# January 19, 2015 Company Report Rating: BUY TP: HK\$ 3.55

H-Share price (HK\$) 10.25% Est. share price return Est. dividend yield 1.66% Est. total return 11.91% 45,448.7 Issued shares (mn) 11,163.6 H-shares (mn) Unlisted shares (mn) 34,285.1 H-share mkt cap (HK\$mn) 35,947 Major shareholder(s): 64.2% **CGNPC** 

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#### **Key Data of CGN**

Installed capacity	End-	End-	End-	End-
(MW)	2013	2014E	2015E	2016E
Total^	8,330	11,624	16,037	21,712
Consolidated	6,122	7,208	8,294	12,880
Attributable	6 261	7 888	9 943	12 929

On-rid generation (GWh)	FY13	FY14	FY15	FY16
Total^	55,357	73,401	93298	121,659
Consolidated Attributable	44,156 <b>43.429</b>	52,175 <b>53.464</b>	56,215 <b>62.305</b>	73,759 <b>78.088</b>

Comparison FY13	CGN	CNNP*
Net power generation (GWh)	44,157	47,932
Average on-grid tariff excluding VAT (RMB / KWh)	0.3684	0.3226
Average utilization hours	7,586	N/A
Total Assets (RMB mn)	127,675	189,023
Total Equities (RMB mn)	31,692	41,352
Net gearing (%)	220.74	277.12
ROAA (%)	4.06	3.42
ROAE (%)	21.32	13.37

Nuclear plants managed by	Installed	Commence			
CGN (stake)	capacity	in operation			
	(MW)				
Daya Bay (75%)	1,968				
No. 1	984	1994-Feb			
No. 2	984	1994-May			
Ling Ao (100%)	1,980				
No. 1	990	2002-May			
No. 2	990	2003-Jan			
Ling Dong (93.2%)	2,174				
No. 1	1,087	2010-Sep			
No. 2	1,087	2011-Aug			
Yangjiang (78.2%)	6,516				
No. 1	1.086	2014-Mar			
No. 2	1,086	2H15			
No. 3	1,086	1H16			
No. 4	1,086	2H17			
No. 5	1,086	2H18			
No. 6	1,086	2H19			
Ningde (32.29%)	4,356				
No. 1	1,089	2013-Apr			
No. 2	1,089	2014-Apr			
No. 3	1,089	2H15			
No. 4	1,089	2H16			
Hongyanhe (38.15%)	4,476				
No. 1	1,119	2013-Jun			
No. 2	1,119	2013-Nov			
No. 3	1,119	1H15			
No. 4	1,119	2H15			
Taishan (10%)**	3,500				
No. 1	1,750	1H16			
No. 2	1,750	2H16			
Total capacity					
In operation	11,624				
Under construction	13,346				
Note ^: All the NPP under managed by CGN including subsidiaries, JV					

Note ^: All the NPP under managed by CGN including subsidiaries, JV

and associates
Note \*: CNNP is a comparable peer of CGN
Note \*: CGN plans to increase the stake to 51%
Source(s): CGN, CNNP, ABCI Securities estimates

# CGN Power Company Limited (1816 HK) Leading nuclear power producer on fast-track growth

- CGN was ranked No. 1 by installed capacity in China. Globally, the Group accounts for 17.8% of nuclear generating capacity under construction.
- China's nuclear power industry will contribute to the global nuclear generation growth in the future, as its installed capacity under construction represents 41% of the global total. CGN, as China's top nuclear energy producer, will play an increasingly significant role in the global nuclear scene.
- CGN is likely to be awarded with NPP projects in the coming years as the government ramps up expansion pace to reach its target by 2020. The Group has also been given the first refusal right to purchase new NPPs from its parent company. We believe strong capacity growth will be a potent earnings driver for CGN in the future.
- We estimate CGN's net profit to grow at ~18% CAGR in FY13-16E, supported by its rising stakes in Taishan NPP. Based on discount cash flow (DCF) method, we estimate the fair value of CGN to be RMB 129bn, representing 21.9x/18.6x FY15E/16E P/E. Our valuation leans toward the conservative side by excluding possible acquisitions of new NPPs or approvals from government, which means that CGN's true value could have been underestimated.

China's largest nuclear power operator. CGN was ranked No. 1 in China's nuclear power industry by total installed capacity with a domestic market share of 64.1% at end-June 2014. It was also ranked first by installed capacity under construction and to be acquired with a domestic market share of 43.4%. According to IAEA statistics, as of end-June 2014, there were 71 reactors under construction worldwide with a total installed capacity of 75,000 MW, while the total capacity under construction of CGN (including Taishan NPP) was 13,346 MW. It implies that CGN accounted for 17.8% of the world's nuclear generating capacity under construction.

**More new NPP projects to come.** To achieve its nuclear power installed capacity target by 2020, we believe the government would accelerate approvals for new NPP construction in the near term. The high entry barriers of the nuclear power industry would result in a highly concentrated market, increasing the chance of CGN being awarded with new NPP projects.

Improvement in safety operation and technology to support shareholders' value. CGN's NPP has an impressive safety operation record. Our analysis indicates the economic value of nuclear assets will be enhanced by the lengthening of maintenance cycle and operational lifespan.

We estimate net profit to grow at ~18% CAGR in FY13-16E. Rapid growth will be driven by the increasing contribution from new reactors commencing operation in coming years. We predict CGN's attributable installed capacity to grow at 27% CAGR in FY13-16E, to be supported by both organic growth and its rising stakes in Taishan NPP from 10% to 51%. Inorganic growth is also expected as CGN has the first right to purchase under-constructing NPPs from its parent, CGNPC.

**Initiate with BUY.** The DCF-derived equity value for CGN arrives at RMB 118bn (or HK\$ 3.24/share) based on its existing NPPs and M&A of the Taishan NPP expected to take place in 2015. Its equity value is estimated at RMB 129bn (or HK\$ 3.55/share), if we factor in the possible acquisition of the Guangxi NPP project from its parent in 2016. Initiate coverage on CGN with a **BUY** rating and TP is set at HK\$ 3.55.

# Financial Summary

FY ended Dec 31	FY11A	FY12A	FY13A	FY14E	FY15E	FY16E
Net power generation (GWh)	40,519	45,113	44,156	52,175	56,215	73,759
Growth (%YoY)	-	11.34	(2.12)	18.16	7.74	31.21
Revenue (RMB mn)	15,881	17,575	17,365	20,993	22,361	28,807
Chg (%,YoY)		10.67	(1.20)	20.89	6.52	28.82
Net Income (RMB mn)	4,727	4,145	4,195	5,504	5,904	6,925
Chg (%,YoY)		(12.33)	1.20	31.23	7.26	17.28
EPS (RMB)			0.1219	0.1211	0.1299	0.1524
P/E (x)			21.15	21.29	19.84	16.92
BVPS (RMB)			0.6698	1.0964	1.2264	1.3358
P/B (x)			3.85	2.35	2.10	1.93
DPS(RMB)			0.0480	0.0400	0.0429	0.0503
Yield (%)			1.86	1.55	1.66	1.95
ROAE (%)		24.56	21.32	15.10	11.19	11.89
Net gearing (%)	195.54	294.83	220.74	90.24	157.78	165.47

Remark: Net power generation refers to amount of electricity sold to grid companies by consolidated

subsidiaries. The reported revenue is including VAT. Forex: RMB0.80060/HKS



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# **Investment Themes**

### A leading nuclear power producer in China

According to IAEA statistics, as of June 30, 2014, there were 435 nuclear power-generating units in operation worldwide with a total installed capacity of 394.8 GW, and 71 reactors under construction globally with a total installed capacity of 75 GW.

Although the installed capacity for nuclear power generation in China only accounted for 4.6% of the global total, the country has the largest installed capacity under construction that represents 41.1% of the world's total. China's nuclear power industry will contribute significantly to the global capacity growth in the future. Hence, CGN, as a leading nuclear power generation operator in China, will benefit from the speedy expansion of nuclear power capacity worldwide.

In terms of total installed capacity and attributable installed capacity of existing nuclear power generation in China, CGN was ranked first as of June 30, 2014, with a market share of 64.1% and 43.5%. In terms of installed capacity under construction and to be acquired, CGN was also ranked first with a market share of 43.4%.

Globally, CGN accounted for 17.8% of the world's nuclear generating capacity in terms of installed capacity under construction and to be acquired.

### Earnings driver: Strong capacity growth in 2014-16

We estimate CGN's net profit to grow by 18% CAGR from RMB 4,195mn in FY13 to RMB 6,925mn in FY16E. Its substantial capacity growth, both organic and inorganic, will be the major earnings driver in coming years.

According to CGN's construction schedule and acquisition plan, 11 nuclear reactors currently under construction will commence operation before 2020. We estimate the total attributable installed capacity (including subsidiaries, associates, JVs; excluding investee companies) will increase by 16.3% CAGR from 6,261 MW at end-2013 to 15,477 MW at end-2019E. In particular, 8 of the 11 nuclear reactors under construction will commence operation before 2017. We estimate the total attributable installed capacity will increase by 27% CAGR from 6,261 MW at end-2013 to 12,929 MW at end-2016E. The expansion, however, will slow to 6% CAGR in 2016E-19E.

