Overview of Human Resources in Nuclear Industry of China

—Country Report of China

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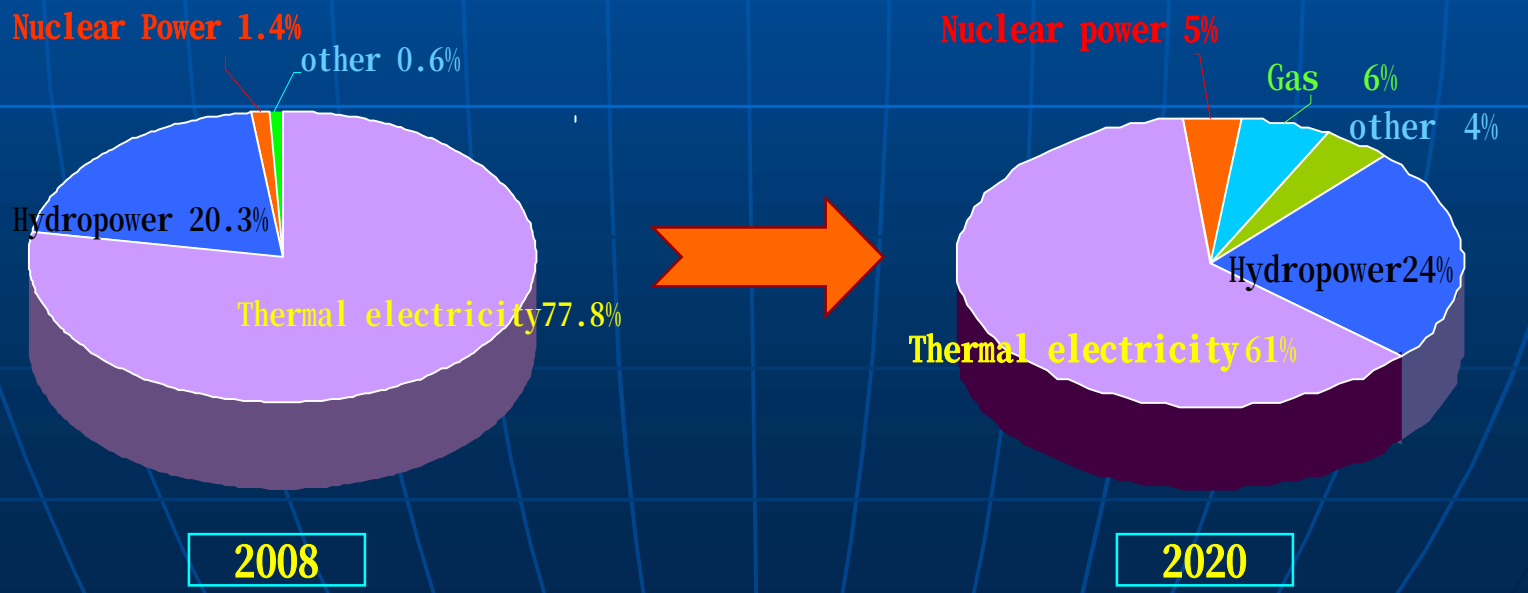
Foreword:

- With the progressive development of modern science and technology and social's continual improvement , the nuclear power technology has been becoming more and more mature.
- Meanwhile, given the global energy crisis and ecological environment pressure, the construction of nuclear power plants has been attached great importance to ensure sustainable development of human society and environment.
- Therefore, how to effectively solve the the human resources shortage problem has been emerged as a urgent and challengeable issue in China.
- In this paper, the reporter tries to talk about the challenges of human resources shortage in China at the review of nuclear power market and opportunity, with an emphasis on training orgnization and modes with CGNPC's characteristics, which aims at providing a useful reference and ideas for the sustainable development of nuclear power .

1.China's Nuclear Power Development Opportunities

- As of 2008,China has 11 nuclear power units in operation with installed capacity of about 9.1 million kilowatts and 24 nuclear power generating units under construction with installed capacity of about 25.4 million kilowatts .However,the proportion of China's nuclear power is just about 1.4%.

