nuclear energy heating, seawater to target market, specific projects to rely on, the CNNC will have engineering conditions in 2012. Through these R&D activities, the CNNC will in Generation III nuclear power technology level occupying the initiative.

The CNNC will contend for accounted for generations nuclear power technology commanding heights. Fujian sanming nuclear engineering construction, based on using Chinese test block heap the technical results, realizing fast reactor technology projects and commercial applications, promoting China's fast reactor technology development, the CNNC will develop the foundation and accumulate experience of the Generation IV nuclear power technology and future longer period of nuclear power plant construction.

### **Tries to Promote Nuclear Engineering Contracting Ability**

The CNNC will further improve "owner company+engineering contracting+professional subcontracting" nuclear engineering construction management patterns and enhance the overall contractors nuclear capability construction. During the 12th five-year period, the CNNC will further adapt "more base, many projects, more technology" of nuclear power plant construction development needs, ramming design, procurement, construction, commission general contracting of nuclear power ability, key build standardization management ability. Relying on domestic Generation II+ improved and Generation III nuclear power engineering projects, the CNNC will establish a

standardized mature management system, form standardization work processes, and promote the establishment of a nuclear engineering construction standards system. It will gradually establish a shared experience feedback platform, make nuclear engineering construction experience feedback normal change, institutionalization and standardization, information, and promote continuous improvement in engineering construction.

### **Strengthen Scientific Management to Promote Nuclear Power Plant Construction**

During the 12th five-year period, the CNNC will continue to build a specialized platform for targets, establishing and perfecting gradually intensive, specialization of nuclear power plant construction operation pattern and standardization, the lean of nuclear power plant construction management system. Through excellent nuclear engineering construction enterprise management in the table, the construction of a nuclear power engineering CNNC performance indexing system, with scientific and reasonable indexes of construction projects owner company, engineering contracting units of work, promote quantification assessment engineering management level of overall ascension.

Using nuclear engineering construction peer assessment methods, through referencing and applying advanced quality management tools, combining with nuclear power engineering construction quality management features, continue to pursue outstanding cultural philosophy, so that the nuclear power engineering construction quality management level continues to be enhanced.

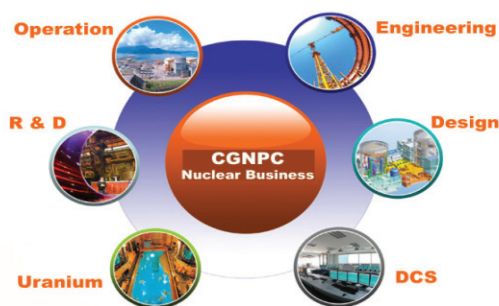
In addition, the CNNC's subordinate enterprises - CNNC Gansu Wind Power

Generation Co., LTD. first-term of the first 50 MW wind project which were constructed before the end of the three-stage flow-shop units will be completely realized in 2010, marking the CNNC's first breakthrough in the wind field, to explore carbon reduction, environmental protection and energy conservation, renewable energy market new strides a firm step.

### Makes Efforts to Establish International First-class Clean Energy Enterprises

By 2010, the CGNPC accumulative total annual generation about 30 billion kWh. The CGNPC put forward its strategic vision: A clean energy corporation with nuclear power as its core business to supply electricity in a safe, environmentally friendly, and efficient manner. It set forth its strategic goals (up to 2020): Total nuclear power installed capacity would exceed 50GWe so that it would become one of the world's top three nuclear power utilities; uranium resources would be industrialized and upsized, so that this would become one of the major businesses of the CGNPC; it would be in the top three nationally in equity installed capacity of wind power, so that it would become a strong competitor and leader of the industry

[Figure 2] Organization Structure



in the country; it would become a dominant investor and operator of conventional clean energy, able to earn profits and ward off risks; with first-mover advantages and industry scale in new energy, new technology, and other relevant industries.