As of June 30, 2014, the total attributable installed capacity of CGN (including subsidiaries, associates, and JVs) was 7,888 MW. Its total attributable installed capacity under construction was 6,153 MW, representing 78.01% of total attributable installed capacity in operation. After increasing its stakes in Taishan Nuclear Power Plant from 10% to 51%, CGN's total attributable installed capacity under construction will increase to 7,588 MW, which represents 96.2% of total attributable installed capacity in operation as at June 30, 2014, based on our calculation.

Moreover, CGN's parent, CGNPC, has given the first refusal right to CGN to acquire new nuclear power plant (NPP) constructed by the former. The parent company has an attributable stake of 61% in Fangchenggang NPP in Guangxi Province, which has 2 nuclear reactors under construction with a total capacity of 2,160 MW. We predict the NPP will commence operation in 2016-17E. As CGN's parent undertakes not to compete with CGN in nuclear power generation business, CGN is granted the first right to acquire the new NPP from the parent group prior to commercial operation. To be conservative, however, we exclude Fangchenggang NPP in our earnings estimates Nonetheless, a scenario analysis on CGN's equity value that includes the potential acquisition of 61% stake in Fangchenggang NPP is provided in this report. Please refer to valuation section for details

Exhibit 1: CGN's nuclear power plant in operation and under construction					
	Number of Reactors*	30/6/2014 Installed Capacity (MW)	30/6/2014 Attributable Capacity (MW)*		
In operation (as of 30/6/2014)		-			
Subsidiaries	7	7,208	6,331		
Associate & JV	4	4,416	1,557		
Total in operation	11	11,624	7,888		
Under construction (pre-acquisition of 41% stake in Taishan NPP)					
Subsidiaries	5	5,430	4,246		
Associate & JV	4	4,416	1,557		
Sub-total (excluding investee company)	9	9,846	5,803		
Investee company	2	3,500	350		
Total under construction (pre-M&A)	11	13,346	6,153		
Under construction (upon increasing its stake in Taishan NPP to 51%)					
Subsidiaries	7	8,930	6,031		
Associate & JV	4	4,416	1,557		
Sub-total (excluding investee company)	11	13,346	7,588		
Investee company	=	=	-		
Total under construction (post M&A)	11	13,346	7,588		

\*Based on ABCI Securities calculation Source(s): The Company, ABCI Securities

Exhibit 2: Growth forecasts of CGN's nuclear power installed capacity					
	Pre-M&A Gross installed capacity	Post-M&A Gross installed capacity	Pre-M&A Attributable installed capacity	Post-M&A Attributable installed capacity	
CAGR (2011-13)	16.6	16.6	6.9	6.9	
CAGR (2013-16)	29.8	37.6	22.4	27.3	
CAGR (2016-19)	5.6	4.8	6.9	6.2	
CAGR (2013-19)	17.1	20.1	14.4	16.3	

Remarks: Gross or attributable installed capacity refers to NPP which under subsidiaries, associates or JVs Source(s): ABCI Securities estimates

Attributable installed capacity (MW) (pre M&A)

(MW) 16,000 14,000 12,000 10,000 8,000 6,000 4,000 2014E 2012 2013 2017F 2011 2015F 2016F 2018F 2019F 30/6/2014

Exhibit 3: Projections of CGN's attributable installed capacity (MW)

Note: The forecasted installed capacity for 2014-19 is based on the expected delivery schedule of the nuclear power-generating units disclosed by the Company Source(s): The Company, ABCI Securities

■ Attributable installed capacity (MW), post M&A



# CGN's NPPs in operation, under construction and to be acquired are strategically located in coastal provinces with relatively strong economic growth

As economic output and power consumption are positively correlated, power consumption in provinces with relatively high economic growth would usually rise. Location of the nuclear power plants, therefore, is one of the crucial factors that determine operational efficiency and investment risks.

Based on our calculation, as of June 30, 2014, about 77.8%, 10.0% and 12.2% of CGN's total attributable installed capacity in operation or under construction were in Guangdong, Fujian and Liaoning, respectively. If CGN raises its stake in Taishan NPP to 51% from 10%, the total attributable installed capacity in operation and under construction in Guangdong will account for 79.9% of CGN's total attributable installed capacity.

GDP growth in Guangdong province was higher than that of the national average in 2010-1H14. Guangdong has been experiencing power shortages. In 2013, about 23% of electricity consumed in Guangdong was purchased from other provinces; the region also has the highest benchmark tariff for desulfurized and denitrated coal-fired units among the Chinese provinces. In 2011-13, about 70% of the electricity generated by Daya Bay NPP in Guangdong was sold to Hong Kong and the proportion is expected to rise to 80% in 2015-18.

Exhibit 4: Location of CGN's NPPs in operation or under construction							
	Number of Reactors^	30/6/2014 Installed Capacity** (MW)	Prop^	30/6/2014 Attributable Capacity^ (MW)	Prop^	Pro-forma Attributable Capacity** (MW)	Prop^
Guangdong province		•		,	-	,	-
In operation	7	7,208	28.9%	6,331	45.1%	6,331	40.9%
Under construction	7	8,930	35.8%	4,596	32.7%	6,031*	39.0%
Total	14	16,138	64.6%	10,928	77.8%	12,363	79.9%
Fujian province							
In operation	2	2,178	8.7%	703	5.0%	703	4.5%
Under construction	2	2,178	8.7%	703	5.0%	703	4.5%
Total	4	4,356	17.4%	1,407	10.0%	1,407	9.1%
Liaoning province							
In operation	2	2,238	9.0%	854	6.1%	854	5.5%
Under construction	2	2,238	9.0%	854	6.1%	854	5.5%
Total	4	4,476	17.9%	1,708	12.2%	1,708	11.0%
Overall	22	24,970	100.0%	14,042	100.0%	15,477	100.0%

<sup>\*</sup> Including NPP in subsidiaries, associates, joint ventures and investee companies including Taishan NPP of which CGN was holding 10% of stake as of end June 2014
\*\*Assuming CGN to raise its stake in Taishan NPP from 10% to 51%

Source(s): The Company, ABCI Securities

Exhibit 5: GDP growth (%YoY) of provinces where CGN's NPPs are located					
Province	2010	2011	2012	2013	1H14
Guangdong	12.2	10.0	8.2	8.5	7.5
Fujian	13.8	12.2	11.4	11.0	9.7
Liaoning	14.1	12.1	9.5	8.7	7.2
National	10.3	9.2	7.8	7.7	7.4

Source(s): NBSC

Exhibit 6: Power consumption growth (% YoY) of provinces where CGN's NPPs are located					
Provinces	2010	2011	2012	2013	1H14
Guangdong	12.5	8.4	5.0	4.6	7.2
Fujian	16.0	15.1	4.2	7.7	7.9
Liaoning	15.4	8.6	2.1	5.7	2.7
National	11.1	11.7	5.5	7.5	5.3

Source(s): NBSC, NEA

<sup>^</sup>Based on ABCI Securities calculation



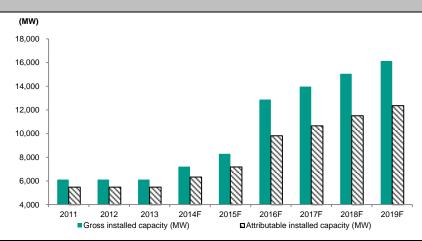
By end-2013, six nuclear power generation reactors were in operation in Guangdong. By end-June 2014, the number of nuclear power generation reactors in operation increased to 7 with a total installed capacity of 7,208 MW. All these reactors are owned by CGN's subsidiaries.

There were 7 nuclear power reactors under construction with a total capacity of 8,930 MW in Guangdong as at June 30, 2014 (including Taishan NPP with installed capacity of 3,500 MW). One new nuclear reactor will commence operation in 2015, to be followed by 3 in 2016 and 1 each in 2017-19. After increasing its stakes in Taishan NPP to 51% (we expect the transaction to take place in 2015), the 7 new nuclear power reactors under construction in Guangdong will be owned by CGN's subsidiaries. In other words, CGN will be monopolizing the nuclear market in Guangdong with its existing NPPs and new NPPs in the province.

Exhibit 7: Nuclear power capacity of CGN in Guangdong Province						
End of	Number of nuclear reactors	Gross installed capacity (MW)	Attributable* installed capacity (MW)			
2011	6	6,122	5,482			
2012	6	6,122	5,482			
2013	6	6,122	5,482			
2014E	7	7,208	6,331			
2015E	8	8,294	7,181			
2016E	11	12,880	9,815			
2017E	12	13,966	10,664			
2018E	13	15,052	11,513			
2019E	14	16,138	12,363			
CAGR (2011-13)		0.0%	0.0%			
CAGR (2013-19)		17.5%	14.5%			
CAGR (2013-16)		28.1%	21.4%			
CAGR (2016-19)		5.8%	5.9%			

\* Based on attributable stake of NPP held or to be held by CGN Source: The Company, ABCI Securities estimates

Exhibit 8: Nuclear power installed capacity of CGN in Guangdong



Remarks: Attributable installed capacity refers to attributable capacity of NPP held by CGN Source(s): The Company, ABCI Securities estimates



# Favorable government policies on nuclear power industry enhance investment returns and lower business risks

Investment returns of NPPs will be enhanced by the following factors:

• Nuclear power enjoys grid connection and dispatch priority over traditional thermal power. Effective on Aug 2, 2007, the Provisional Measures on the Dispatch of Energy Saving Power Generation piloted by the General Office of the State Council enable nuclear power to possess several competitive advantages over traditional coal-fired, gas-fired and oil-fired thermal power plants. Subsequently, utilization hour of NPP on average is much higher than thermal power plants. In 2013, the average utilization hour of NPP controlled by CGN was 7,586 hrs, compared with the nationwide average of 5,012 hrs in fossil-fuel power.