- With the expansion of national power capacity, the proportion of nuclear power capacity will be most probably up to 5% by 2020. The installed capacity will increase to 70 million kilowatts in 2020 and 18 million kilowatts under construction .



2. State Plan for Medium and Long-term Development of Nuclear Power

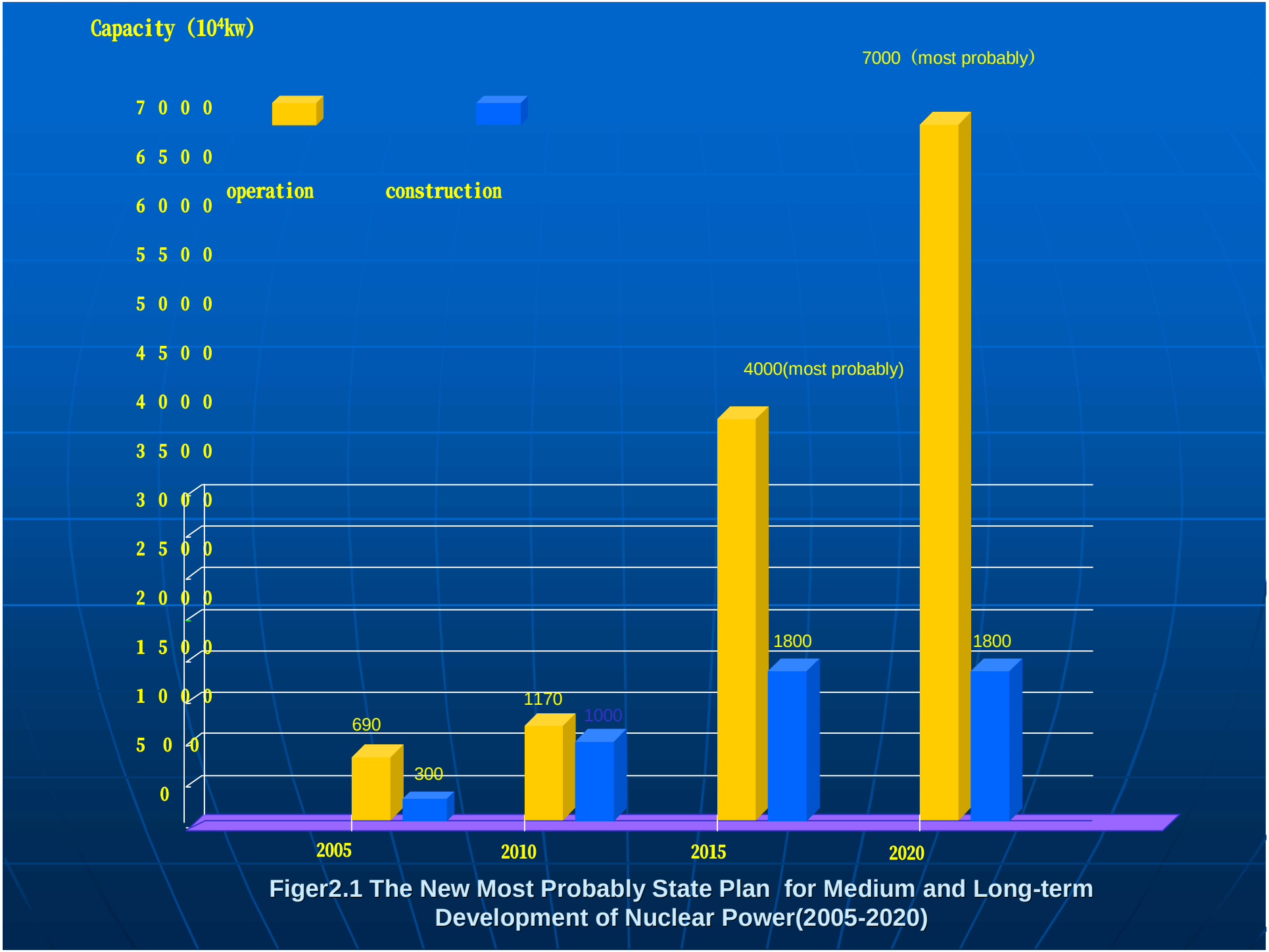
- In the 80s 20th century, China's industrial policies for nuclear power is " **properly development**".