### The Nuclear Power Industry

From the start, Daya bay nuclear power unit construction CGNPC unswervingly follow the route of "introduction, digestion, absorption and innovation," accumulate formed nuclear power station design, construction and operation of the major technical improvement project, management software, the mode of management, operation maintenance management procedure specification, such as tangible and intangible of intellectual property, and has formed its own brands in China improved PWR nuclear power technology solutions CPR1000, establishes the nuclear power design, engineering construction, operation technology and other fields of technology innovation system, perfected the scientific management mechanism, the mechanism of talents training and technology input mechanism, producing a number of major scientific research achievements.

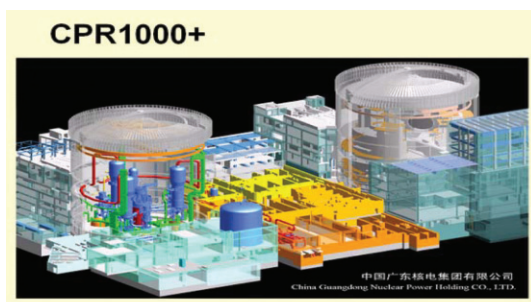
In order to improve the technological research and development ability and to meet the national nuclear power development demands of the new situation, the CGNPC formulated and promulgated the medium-term technological development planning and R&D work to create a comprehensive plan and arrangement. The CGNPC's goal is to enhance the technical ability, and the Chinese academy of sciences and the China Huaneng Group carry out a strategic cooperation, the high beginning start, a joint venture with base,

build an institute of technology research and development and application of common technology service as the main body of the technology development platform.

Based on operational nuclear power plant and nuclear power engineering construction, and based on the CGNPC's established Generation II+ improved nuclear power technology and the three generations of nuclear power technology between the effective dovetailing technological innovation platform; make full use of second generation improvement projects and consolidate vendor autonomy effect, system research three generations of nuclear power technology solutions, initially formed three generations of nuclear power technology introduction, digestion, attract and create new platform.

The CGNPC actively participates in future advanced technology research and demonstration projects of cooperative research, such as the large-scale advanced PWR, HTR-PM, etc. In 2006, China approved through the state council the CGNPC's participation in large-scale advanced PWR national science and technology plan major projects research member unit. The CGNPC signed a cooperative agreement with Tsinghua University of China on joint participation in high-temperature gas-cooled reactor Generation IV nuclear power technology development and construction.

[Figure 3] CPR1000<sup>+</sup>



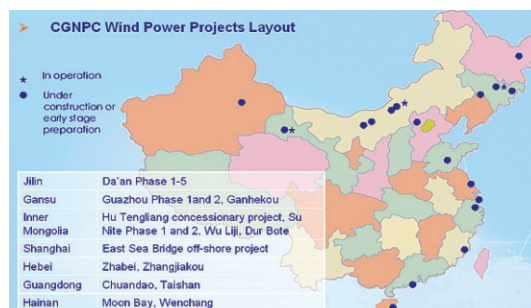
## Other Forms of Clean Energy

In actively promoting nuclear power plant construction at the same time, according to the new CGNPC strategic positioning, and actively promote wind, utilities, and other forms of clean energy development and construction work.

### Wind Energy Development

In February 2007, the CGNPC wind power company was founded. Its registered capital is 3 million RMB, by CGNPC holdings, and its specialty is the investment, construction, operation, maintenance, etc. of wind farms. The CGNPC established branches in Inner Mongolia, the north, the northeast and northwest, the east, and the south, six regional branches in China, with its "land and ocean simultaneously, on land priority" strategy in the "three north," coastal winds with two push prophase work progress. By the end of 2010, with the CGNPC's total installed capacity of wind power of more than 2,300 MW, accumulated total approved project capacity of 2,842 MW, construction projects capacity of 1400 MW, and in the project capacity 1,340 MW, and participation in the Chinese million kilowatt, million kilowatt, sea wind power base construction, and develop the feasibility study work of wind power

[Figure 4] CGNPC Wind Power Projects Layout





project reached 8,760 MW, carry out the previous work in the provinces of Inner Mongolia, Jilin, Gansu, Hebei, Heilongjiang, Xinjiang, Fujian and Hainan, Guangdong and Jiangsu and so on, accumulative total has wind resources reserve of 41,000 MW.