Exhibit 9: Average utilization hour of CGN's power-generating units and industry average in China									
	2011	2012	2013	1H14					
Average utilization hours of nuclear power-generating units controlled by CGN	7,773	7,750	7,586	3,883					
Average utilization hours of power generation units in China	4,730	4,579	4,511	2,087					
of which, hydro power	3,019	3,591	3,318	1,430					
wind power	1,890	1,929	2,080	986					
nuclear power	7,759	7,855	7,893	3,430					
fossil-fuel power	5,303	4,982	5,012	2,375					

Source(s): The Company, China Electricity Council: 2013 Electrical Power Industry Consolidated Statistics Express, NEA

 NPP's enjoys VAT refund policy. The VAT refund policy raises EBITDA margin of NPP operators. Nuclear power companies in China are subject to the policy of "refund-after-collection" for VAT that lasts 15 years from the month following the commencement of operation, with the refund gradually decreasing in 3 phases.

#### Schedule of VAT refund policy

Year 1-5: 75% refund Year 6-10: 70% refund Year 11-15: 55% refund

 NPP enjoys favorable corporate income tax policy. NPPs approved on or after Jan 1, 2008 are exempted from PRC corporate income tax for 3 years starting from the first year when electricity sale generates revenue; these NPPs are also entitled to a 50% reduction in PRC corporate income tax in the next 3 years.

### Schedule of corporate income tax rate

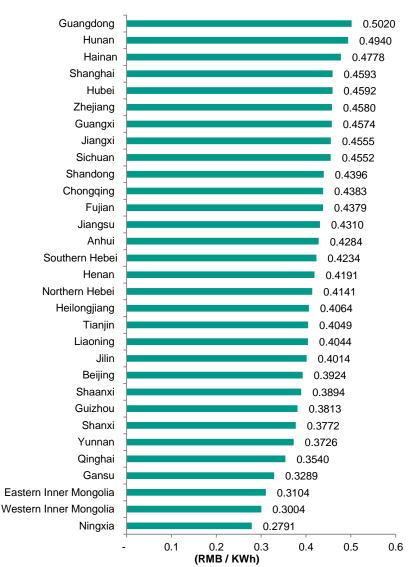
Year 1-3 in commercial operation: 0% Year 4-6 in commercial operation: 12.5%

The substantial lead time between the construction and commercial operation of each NPP means that NPP operators usually face tremendous uncertainties regarding future tariff changes and power demand. In our view, NDRC's favorable tariff policy and the grid connection priority offer great help in lowering business risks for operators.

Applicable to nuclear power-generating units commencing operations after Jan1, 2013, the benchmark on-grid tariff for nuclear power in China is RMB 0.43/KWh, according to NDRC. Moreover, the on-grid tariff for generating units using technical improvements or upgrades, self-reliant innovation, or domestically manufactured key equipment may be adjusted upward. The tariff policy has set the floor of the tariff rate for existing NPPs or new types of NPP. The uncertainty of future power demand is partially buffered by grid connection priority of NPPs over traditional thermal power plants.

Although NDRC revised down the on-grid tariffs for thermal power plants on Sep 1, 2014, the tariffs for CGN's NPPs in Guangdong and Fujian are still more competitive than those of the local thermal power plants. We, however, believe that CGN's NPP in Liaoning is under pressure as the latest tariffs for major thermal power plants have turned more favorable.

Exhibit 10: Standard tariff (including VAT) rate of coal-fired power (desulfurization, denitrification and dust filtered) in China



Source(s): NDRC, Aug 2014



Exhibit 11: Competitive tariff rates of CGN's NPP	's	
On-grid tariff (including VAT) (RMB/KWh)	2013	1H14
CGN's NPP:		
Daya Bay NPP (Guangdong province)	0.420	0.420
Ling Ao NPP (Guangdong province)	0.429	0.429
Ling Dong NPP (Guangdong province)	0.430	0.430
Yangjiang NPP( Guangdong province)	0.430	0.430
Ningde NPP (Fujian province)	0.430	0.430
Hongyanhe NPP (Liaoning province)	0.4142	0.4142
Benchmark on-grid tariff (including VAT)* of coal-fired power plants in: Guangdong Fujian Liaoning		With effective from Sep 1, 2014 (RMB/kWh)* 0.5020 0.4379 0.4044
On-grid tariff (including VAT) of Huaneng Power's coal-fired power plants in: Guangdong		1H 2014 and after (RMB/kWh) 0.5005-0.53626
		(latest:0.4885-0.52426**)
Fujian		0.44812
		(latest:0.44362**)
Liaoning		0.4022-0.4122
		(latest:0.3924-0.4024**)

<sup>\*</sup> NDRC issued notification on Aug 20, 2014 to lower benchmark on-grid tariff effective from Sep 1, 2014.

\*\* Following NDRC's notification, Huaneng Power informed through the HKEx website that it would adjust down the on-grid tariff starting from Sep 1, 2014. The bracketed figures refer to the new on-grid tariff rates after the adjustment. Source(s): The Company, NDRC, Huaneng Power International, Inc



### New investment opportunities to enhance shareholders' value

Our earnings and valuation model include existing NPPs in operation or under construction; NPPs pending approvals for construction by the government are excluded from our assumptions. Thus, the present value of CGN could be underestimated as the potential new NPPs have not been factored in.

New investment opportunities in NPP are widened as the central government aims to increase installed capacity of nuclear power by 2020. According to China's 12<sup>th</sup> five-year power development plan, the government aims to increase nuclear power installed capacity from 10,820 MW in 2010 to 40,000 MW in 2015, representing a 29.9% CAGR. By 2015, the government targets to have 18,000 MW of nuclear power capacity under construction. Nuclear power capacity under construction in 2015 will represent 45% of the expected installed capacity of the same year, implying significant capacity growth beyond 2015. By 2020, the government aims to have 58,000 MW of installed capacity in operation and 30,000 MW under construction.

By end-June 2014, the total nuclear capacity in operation in China was 18,128 MW while 30,749 MW was still under construction. Total installed capacity will reach 48,877 MW as construction completes for all plants. Construction cycle of a nuclear reactor usually lasts 5-6 years; thus most of the plants currently under construction are expected to be completed in the next 3-4 years. To achieve the targeted installed capacity of 58,000 MW by 2020, we expect the government to accelerate approval for NPP construction with a total capacity of  $\geqslant$  9,200 MW in 2014E-15E. Besides, we expect construction of NPPs with a total capacity of 30mn KW will be approved in 2016E-20E.

We believe high entry barriers of the nuclear power industry, including regulatory and technological requirements, financing access, and the need for highly trained personnel will leave most of the new investment opportunities to existing players. Newcomers without prior experience in the industry may act as financial investors and take up minority stakes in new NPPs. Yet, CGN, as a leading NPP operator in China, will have more advantages in capturing the emerging NPP investment opportunities.



#### World-class operation with proven safety track record

According to World Association of Nuclear Operators (WANO), 33 out of the 54 WANO's performance indicators among the 6 nuclear power-generating units at Daya Bay were ranked in the top quartile (considered as "advanced"); 28 out of the 54 indicators were ranked in the top decile (considered as "excellent") in 2013. For the same year, the average capacity factor of the 6 nuclear power-generating units in the Daya Bay base was 87.2%, compared with WANO's reported global average of 83.4% among PWR nuclear power-generating units in operation.

Safety operation of NPP is crucial to protecting shareholders' value in the long term. Operational lifespan of most NPPs controlled by CGNP is 40 years, while the two reactors in Taishan NPP have a lifespan of 60 years.

After reviewing the portfolio of CGN's NPPs, we have identified a few factors crucial in sustaining CGN's high performance standard.

First, all the reactors in operation, under construction, or to be acquired by CGN belong to the PWR type—the major type of reactor used in the global nuclear industry. Hence, management and operation staff of CGN's NPPs is specialized in operating PWR-type NPP. Unlike its peer, CNNC, which operates 2 types of reactors, PWR and PHWR, CGN is able to specialize, centralize and standardize its management model for NPP operation.

Secondly, all existing nuclear power-generating units in China are currently using the 2<sup>nd</sup>-generation technology. Most 2<sup>nd</sup>-generation gigawatt-level PWR nuclear power stations built after 2007 have a localization ratio of over 60%; for certain projects, the figure reaches above 80%. Hence, regular repair and maintenance of NPPs is not heavily reliant on foreign help.

With the Three Mile Island NPP accident in the U.S. in 1979, Chernobyl NPP disaster in Ukraine in1986, and Fukushima Daiichi NPP incident in Japan in 2011, nuclear safety has remained the greatest public concern. New safety standards have been issued to help prevent and mitigate impacts of severe accidents.

Insurance provides buffer to cover economic loss upon accidents. CGN's insurance coverage include: (i) nuclear insurance (including physical losses, such as machinery breakdown insurance and 3<sup>rd</sup>-party liability insurance), (ii) construction and erection all risk insurance, and (iii) other insurance policies customary for the nuclear power industry or required by law. We, however, are unable to evaluate the adequacy of such insurance coverage until the outbreak of accidents or relevant claims arise.