- In March 2005, the State Council adjusted the policy from"**moderate**" to "**positive**."

- In March 2006, the State Council Executive Meeting adopted the principle of " Medium and Long-term Development Plan of Nuclear Power" which proposed the national nuclear power capacity would reach 40 million kilowatts in 2020 and the capacity under construction would reach 18 million kilowatts at the end of 2020.

2. State Plan for Medium and Long-term Development of Nuclear Power

- At present, the nuclear energy policy has gradually changed from the "positive" to "rapid development."
- National Development and Reform Commission intends to complete the new " State Plan for Medium and Long-term Development of Nuclear Power"in which the installed capacity will most probably rise to 70 million kilowatts in 2020 and 18 million kilowatts under construction .
- In this case,it means that there are nearly 6 or 7 newly-commenced units each year from 2009 to 2020 in China. And the investment scale will amount to more than 1 trillion yuan at least. As shown in Figure2.1.



Figer2.1 The New Most Probably State Plan for Medium and Long-term Development of Nuclear Power(2005-2020)

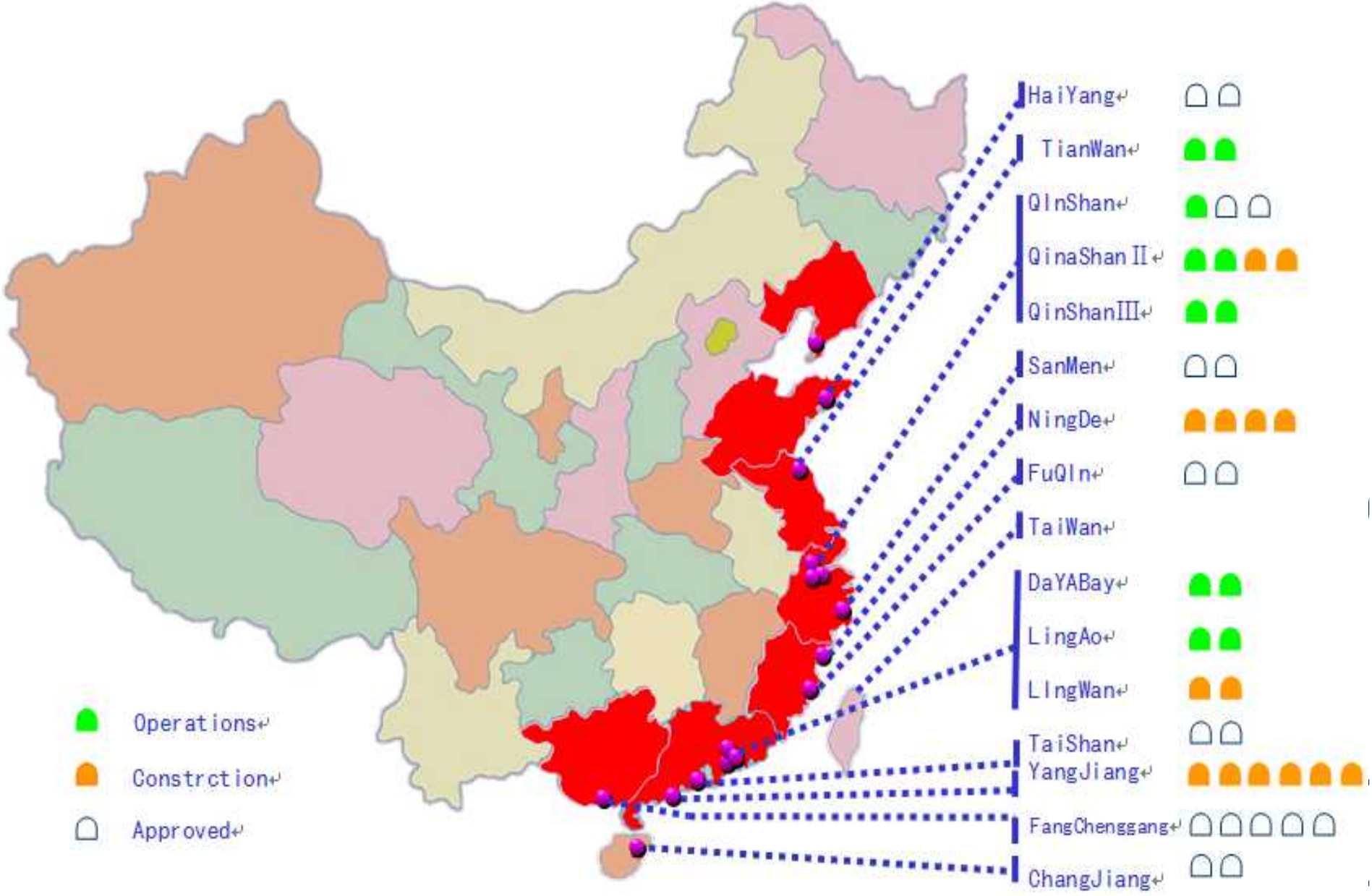
2.1 Nuclear Power Plants in Commercial Operation