### **Solar Photovoltaic Energy**

With China actively developing solar power, the CGNPC established CGNPC solar companies, accelerate solar power project development and construction. The CGNPC controls more than 8,900 MW of solar power resources, including the projects in Gansu and Qinghai, where 20 MW have been completed and put into production, and the projects in Ningxia, Tibet and so on, where there are 70 MW, are currently under construction. Before 2015, the CGNPC will build solar projects with 2,000 MW and promote domestic solar photovoltaic energy industry development. It will also become a domestic solar power industry leading enterprise.

### **Hydropower Development**

Water, electricity, and other new forms of energy are important components of the CGNPC's future business. Actively promote hydropower and other new energy development, to ensure steady growth of the CGNPC's power generating business, enhance the flexibility to have the important meaning. The CGNPC focuses on the development of clean power and renewable energy, actively looking for market opportunities, through various channels, in a variety of forms, enlarging the scale, strengthen the strength, continuously improve the market operation and capital operation ability, innovation development mechanism, and become the

important support group development business without one.

To the end of the decade, the CGNPC will have hydropower rights capacity of 3,410 MW, among them, holding an installed capacity of 1,200MW, under 600MW. In order to vigorously exploit the hydropower development strategy, the CGNPC obtained multiple projects holding exploitation successively in Sichuan, Guangdong, Guangxi, and Hubei.

### **Uranium Resource Development**

CGNPC Uranium Development Co., LTD. undertakes nuclear fuel supply and security tasks, is responsible for establishing a natural uranium commercial reserve mechanism, based on demand and the market supply position in the international market or on the domestic procurement of natural uranium, uranium resources to develop overseas investment and development, and bear the nuclear fuel related technical services. The uranium industry company undertakes nuclear fuel supply and security tasks, is responsible for establishing natural uranium commercial reserve mechanism, based on demand and market supply position in the international market or domestic procurement natural uranium, uranium resources to develop overseas investment and development, and bear the nuclear fuel related technical services.

For the construction of a uranium resources security system, to speed up the pace of overseas acquisition CGNPC uranium and approved by the state council, and China won the nuclear fuel import and export franchise. The CGNPC actively expands into Kazakhstan, Australia, Uzbekistan, Africa, Canada, and other regions. At present, the

CGNPC has targeted a natural uranium total of about 17 million tons, and it can satisfy the refueling demand of 26 years of 40 units with 1000MW.

## Several Enlightenment

### Notice Differential Operation

China's main nuclear power companies according to their own advantages and characteristics, in business development on attention industrialization, in three generations of nuclear power technology without retaining control circumstances, for the Generation IV, CNNC on own voice, CGNPC is to develop their own Generation II+ (CPR1000+), also constructed Generation III (EPR) unit with a French company.

### Strengthening Technological Innovation Ability and Construction

Nuclear power is a high-tech strategic industry; the nuclear technology independent innovation ability construction is the core competitiveness of CNNC key elements. In September 2010, in honor of the 55th anniversary of China's national nuclear industry, the CNNC convened the system technology work conference and released its 12th five-year technology development plan and about speeding up the work of scientific and technological innovation, 21 measures based on the scientific and technological innovation, speed up the ascension group company core competitiveness.

### Executes Capital Operation

In 2010, CNNC nuclear power industry listing work steadily, belonged to substantiate

operation phase, plan enter this year complete listing target, realize listing and financing. The CGNPC actively functions to actualize the whole appears on the market target. By listing and financing, which can effectively solve the nuclear power plant construction investment demanding difficult problem.

### Vigorously Develop Clean Energy

China's main nuclear power companies make positive corresponding Chinese government to meet the world's emissions commitment, optimize energy structure, and to reduce fossil energy dependence and on global climate, the influence of the first wind project CNNC realization, expanding new energy field as an important step forward. In the nuclear power industry, the CGNPC vigorously develops the basis of wind, photovoltaic energy, utilities, and other forms of clean energy, clean energy installed ratio enhanced unceasingly.