Taishan NPP: 51%-owned by CGNPC (with CGN holding a 10% stake). Two nuclear generating units are expected to commence operation in 2016 with a total installed capacity of 3,500 MW. CGN plans to acquire a 41% stake from CGNPC on top of the 10% it currently holds. Ultimately, CGN will be a controlling shareholder with a 51% stake.

Fangchenggang NPP: 61%-owned by CGNPC. The nuclear power projects are still under construction. The total installed capacity for the power station is estimated to be **2,160 MW**.

# Strong support by controlling shareholder CGNPC

We believe continued support from its parent company, CGNPC, is crucial to CGN's nuclear business expansion. In particular, CGNPC could help reduce risks associated with the early stage of NPP development for CGN.

CGN positions itself as a nuclear power operator instead of an upstream NPP contractor or fuel processor. The Group does not need to devote substantial financial resources during the early stage of NPP development. Currently, CGNPC is the controlling shareholder of the **Taishan NPP** and **Fangchenggang NPP**, which are both under construction and scheduled to operate after 2015. CGNPC will bear most of development costs initially, and CGN has the right of first refusal to purchase NPPs built by CGNPC. In another words, CGNPC bears a large part of development risks while CGN takes up most of the operational risks .

For future NPP projects, it is possible that CGNPC would first construct the plants and subsequently inject them into CGN upon completion.

# A higher ROAE than the industry benchmark indices

CGN's competitive advantages, which include applicable preferential tax policies, enable a relatively high ROAE compared with the industry benchmark indices.

CGN's ROAE was 21.32% in 2013, compared with 12.65% in Hang Seng Utility Index, 14.90% in CSI 300 Utilities Index, and 6.24% in S&P Global Nuclear Energy Index.

We expect CGN's ROAE to decline from 21.3% in FY13 to 13.6% in FY14E and 10.3% in FY15E, based on the belief that the Group would deleverage its balance sheets in coming years. We also expect its net debt/equity ratio to fall from 221% at end-2013 to 145% at end-2015E. In the long run, we expect the Group to maintain a net debt/equity ratio of ~150%.

Exhibit 12: ROAE Comparison (%	6)				
	2011	2012	2013	2014E	2015E
CGN	N/A	24.56	21.32	13.56	10.26
CNNP*	N/A	13.02	12.93	N/A	N/A
Hang Seng Utility Index	13.13	13.45	12.65	12.75	12.31
CSI 300 Utilities Index	10.53	12.51	14.90	15.42	14.66
S&P Global Nuclear Energy Index	-0.13	4.31	6.24	6.56	7.11

ROAE = Net profit attributable to owners of company / average equity attributable of owners of the company

We believe China National Nuclear Power Co Ltd (CNNP), another nuclear power operator in China, is CGN's major comparable in the domestic market.

According to IAEA-PRIS, as of Sep 2014, there were 20 nuclear reactors in operation with a total gross installed capacity of 18,128 MW in China; among which, 9 reactors with a total installed capacity of 6,506MW were controlled or managed by CNNP. The remaining reactors in operation were controlled or managed by CGN.

<sup>\*</sup> China National Nuclear Power Co Ltd (CNNP) is the 2<sup>nd</sup> largest nuclear power producer in China Source(s): The Company, CNNP, ABCI Securities estimates, Bloomberg



According to China Securities Regulatory Commission (CSRC), CNNP has already submitted its A-share listing application and disclosed its listing prospectus in the CSRC's website. Based on the disclosed information, CGN's ROAA and ROAE are higher than those of CNNP while its leverage was lower in comparison.

		INP		
Major financial data of CGN				
(RMB mn)	2011	2012	2013	1H14
Gross revenue	15,881	17,575	17,365	9,754
Net profit (group)	5,396	4,977	5,071	3,090
Net profit (owners)	4,727	4,145	4,195	2,572
Total assets	113,708	122,263	127,675	131,923
Total equity	23,543	24,150	31,692	38,712
MI	6,091	7,845	8,640	21,331
Owners	17,452	16,304	23,052	29,832
Major financial data of CNNP				
(RMB mn)	2011	2012	2013	1H14
Gross revenue	18,081	17,750	15,617	8,453
Net profit (group)	4,409	4,556	5,122	2,073
Net profit (owners)	2,126	2,094	2,477	991
Total assets	148,292	167,374	189,023	207,127
Total equity	26,906	35,300	41,352	41,514
MI	13,048	17,009	21,337	21,331
Owners	13,859	18,292	20,016	20,183
Major financial ratios of CGN	2011	2012	2013	1H14
Sales/avg. assets	N/A	14.90%	13.90%	7.51%
ROAA	N/A	4.22%	4.06%	2.38%
ROAE (group level)	N/A	20.87%	18.16%	8.78%
ROAE (owners)	N/A	24.56%	21.32%	9.73%
Total equity/total assets	20.7%	19.8%	24.8%	29.3%
Major financial ratios of CNNP	2011	2012	2013	1H14
Sales/avg. assets	N/A	11.25%	8.76%	4.27%
ROAA	N/A	2.89%	2.87%	1.05%
ROAE (group level)	N/A	14.65%	13.37%	5.00%
ROAE (owners)	N/A	13.02%	12.93%	4.93%
Total equity/total assets	18.1%	21.1%	21.9%	20.0%

ROAA = Net profit of the group/average total assets
ROAE (group level) = Net profit of the group/average total equity
ROAE (owners level) = Net profit attributable to owners of the company/average equity attributable to owners of

Source(s): The Company, preliminary A-share prospectus of CNNP disclosed in CSRC's website



# **Valuation Analysis**

For utility companies such as CGN with various power plants in operation or under construction, a major portion of the future income is derived from assets under construction. Thus, we believe discounted cash flow (DCF) is an appropriate method to evaluate CGN.

We factor in the following aspects in our DCF analysis for CGN:

- Existing power plants in operation
- 2. Completion schedule of new power plants under construction
- 3. On-grid tariff for operating NPPs and uncompleted NPPs
- 4. Lifespan of power plant
- 5. Dispatch priority of nuclear power
- 6. Future macro-economy and power demand
- 7. Cost structure of existing businesses
- 8. Continuation of preferential tax policy

Based on the CAPEX plan of CGN, we consider the Group's major capital outlay in coming years would be the acquisition cost for the additional 41% stake in Taishan NPP and the capital expenditure for the construction of uncompleted power-generating units. In our valuation model, we assume: (1) under-constructing units would be completed on schedule and the capital expenditure would be within budget; (2) CGN and its NPPs would be able to finance for the construction of new NPPs; (3) the power-generating units would be operated according to their design lifespan; (4) the decommission cost of each power-generating unit would amount to about 10% of the budgeted CAPEX.

Based on our calculation, the equity value of CGN (excluding potential purchases of any under-constructing NPP projects from its parent company) amounts to RMB 118bn, representing 20x of FY15E P/E.

CGNPC, the ultimate parent group of CGN, has undertaken not to compete with CGN in terms of operating NPP and has granted the first refusal right to CGN to purchase NPP projects constructed by CGNPC. If CGN exercises these call options at bargain prices in the future, CGN's equity value will be enhanced.

Currently, CGNPC has a 61% stake in the Fangchenggang NPP in Guangxi. This NPP is under construction with two reactors at 1,080MW each. Both follow the model of CPR-1000 and are pressurized water reactors (PWR). These reactors are identical to the operating reactors in Yangjiang NPP and Ningde NPP. Hence, the development risks (mainly cost-overrun risk, technological risk, finance risk, etc.) of Fangchenggang NPP is reduced. The Fangchenggang NPP has commenced construction in 2H10 and we predict the reactors to commence commercial operations in 2H16. To avoid competition with CGN, CGNPC needs to inject the Fangchenggang NPP into CGN prior to its commercial operation. If CGN purchases a 61% stake in Fangchenggang NPP at replacement cost in 2016, we estimate the net present value of the attributable 61% stake to be RMB 10,897 mn (WACC 6.82%; on-grid nuclear tariff RMB 0.43/KWh; capex budgeted at RMB 12.2 mn/MW).

The equity value of CGN will rise further from RMB 118,122mn (RMB 2.599/share) to RMB 129,019 mn (RMB 2.839/share) if CGN exercises the call option to acquire the 61% equity stake in Fangchenggang NPP at replacement cost.