Group	Plants name	Power (10^6kw)	Total (10^6kw)	Reactor
CGNPC	DaYaBay	2×100	400	PWR
	LingAo Ⅰ	2×100		PWR
CNNC	QinShan Ⅰ	1×30	502	PWR
	QinShan Ⅱ	2×60		PWR
	QinShan Ⅲ	2×70		HWR
	TianWan	2×106		PWR
Total (10^6kw)	902			

2.2 Nuclear Power Projects Under Construction and Agreed to Carry Out Preparatory work

Group		Plants Name	Power (10^4kw)	Total (10^4kw)	Reactor	Operation Time
CGNPC	1	GuangDong LingAo II	2×108	2534	CPR1000	2010-2020
	2	GuangDong , YangJiang	6×108		CPR1000	
	3	GuangDong, TaiShan	2×170		EPR1700	
	4	GuangXi, Fang Chenggang	2×108		CPR1000	
	5	HuBei, DaFan	2×125		AP1000	
	6	Liao Ning, Hong Yanhe (CGNPC&CPIC—45%: 45%)	4×108		CPR1000	
	7	Fu Jian, Ning De (CGNPC&DTPC—51%: 49%)	4×108		CPR1000	
CNNC	1	QinShan II (extension)	2×65	1192	PWR	
	2	QinShan,FangJiashan(extension)	2×108		PWR	
	3	ZheJiang, SanMen	2×125		AP1000	
	4	FuJian, FuQin	2×108		PWR	
	5	HuNan, Tao Huajiang	2×125		AP1000	
	6	HanNan, ChangJiang	2×65		PWR	
CPIC	1	ShanDong, HanYang	2×125	500	AP1000	
	2	JiangXi, PengZe	2×125		AP1000	
CHG	1	ShanDong, RongCheng	19×20	380	HTGR	
Total(10^4kw)			4606			

2.3 Distribution of Nuclear Power Projects under Construction in China



3. Strategy of Human Resource Training in CNGPC

- ## 3.1 Strategic Perspective

Orienting to the actual demands and long-term target of national development, CGNPC has drafted series of human resource training strategy and plans according to analyze and forecast the demands for human resource in the next ten years,as well as the State Plans for Medium and Long-term Development of Nuclear Power.

3.2 Strategic Goal

By the year 2010, CGNPC plans to cultivate senior management talents in NPP design,engineering, operation,R&D, technological support and new business areas . to attain the following targets :

- 20 senior managers in management and operation
- 20 senior project managers
- 30 chief technological experts
- 30 senior marketing managers
- 600 technological experts in operation
- 300 technological experts in engineering
- 200 technological experts in design
- 50 senior managers in contract and business

By the year 2020,the number of talent team will expand in accordance with country's higher goal to 20,000.And CGNPC is able to provide all project bases of CNGPC for the plentiful profesional nuclear talented people.

3.3 Strategic organization structure

Nuclear Power Institute

- Management Training Center of Group
- Su Zhou Branch of Institute
- Nuclear Power Operator training base in DaYaBay
- Nuclear Power engineering training base

3.4 Strategic Implementation

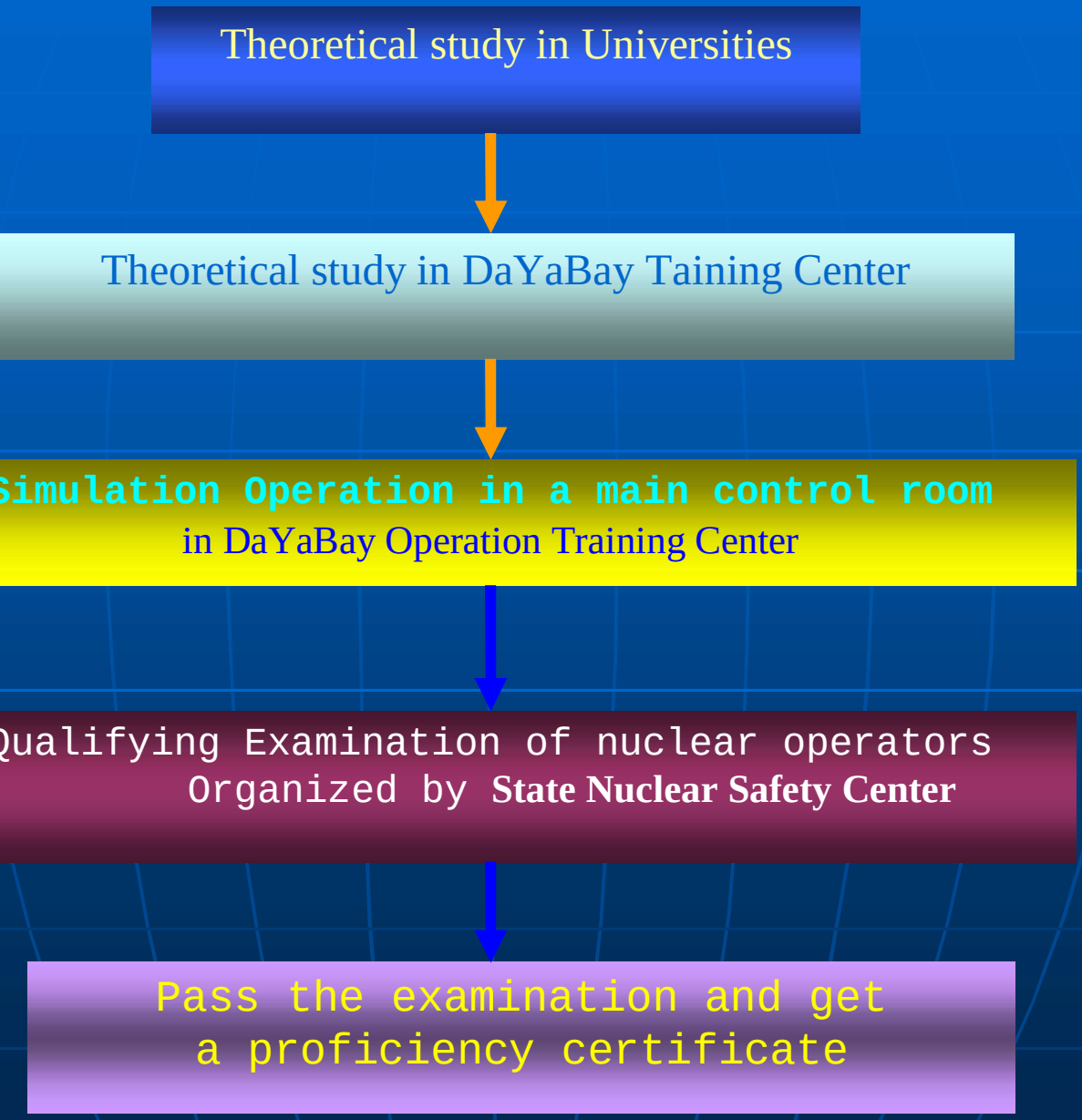
Training System	Training Organization			
	Nuclear Power Institute			
	Management Training Center of Group	Su Zhou Branch Of Institute	[illegible] operator training base	Nuclear Power Engineering training Bases
Management Training	Divided into the training of leading cadres, general management training and new staff induction training, which aims at developing nuclear power at all levels of management for cadres and new employees.			
Operation training	The training includes DaYaBay Nuclear Power operator training, the advanced pressured nuclear reactor in Taishan and operational training in all bases. By 2010, the number will reach around 7000.			
Engineering Training	The training includes engineering d by the year 2010, engineering and project management personnel in CGNPC will exceed 4,000 people esign, project management and debugging training.			
Jointly running schools	The group has signed nuclear power plant personnel training cooperation agreement with 11 famous universities, During 2006-2008, CGNPC recruited beyond 1000 university students a year .			