Exhibit 14: Major assumptions in our DCF's analysis for CGN					
Items	Assumption				
Debt / equity	60% / 40%				
Average beta	0.6843				
Risk free rate (HK)	1.931%				
Mkt return rate (HK)	12.853%				
Effective tax rate	15.0%				
Cost of equity	9.40%				
Cost of debt (After tax)	5.10%				
WACC	6.82%				

Source(s): ABCI Securities estimates

Exhibit 15: On-grid tariff and fuel cost assumptions								
NPP	On-grid Tariff (incl. VAT) (RMB / KWh)	Long-term Avg. load Factor (%)	Unit fuel Cost (RMB / KWh)					
Daya Bay NPP	0.420	85	0.055					
Ling Ao NPP	0.429	85	0.055					
Lingdong NPP	0.430	85	0.055					
Yangjiang NPP	0.430	85	0.055					
Taishan NPP	0.430	85	0.055					
Ningde NPP	0.430	75	0.055					
Hongyanhe NPP	0.400	75	0.055					

Source(s): ABCI Securities estimates

Exhibit 16: Ass	sumptions o	f Constructi	on CAPEX o	of NPPs					
	Capacity	Total CAPEX	Unit CAPEX	CAPEX incurred	Est. CAPEX	Est. CAPEX	Est. CAPEX	Est. Commence-	Design life of
				up to	in 2H14	in 2015	after	ment start	power
			(RMB mn	30/6/2014			2015*	512.1	unit
	(MW)	(RMB mn)	/ MW)	(RMB mn)	(RMB mn)	(RMB mn)	(RMB mn)		(years)
Yangjiang NPP									
Unit 1	1,086	12,814	11.80	12,173	-	641	-	1H14**	40
Unit 2	1,086	12,814	11.80	10,621	755	797	1,395	2H15	40
Unit 3	1,086	13,064	12.03	9,933	1,151	829	2,302	1H16	40
Unit 4	1,086	13,064	12.03	6,893	1,490	1,735	4,435	2H17	40
Unit 5	1,086	13,539	12.47	4,072	1,280	2,843	6,624	2H18	40
Unit 6	1,086	13,539	12.47	2,219	1,079	2,285	9,035	2H19	40
Total	6,516	78,832	12.10	45,911	5,755	9,129	23,791		
Ningde NPP									
Unit 1	1,089	13,275	12.19	13,275	-	-	-	1H13	40
Unit 2	1,089	13,275	12.19	12,612	266	398	266	1H14	40
Unit 3	1,089	13,275	12.19	11,080	711	1,153	1,043	2H15	40
Unit 4	1,089	13,275	12.19	8,725	1,469	1,447	3,104	1H16	40
Total	4,356	53,101	12.19	45,691	2,445	2,998	4,412		
Hongyanhe NPP									
Unit 3	1,119	13.635	12.18	12.471	500	300	864	1H15	40
Unit 4	1,119	13,635	12.18	11,223	1,000	800	1,612	2H15	40
Total	2,238	27,270	12.18	23,694	1,500	1,100	2,476		
Taishan NPP									
Unit 1	1,750	36,590	20.91	31,804	2,086	2,457	2,329	1H16	60
Unit 2	1,750	36,590	20.91	26,021	2,434	5,647	4,922	2H16	60
Total	3,500	73,180	20.91	57,825	4,520	8,104	7,251	20	

<sup>\*</sup>Based on the estimated capital investment on the NPP by CGN
\*\*Actual commencement period
Source(s): The Company



Exhibit 17: Valuation summary (excluding first refusal right to purchase under-constructing NPP projects for parent)								
NPP	Attributable stake	# of reactors	Attributable NPV (RMB mn)					
Daya Bay NPP	75%	2	20,113					
Ling Ao NPP	100%	2	26,249					
Lingdong NPP	93.2%	2	20,365					
Yangjiang NPP	78.2%	6	37,889					
Taishan NPP	51% (Post M&A)	2	11,828					
Ningde NPP	32.29%	4	9,138					
Hongyanhe NPP	38.15%	4	7,886					
Sub-total			133,468					
Less: Est. net debt			15,372					
Total			118,122					

Source(s): ABCI Securities estimates



# **Comparative approach**

CGN is one of leading nuclear power operators in China. So far, no pure nuclear power operator in China has ever been listed in Hong Kong. Based on CGN's fast growth (we estimate CGN's net profit to grow at 18% CAGR from FY13-16E) supported by favorable policies from the Chinese government in coming years, we consider other emerging green energy players, which include Datang Renewable (DTR, 1798 HK), Huaneng Renewable (HNR, 958 HK), China Longyuan (CLY, 916 HK) and China Everbright International (CEBI, 257 HK) as CGN's comparable peers for valuation. We also include Hong Kong electricity operators-CLP Holdings (CLP, 2 HK), Power Assets (6 HK), and HK Electric Investments (HKEI, 2638 HK) in our comparison based on the fact that part of the electricity generated by CGN will be supplied to Hong Kong.

Thus, a total of 7 Hong Kong-listed energy companies are identified as CGN's comparable peers. Based on current market valuations, their P/E fall into the range of FY15E P/E 11.8-22.1x (average: 16.6x).

Exhibit 18: Assets and equity return of the peers							
		ROAE (%) FY15E	ROAA (%) FY15E	Net Gearing (%) FY15E			
2 HK	CLP HLDGS LTD	10.87	4.79	67.52			
6 HK	POWER ASSETS HOL	7.14	7.32	Net Cash			
2638 HK	HK ELECTRIC INVE	9.36	3.85	133.44			
1798 HK	CHINA DATANG C-H	3.61	1.08	301.94			
958 HK	HUANENG RENEWA-H	10.67	2.43	297.12			
916 HK	CHINA LONGYUAN-H	9.53	3.72	170.59			
257 HK	CHINA EVERBR INT	11.56	8.83	38.76			
	Average	8.96	4.58	168.23			
	CGN	10.37	3.39	151.55			

Source(s): Bloomberg, the companies, ABCI Securities estimates

Exhibit 19: Peers' valuation and earnings growth								
		No. of shares	Share price <u>As of 01/16/2015</u>	Market Cap	Market Cap	FY14E P/E	FY15E P/E	Net income CAGR 13-16E
		(mn share)	(HKD)	(HKD)	(USD)	(x)	(x)	(%)
2 HK	CLP HLDGS LTD	2,526	68.15	172,178	22,216	16.25	16.00	3.30
6 HK	POWER ASSETS HOL	2,134	77.95	166,366	21,467	18.69	18.70	1.18
2638 HK	HK ELECTRIC INVE	8,836	5.10	45,065	5,815	14.57	14.70	0.94
1798 HK	CHINA DATANG C-H	7,274	1.08	7,856	1,014	288.35	17.65	28.19
958 HK	HUANENG RENEWA-H	9,029	2.71	24,469	3,157	17.79	11.80	34.55
916 HK	CHINA LONGYUAN-H	8,036	8.51	68,390	8,824	22.06	15.46	27.83
257 HK	CHINA EVERBR INT	4,484	11.64	52,190	6,734	29.32	22.13	27.59
	Average					19.78 <sup>1</sup>	16.63	17.65
	CGN	45,449	3.31	150,436	19,411	21.29	19.84	18.19

Note 1: Excluding the outliner of China Datang Source(s): Bloomberg, the companies, ABCI Securities estimates

		Mkt cap	Α	s of	P/E	(x)	P/B	(x)	ROAL	E (%)	EV/EE	BITDA
			01/10	6/2015								
Company	Ticker	(HK\$ mn)	CRY	Share Price	FY14E	FY15E	FY14E	FY15E	FY14E	FY15E	FY14E	FY15E
Hang Seng Index -												
Utilities sector												
CLP HLDGS LTD	2 HK	172,178	HKD	68.15	16.25	16.00	3.30	4.84	1.80	1.72	11.57	10.8
HONG KG CHINA GS	3 HK	185,433	HKD	17.64	25.24	23.46	7.97	2.94	3.35	3.14	13.91	13.6
POWER ASSETS HOL	6 HK	166,366	HKD	77.95	18.69	18.70	1.18	15.83	1.33	1.30	63.76	7.1
HK ELECTRIC INVE	2638 HK	45,065	HKD	5.10	14.57	14.70	0.94	15.59	0.89	0.91	13.38	9.3
CHINA RES POWER Sector Weighted	836 HK	97,626	HKD	20.35	8.08	7.44	7.67	0.97	1.32	1.17	16.75	15.5
Average					18.05	17.41	4.55	7.21	1.98	1.87	26.12	11.3
Major power groups in												
China												
HUANENG POWER-H	902 HK	156,886	HKD	11.30	10.34	9.74	4.73	2.06	1.81	1.65	18.33	16.9
DATANG INTL PO-H	991 HK	92,162	HKD	4.28	10.39	8.36	21.80	0.38	0.98	0.94	8.98	9.9
HUADIAN POWER-H	1071 HK	68,778	HKD	6.81	8.42	8.66	2.25	3.85	1.51	1.38	18.53	14.6
CHINA POWER INTE	2380 HK	29,213	HKD	4.23	8.14	7.90	4.64	1.70	1.11	1.02	13.51	12.0
CGN MEIYA	1811 HK	9,697	HKD	2.26	14.25	12.75	4.64	2.74	1.53	1.38	10.61	11.2
GD POWER DEVEL-A	600795 CH	100,796	RMB	4.29	11.26	10.29	16.87	0.61	1.90	1.67	16.70	16.0
SDIC POWER HOL-A	600886 CH	95,718	RMB	11.30	14.39	12.50	12.07	1.04	3.45	2.83	25.16	23.6
GUANGDONG ELEC-A	000539 CH	39,333	RMB	7.61	11.19	10.47	9.14	1.14	1.57	1.41	14.66	14.0
Sector Weighted Average					9.57	8.65	9.72	1.32	1.69	1.48	15.30	14.3
New energy players												
CGN POWER-H	1816 HK	146,345	HKD	3.22	21.29	19.51	11.46	1.70	2.01	2.03	13.55	10.3
GUODIAN TECHNO-H	1296 HK	6,124	HKD	1.01	7.56	6.37	11.46	0.56	0.49	0.46	6.68	7.3
CHINA DATANG C-H	1798 HK	7,856	HKD	1.08	288.35	17.65	123.17	0.14	0.67	0.64	0.91	3.6
HUANENG RENEWA-H	958 HK	26,363	HKD	2.71	17.79	11.80	35.18	0.34	1.31	1.20	8.18	10.6
CHINA POWER NEW	735 HK	5,558	HKD	0.47	12.98	7.84	55.43	0.14	0.55	0.52	4.42	6.8
CHINA LONGYUAN-H	916 HK	68,390	HKD	8.51	22.06	15.46	27.20	0.57	1.66	1.53	7.94	9.5
CHINA EVERBR INT	257 HK	52,190	HKD	11.64	29.32	22.13	25.04	0.88	3.49	3.10	9.54	11.5
CT ENVIRONMENTAL	1363 HK	11,248	HKD	7.80	29.21	20.74	28.33	0.73	6.66	5.16	8.23	28.0
JINGNENG CLEAN-H	579 HK	22,879	HKD	3.33	12.70	8.39	34.25	0.24	1.45	1.27	12.93	16.1
HUADIAN FUXIN -H	816 HK	30,857	HKD	3.67	12.05	8.99	28.69	0.31	1.69	1.46	14.82	15.8
CHINA SUNTIEN-H	956 HK	6,687	HKD	1.80	12.76	9.61	30.19	0.32	0.70	0.64	5.58	5.6
CHINA WINDPOWER	182 HK	4,160	HKD	0.47	9.89	6.37	37.44	0.17	0.75	0.68	7.94	10.7
Sector Weighted Average					26.05	16.45	24.35	0.96	2.07	1.92	10.88	11.3
Nuclear power players												
CGN MINING	1164 HK	2,366	HKD	0.71	_	_	_	_	_	_	_	
CNNC INTL LTD	2302 HK	1,419	HKD	2.90	_	_	_	_	_	_	_	
SUFA TECH INDS-A	000777 CH	14,908	RMB	31.15	163.95	141.59	14.08	10.06	11.29	10.82	7.14	7.8
CNI 23 INT'L	611 HK	1,564	HKD	1.42	-			-				
SHANGHAI ELECT-H	2727 HK	130,865	HKD	4.52	19.57	18.47	5.59	3.30	1.38	1.31	7.35	7.5
HARBIN ELECTRIC	1133 HK	7,600	HKD	5.52	14.35	13.40	11.25	1.19	0.47	0.45	3.35	3.4
DONGFANG ELECT-H	1072 HK	51,897	HKD	15.38	15.40	13.98	12.80	1.09	1.30	1.22	8.58	9.6
Sector Weighted		,			18.84	17.06	5.39	2.06	1.34	1.27	4.90	5.1
Average					10.04	17.00	3.39	2.00	1.34	1.41	4.50	J.