3.4.1 Management Training

- Management training system is divided into the training of leading cadres, general management training and new staff induction training, which aims at developing nuclear power at all levels of management for cadres and new employees.

- According to the special training program in accordance with for much-needed administrative talents and technical talents with digital operation, the group selects each year a group of excellent technical backbones of the youth to train abroad.

3.4.2 Operation training



3.4.3 Nuclear Power Engineering Training

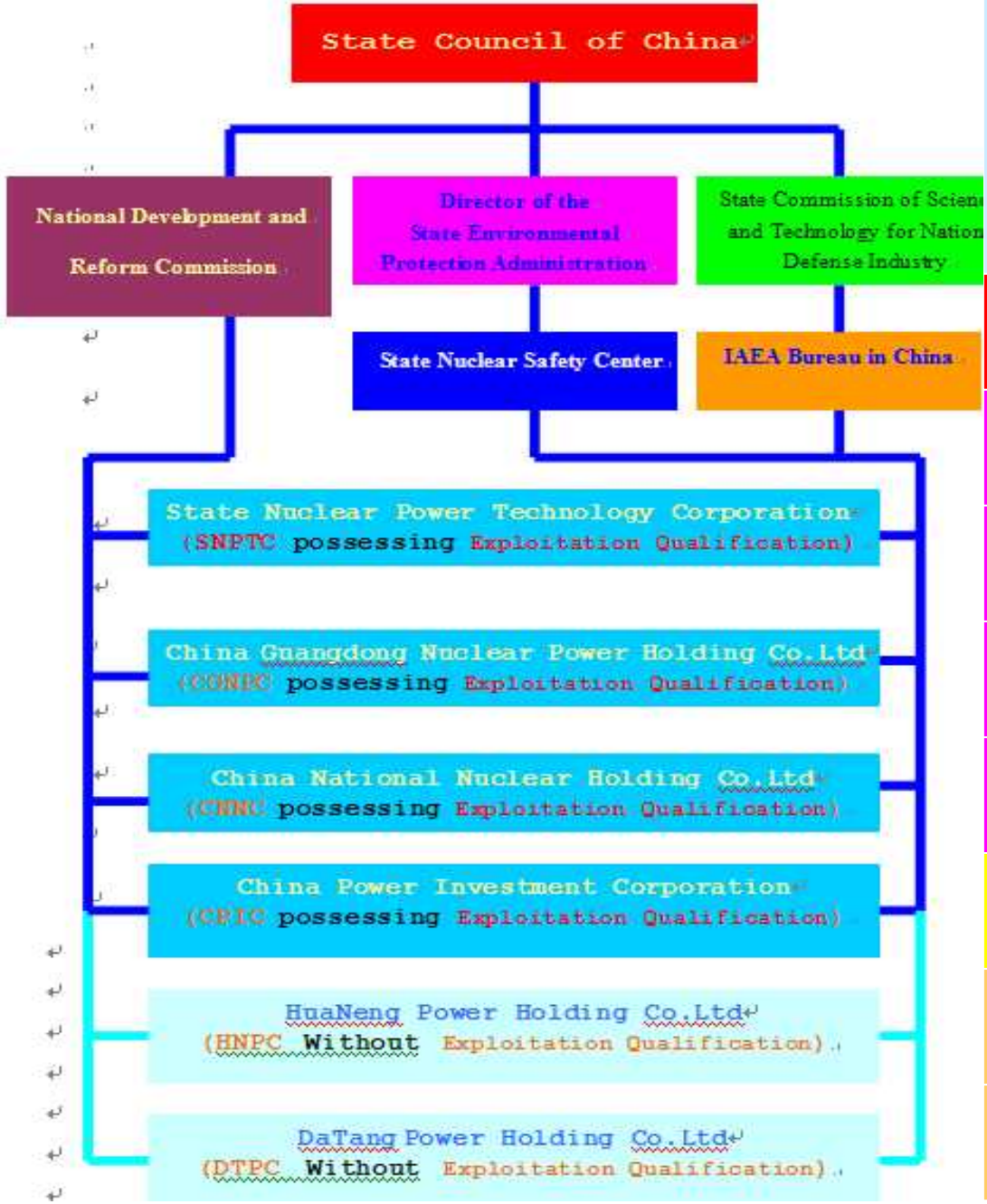
- The training includes engineering design, project management and debugging training.
- According to the project management training programs by the year 2010, engineering and project management personnel in CGNPC will exceed 4,000 people, which can bear several nuclear power projects and meet the demands for CGNPC in "Eleventh Five-Year" period and follow-up nuclear power projects.

3.4.4 Jointly running schools with universties

- The group has signed personnel training cooperation agreement with 13 famous universities, for example Tsing hua University, Technology University of China ,Shanghai Jiaotong University, Xi'an Jiaotong University,SiChuan University ,North China Electric Power University, Harbin Engineering University and so on.

- According to the training model of "Ordered training + joint school",CGNPC selects a third-year university students to implement the targeted training. During 2006-2008, CGNPC recruited almost 1000 university students a year .

4.Nuclear Power Administrative Institutions & Corporations



Power Corporations

possessing Exploitation Qualification

- SNPTC
- CGNPC
- CNNC
- CPIC

Without Exploitation Qualification

- HNPC
- DYPC

4.1Four Nuclear Power Groups possessing Exploitation Qualification

- **State Nuclear Power Technology Corporation (SNPTC)**

  SNPTC is a state-owned key enterprises managed by the State Government.It administrates the nuclear power technology Ap1000 applied in the nuclear power projects of ZheJiang,SanMen (CNNC)and ShanDong,HaiYang (CPIC).

- **China Guangdong Nuclear Power Holding Co.Ltd (CGNPC)**

  It is the only clean energy corporation in China which concentrates its business on nuclear power.CGNPC has owned nearly 4000 MWe of installed capacity and 25,340 MWe of installed currently under construction.It has established its own nuclear power brand--- the improved Chinese PWR--- CPR1000.

- **China National Nuclear Corporation(CNNC)**

  It is mainly responsible for research , construction and operation relating to the military nuclear industry,nuclear power, nuclear fuel, the application of nuclear technology and so on. CNNC has owned nearly 5020 MWe of installed capacity and over 11,920 MWe of installed currently under construction.

- **China Power Investment Corporation(CPIC)**

  It has owned Shandong Haiyang nuclear power project and cooperated with CGNPC in LiaoNing Hong Yanhe nuclear powerproject at the shareholding proportion of 45%:45%. CPIC has owned 5000 MWe of installed capacity under construction.

4.2Two Power Groups Without Exploitation Qualification

- **HuaNeng Power Holding Co.Ltd(HNPC)**

  HNPC concentrates on the conventional power,such as:Thermal electricity,wind power andhydropower.Recently years,it has paid efforts to compete in the exploitation of nuclear power projects. It has owned 3800 MWe of installed capacity under construction in ShanDong,RongCheng nuclear power project with the application of High Temprature Gas Cooled Reactor.

- **DaTang Power Holding Co.Ltd(DTPC)**

  Just like HNPC, **DTPC** also concentrates on the conventional Power and cooperated with CGNPC in FuJian NingDe nuclear Power project at the shareholding proportion of 49%:51%(DTPC:CGNPC).

Thank you!