Source(s): Bloomberg, ABCI Securities estimates



# **Competitive Strengths of CGN**

# The largest player in an oligopolized market

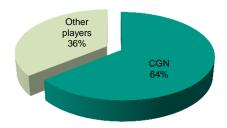
CGN was the first mover in China's nuclear power industry. According to CNEA Report, the Daya Bay Nuclear Power Station, which is majority-owned by CGN, was the first nuclear power station that commenced operation commercially in China back in 1994.

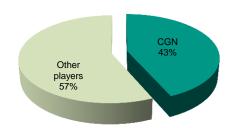
CGN is currently the largest player in China's nuclear power industry. According to CNEA Report, CGN was ranked No.1 by total installed capacity of operating nuclear power-generating units with a market share of ~64.1% as at end-1H14. CGN was also ranked first in China by attributable installed capacity of operating nuclear power-generating units with a market share of ~43.5%.

Also based on the CNEA Report, CGN was ranked top in China by installed capacity of nuclear power-generating units under construction and to be acquired as at end-1H14; the corresponding market share was ~43.4%.

Exhibit 21: CGN's market share by installed capacity at end-1H14

Exhibit 22: CGN's market share by installed capacity of nuclear power-generating units under construction at end-1H14





Source(s): CNEA Source(s): CNEA

Exhibit 23: Operating nuclear power-generating units operated and managed by major market participants in China as of end-1H14

Company name	Unit in operation (Unit)	Installed capacity (MW)
CGNPC	11	11,624
CNNC	9	6,510
China Power Investment Corporation	2	2,238

Source(s): CNEA

# Right of first refusal

Looking forward, under the Non-competition Deed between CGN and its parent company, CGNPC, CGN has the right of first refusal to acquire new NPPs built by CGN Group. CGN may boost its earnings by acquiring stakes of NPPs from its parent company.



# Favorable government policies and significant entry barriers

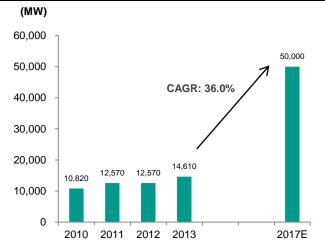
With the growing awareness on environmental protection, a low-carbon economy has been advocated in China. The Chinese government has promulgated a range of laws, regulations, and policies to optimize energy mix and promote the use of non-fossil energy.

High utilization hour of nuclear power plants makes them more economically efficient. Since operation of the nuclear power stations is not subject to seasonal or weather conditions, these plants can usually operate at designed capacity. According to NEA, the average utilization hour of a nuclear power plant was 7,893 hours in 2013, which was 2.38 times and 3.79 times of that in hydropower and wind power.

Higher reliability of nuclear power compared to green energy enables the former to become an important energy source in China. According to the Work Plan on Strengthening the Prevention and Control of Air Pollution for the Energy Industry (the Work Plan) announced in Mar 2014, the Chinese government will implement plans concerning nuclear power safety and the industry's medium-to-long term development. According to the Work Plan, the operating installed capacity, capacity under construction, and annual generation of nuclear power in China are targeted to reach 50,000 MW, 30,000 MW and over 280,000 GWh, respectively, by 2017.

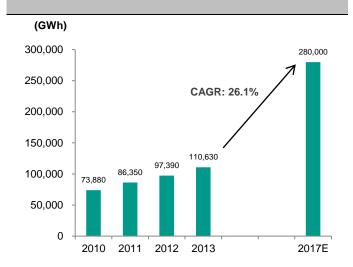
To achieve these targets, the operating installed capacity and annual generation of nuclear power would need to achieve CAGRs of 36.0% and 26.1% in 2013-17E.

Exhibit 24: Operating installed capacity of nuclear power in China



Source(s): National Bureau of Statistics of China, China Electricity Council, Work Plan on Strengthening the Prevention and Control of Air Pollution for the Energy Industry

### Exhibit 25: Annual generation of nuclear power in China



Source(s): National Bureau of Statistics of China, China Electricity Council, Work Plan on Strengthening the Prevention and Control of Air Pollution for the Energy Industry

CGN, as the largest nuclear power player in China, benefits from the government incentives to propel nuclear power development. These incentives mainly include:

**Priority in grid connection and dispatch:** According to the PRC laws and regulations, nuclear power enjoys priority over coal-fired, oil-fired and natural gas-fired generating units in grid connection and dispatch.



**Benchmark on-grid tariff:** The benchmark on-grid tariff for nuclear power in China is RMB 0.43/KWh, applicable to nuclear power-generating units commencing operations after Jan 1, 2013. For the first group of nuclear power-generating units initiating the use of technical improvements or upgrades, self-reliant innovation or domestically manufactured key equipment, the corresponding tariffs can be adjusted upward.

**Preferential tax treatment:** Nuclear power companies in China are subject to the policy of "refund-after-collection" for VAT within 15 years from the month following the commencement of operation. Moreover, an income tax holiday is available for nuclear power plants approved on or after 2008, with the income taxes for the first 3 years (starting from the first year of electricity sale) being exempted; the PRC corporate income tax for the following three years are also entitled to a 50% reduction.

#### **Restrictions on newcomers**

Due to the uniqueness of the nuclear power industry, the government has certain policy restrictions pertaining to the ownership of nuclear power projects. Such restrictions present high entry barriers for newcomers.

According to the CNEA Report, all nuclear power stations in China (other than nuclear reactors for research and demonstration purposes) are majority-owned by CGN Group (including CGN), CNNC or China Power Investment Corporation. Nuclear power projects are subject to inspection by the NDRC and approval by the State Council.



# Support from CGNPC to drive sustainable growth

Under the Non-competition Deed, CGN has the right of first refusal to purchase nuclear power stations constructed by its parent company, CGNPC. We expect that the planned injection of nuclear power assets from the parent group to CGN would boost earnings in the future.

CGN has planned to acquire a 41% equity stake in Taishan Nuclear from CGNPC. In addition, CGN Group is currently constructing 2 nuclear power-generating units in Fangchenggang, Guangxi Province, with a total installed capacity of 2,160 MW. CGN has the right of first refusal to acquire the equity interest held by CGNPC in these nuclear power-generating units upon completion or prior to commercial operation.

Apart from the businesses currently operated by CGN, CGNPC also has interests in the Retained Business listed below through a number of companies controlled by it (Retained Group).

Retained Group	Equity Interest Percentages	Reasons for Exclusion
Taishan Nuclear	10% by GNIC, 12.5% by CGNPC, 47.5% by Taishan Investment and 30% by EDF International	<ul> <li>Nuclear power projects are still under construction</li> <li>Its 12.5% equity interest held by CGNPC, along with its 28.5% equity interest held by CGNPC via Taishal Investment, is proposed to be acquired by CGN</li> </ul>
Taishan Investment	60% by CGNPC and 40% by Guangdong Yudean Group Co., Ltd. (廣東省粵 電集團有限公司)	<ul> <li>It is an investment holding company holding 47.5% equity interest in Taishan Nuclear</li> <li>60% equity interest held by CGNPC is proposed to be acquired by CGN</li> </ul>
Fangchenggang Nuclear	61% by CGNPC and 39% by Guangxi Investment Group Co., Ltd. (廣西投資 集團有限公司)	Nuclear power projects are still under construction
CGN Lufeng Nuclear Power Co., Ltd. (中廣核陸豐核電有限公司)	100% by CGNPC	Nuclear power projects are still at the early preparatory phase
Xianning Nuclear Power Co., Ltd. (咸寧核電有限公司)	60% by CGNPC and 40% by Hubei Energy Group Co., Ltd. (湖北能源集團股份 有限公司)	Nuclear power projects are still at the early preparatory phase
Anhui Wuhu Nuclear Power Co., Ltd. (安徽蕪湖核電有限公司)	51% by CGNPC, 20% by Shenergy Company Limited (申能股份有限公司), 15% by Anhui Province Wenergy Company Limited (安徽省皖能股份有限公司) and 14% by Shanghai Electric Power Co., Ltd. (上海電力股份有限公司)	Nuclear power projects are still at the early preparatory phase
CGN Shaoguan Nuclear Power Co., Ltd. (中廣核韶關核電有限公司)	100% by CGNPC	Nuclear power projects are still at the early preparatory phase
CGN Huizhou Nuclear Power Co., Ltd. (中廣核惠州核電有限公司)	100% by CGNPC	Nuclear power projects are still at the early preparatory phase
CGN Taishan No. 2 Nuclear Power Co., Ltd. (中廣核台山第二核電有限 公司)	100% by CGNPC	Nuclear power projects are still at the early preparatory phase



(Cont'd) Lingwan Nuclear Power Co., Ltd. (嶺灣核電有限公司)	100% by CGNPC	Nuclear power projects are still at the early preparatory phase
Hubei Nuclear Power Co., Ltd. (湖北核電有限公司)	60% by CGNPC and 40% by Hubei Energy Group Co., Ltd. (湖北能源集團股份 有限公司)	There is no concrete development and construction work of any nuclear power project
Jilin Nuclear Power Co., Ltd. (吉林核電有限公司)	100% by CGNPC	<ul> <li>There is no concrete development and construction work of any nuclear power project</li> </ul>
CGN Engineering	100% by CGNPC	<ul> <li>Principally engage in the business of construction and engineering of nuclear power projects, it provides technical support and engineering service directly to those nuclear power projects which are still under construction or at the early preparatory phase</li> </ul>

Moreover, by leveraging the working relationship of CGNPC with the provincial governments, we believe CGN could benefit from favorable terms in developing new projects and obtaining relevant approvals.

Furthermore, CGNPC is engaged in the uranium development and trading business in Namibia, Kazakhstan and Australia. This would help stabilize CGN's natural uranium supply.



# World-class operations leveraging on advanced technology and management systems

According to World Association of Nuclear Operators (WANO), 33 out of the 54 WANO's performance indicators among the 6 nuclear power-generating units at Daya Bay were ranked in the top quartile (considered as "advanced"); 28 out of the 54 indicators were ranked in the top decile (considered as "excellent") in 2013.

We attribute the outstanding operating performance to its high standards implemented from the start. CGN imported complete sets of nuclear power-generating units from France for the Daya Bay nuclear power station. It adopted the nuclear power operational standards and management systems used by the International Atomic Energy Agency and developed the modern enterprise systems in line with international practices.

By leveraging on the construction and operating experiences of the Daya Bay nuclear power station, CGN would be able to develop an effective management and operating system for its other nuclear power plants.

# Commitment to safety with an excellent track record

The International Nuclear and Radiological Event Scale (INES) was introduced in 1990 by the International Atomic Energy Agency (IAEA) in order to enable prompt communication of safety-significant information in case of nuclear accidents.

CGN's nuclear power operation has an excellent safety track record. As at end-1H14, there had been no incidents at or above level 2 on the INES in the nuclear power-generating units operated and managed by CGN.

The Chernobyl disaster in 1986 and Fukushima Daiichi nuclear disaster in 2011 were classified as level 7 Major Accident in accordance with INES.

Exhibit 27: Main features of each level of the international nuclear radiological event scale from INES				
INES Level	People and Environment	Radiological Barriers and Control	Defense-in- Depth	
Major Accident Level 7	Major release of radioactive material with widespread health and environmental effects requiring implementation of planned and extended countermeasures			
Serious Accident Level 6	Significant release of radioactive material likely to require implementation of planned countermeasures			
(Cont'd)				



(Cont'd)			
Accident with Wider Consequences Level 5	1) Limited release of radioactive material likely to require implementation of some planned countermeasures. 2) Several deaths from radiation	1) Severe damage to reactor core 2) Release of large quantities of radioactive material within an installation with a high probability of significant public exposure. This could arise from a major criticality accident or fire.	
Accident with Local Consequences Level 4	1) Minor release of radioactive material unlikely to result in implementation of planned countermeasures other than local food controls 2) At least one death from radiation	1) Fuel melt of damage to fuel resulting in more than 0.1% release of core inventory 2) Release of significant quantities of radioactive material within an installation with a high probability of significant public exposure	
Serious Incident Level 3	1) Exposure in excess of ten times the statutory annual limit for workers. 2) Non-lethal deterministic health effect (e.g., burns) from radiation	1) Exposure rates of more than 1 Sv/h in an operating area 2) Severe contamination in an area not expected by design, with a low probability of significant public exposure.	1) Near accident at a nuclear power plant with no safety provisions remaining 2) Lost or stolen highly radioactive sealed source. 3) Misdelivered highly radioactive sealed source without adequate procedures in place to handle it.
Incident Level 2	1) Exposure of a member of the public in excess of 10 mSv 2) Exposure of a worker in excess of the statutory annual limits	1) Radiation levels in an operating area of more than 50 mSv/h 2) Significant contamination within the facility into an area not expected by design	1) Significant failures in safety provisions but with no actual consequences 2) Found highly radioactive sealed orphan source, device or transport package with safety provisions intact. 3) Inadequate packaging of a highly radioactive sealed source.
Anomaly Level 1			1) Overexposure of a member of the public in excess of statutory annual limits. 2) Minor problems with safety components with significant defense-in-depth remaining. 3) Low activity lost or stolen radioactive source, device or transport package.



# **Outstanding Research and Development Capabilities**

To enhance competitiveness, CGN emphasizes heavily on the research and development (R&D) of technologies. It has 2 specialized R&D organizations, CNPRI and Suzhou Nuclear Power Research Institute and 4 national R&D centers providing the platforms and capabilities to develop nuclear reactor technologies.

As of Mar 31, 2014, CGN had over 1,600 R&D employees engaging in continuous upgrades of nuclear power technologies and self-reliant development of new nuclear reactors.

# **Experienced and Dedicated Management Team**

The experienced management team is familiar with the industry history and has deep insights into future trends of nuclear power. Each key senior management has more than 20 years of experience in the industry and substantial practical knowledge in the management of nuclear power stations.

Mr. Gao Ligang (高立剛), aged 49, is the executive Director and President of CGN. He was the senior vice president of CGNPC before being appointed as the executive Director and President in Mar2014. Mr. Gao has more than 26 years of experience in the nuclear power industry. He joined GNPJVC in Mar 1988 and had worked for CGNPC, Taishan Nuclear, Yangjiang Nuclear and DNMC as senior management.

Mr. Gao obtained a bachelor of engineering degree in power system and automation from Huazhong University of Science and Technology (formerly known as Huazhong Institute of Technology) in July 1985 and a master of engineering degree in power system and automation from North China Institute of Electric Power (華北電力學院) in Jan 1988. Mr. Gao was accredited as a professorship-level senior engineer by CGNPC in Dec 2001.

Mr. Yue Linkang (岳林康), aged 58, is the Chief Financial Officer (CFO), appointed on Mar 24, 2014. Mr. Yue joined GNPJVC in 1991 as assistant manager, manager, and chief accountant while concurrently serving as manager (responsible for financial management) of the finance department at GNPJVC from 1994 to 2003, successively as deputy CFO, CFO and chief economist at CGNPC from 2003 to 2014. Mr. Yue graduated from Tsinghua University (清華大學) with a bachelor of engineering degree in reactor in 1982 and obtained a master of engineering degree in industrial management engineering from Tsinghua University (清華大學) in 1984. Mr. Yue was accredited as a senior economist and senior accountant by CNNC and the third Assessment Committee of Senior Accountant Qualification of Guangdong Province in 1994 and 2002, respectively.



Mr. Shu Guogang (東國剛), aged 50, is the Vice President of CGN, appointed in Mar 2014, and the general manager of the nuclear engineering unit. Mr. Shu is also the general manager of the CGN Engineering. Before that, Mr. Shu had worked for research institutes such as Suzhou Nuclear Power Research Institute (蘇州熱工研究院), Thermal Power Research Institute of the Ministry of Electric Power Industry (電力工業部熱工研究院) and Thermal Power Research Institute of the State Power Corporation (國家電力公司熱工研究院). Mr. Shu graduated from Beijing Iron and Steel Institute (北京鋼鐵學院) with a bachelor of engineering degree in metallic materials in 1984 and obtained a master of engineering degree in metallic materials and heat treatment from Beijing Iron and Steel Institute (北京鋼鐵學院) in 1987 and a doctor of engineering degree in high voltage and insulation technology from Wuhan University (武漢大學) in 2004. Mr. Shu was accredited as a professorship-level senior engineer by the Ministry of Electric Power Industry in 1999.

Mr. Su Shengbing (蘇聖兵), aged 52, is the Vice President of CGN, appointed in Mar 2014, and the general manager of the nuclear operation unit. He is also the general manager of CGN Operations. Before that, Mr. Su had worked for GNIC, CGNPC, Hongyanhe Nuclear, DNMC, Ling'ao Nuclear and GNPJVC. Mr. Su graduated from Xi'an Jiao Tong University (西安交通大學) with a bachelor of engineering degree in nuclear reactor engineering in 1982 and a master of engineering degree in industrial engineering from Huazhong University of Science and Technology (華中科技大學) in 2008. Mr. Su was accredited as a professorship-level senior engineer by CGNPC in 2002.

Mr. Fang Chunfa (方春法), aged 45, is the Board Secretary, appointed in Mar 2014, and general manager of the investor relations department of CGN, who is also a councilor of Shenzhen Soft Science Development Foundation (深 圳軟科學綜合研究院基金會). Before that, Mr. Fang had worked for CGNPC, DNMC and GNPJVC. Mr. Fang graduated from Beijing Foreign Studies Institute (北京外國語學院) with a major in English language in 1989, and obtained a master of business administration degree from Huazhong University of Science and Technology (華中科技大學) in 2009. Mr. Fang was accredited as a senior engineer by CGNPC in 2003.



# **Business strategies of CGN**

# Strengthening leadership in domestic market while expanding overseas

#### Further strengthen its market position in China

The Chinese government targets to increase the installed capacity of nuclear power from 14,834 MW by end-2013 to 40,000 MW by end-2015, implying a 64.2% CAGR. With the advocacy of a green economy, China's nuclear power industry will continue to grow in the next few decades.

As the largest nuclear power player, CGN will continue to expand its generating capacity. CGN expects its total installed capacity will account for ~60% of China's total operating nuclear power installed capacity by end-2015. It targets to be one of the top 5 international nuclear power enterprises in terms of installed capacity of operating nuclear power-generating units by end-2015.

To achieve the target, CGN will acquire new nuclear power projects from CGNPC based on its right of first refusal under the Non-competition Deed established with its parent company, CGNPC. We estimate that CGN to invest ~RMB 40bn in nuclear power projects under construction in 2014-16, and acquire an additional 41% equity interest in Taishan Nuclear from CGNPC for ~RMB 13bn.

Apart from acquiring under-constructing projects from CGNPC, CGN plans to commence construction of new power projects. The exact schedule for these projects will depend on market development, results of feasibility studies and level of support offered by the local governments.

# Seeking opportunities in the international market

According to CNEA's forecast, the global nuclear power industry is expected to grow rapidly in decades to come.

CGN is seeking opportunities in the overseas markets. Due to the long construction cycle, as well as the large capital input and difficulties in managing the risks and costs associated with nuclear power projects, CGN will evaluate the following aspects thoroughly before investing in any foreign countries.

- a) Government policies, political and economic environment and outlook;
- b) Legal system;
- c) General business practice;
- d) Electricity demand, growth trend and on-grid tariffs;
- e) Technical conditions for the construction of nuclear power projects;
- f) Expected returns of projects;
- g) Source of sufficient funds
- h) Robust risk management in the local market.

As of the publishing date of this report, CGN has not identified any specific target markets or projects, or entered into any legally binding agreements in connection with its international expansion plan.



#### Commitment to cost control

**Improve cost control on operations.** CGN intends to enhance cost control over the following key aspects:

- Development and introduction of safe and economical nuclear power technologies, project management, nuclear fuel supply, operations management;
- Life extension of nuclear power stations. CGN would continue to engage in the R&D of life extension and decommissioning technologies for nuclear power-generating units

CGN would focus on R&D and strategic cooperation with suppliers to control cost.

**Enhance "multi-station management" and economies of scale.** CGN would apply the operation and managing experience accumulated from its Daya Bay and the 11 nuclear power-generating units at Ningde Nuclear Power Station, Hongyanhe Nuclear Power Station, and Yangjiang Nuclear Power Station commencing operations in the next few years.

Through the integrated service platform, CGN plans to further enhance the internal sharing of competent personnel, information, experience, spare parts and service supporting systems among the nuclear power stations, and strive to achieve synergies and economies of scale.

**Strengthen financial control.** CGN intends to strengthen the financial control by maintaining an optimal financial leverage ratio. CGN would seek funding in both domestic and overseas markets, and use low-risk financial products, including derivative financial instruments, to mitigate financial risks.

#### Focus on people

**Build a staff team aligning with corporate objectives.** Due to the technology-intensive nature of nuclear power operations, CGN depends on the team of highly qualified professionals. It would focus on promoting a code of conduct featuring honesty, transparency, professionalism, execution and teamwork. It would continue to improve the training programs as well as building compensation and incentive scheme aligning rewards with employees' contributions.

Fulfill corporate social responsibilities to achieve collaborative development with society. CGN intends to fulfill the corporate social responsibilities and contribute to public welfare via the following aspects:

- Improving the environment of neighboring communities, providing job opportunities, and stimulating local economies;
- Strengthening communication with the public, including maintaining timely, transparent and open disclosures of nuclear power operations and safety;
- Supporting public welfare by providing financial aid and volunteer work to alleviate poverty, promoting education and technological development in less developed regions and helping fight against natural disasters.



# Uphold and improve safety standard

As nuclear safety is the fundamental safeguard for society and the environment, CGN will continue to implement the principle of "Safety First, Quality Foremost, Pursuit of Excellence" and seek to make nuclear safety the core of the corporate culture in every aspect of the operation.

#### With respect to the management of operating nuclear power stations:

- Continue to concur with international organizations, such as WANO, as well as domestic and foreign peers to compare and improve the performance by exchanging experiences in maintaining nuclear safety and operational performance.
- Continue to minimize human error in the operations of nuclear power station and focus on maintaining equipment reliability. Also, CGN would continue to strengthen nuclear safety by developing the safety assurance systems. It will strive to create a productive working environment, provide skills and knowledge training for workforce, and monitor safety culture indicators and safety culture assessment.
- Continue to reduce the accident rate and collective dosage levels by improving the health and safety management in the workplace. CGN aims to reduce the discharge of radioactive wastes through improving management and technical advancement, and ensuring compliance with the national emissions standards.

# With respect to the management of nuclear power projects under construction:

- The under-constructing nuclear power projects are mainly being conducted by CGN's sister company, CGN Engineering, which is wholly owned by the CGNPC. CGN has entered into a Custodian Services Framework Agreement with the controlling shareholder to manage its equity interest in CGN Engineering, such that CGN can ensure the project construction would comply with the requirements and be completed on time.
- In order to achieve the Six Controls on nuclear power projects, CGN formulates a set of project quality assurance standards prior to the construction of each project. These standards are reviewed and approved by the national nuclear safety regulatory authorities. CGN signs a commissioning contract with CGN Engineering and formulate annual planning and assessment programs.
- CGN would continue to reinforce the projects' quality while ensuring nuclear safety. It would continue to strengthen the standardization of safety, quality and environmental management.

# With respect to technical innovation and the building of core competency:

- CGN would strive to innovate in nuclear power equipment commissioning, testing and maintenance to improve equipment reliability and extend equipment life. It would leverage the experiences of domestic and foreign companies in the same industry.
- It also would develop and deploy management and disposal technologies for low- and medium level radioactive wastes and continue to reduce their volume and disposal costs.



# **Key Financial Data of CGN**

# One of the key players in nuclear industry

CGN is the largest nuclear power producer in China primarily engaged in the operation and management of nuclear power stations. The major business of the Group is sale of electricity generated by nuclear power that contributed to over 90% of revenue in FY11-13.

Sales to the 5 largest customers contributed to 95.8%, 95.3%, 95.8% and 97.2% of total revenue in 2011-13 and 1Q14, respectively, and corresponding sales to the largest customer contributed to 67.4%, 70.2%, 70.5% and 73.0% of total revenue. Customers of CGN are highly concentrated, with the major ones including Guangdong Power Grid Corporation and Hong Kong Nuclear Investment Company (HKNIC).

#### **Guangdong Power Grid Corporation**

Guangdong Power Grid Corporation, CGN's largest customer, is a whollyowned subsidiary of China Southern Power Grid. Guangdong Power Grid Corporation operates and manages the Guangdong Grid, power dispatch control, as well as the operation and maintenance of the power grids.

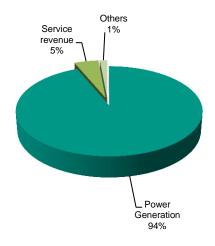
### Sales agreement with HKNIC

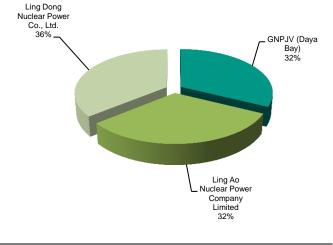
HKNIC, the 2<sup>nd</sup> largest customer of CGN. was founded in 1983. It is an investor in GNPJVC, which owns the Daya Bay Nuclear Power Station. GNPJVC is 25%-owned by HKNIC and 75%-owned by CGN. HKNIC is a subsidiary of CLP Holdings Limited, a company listed on the Hong Kong Stock Exchange.

HKNIC entered into the Joint Venture Contract on Jan18, 1985, pursuant to which HKNIC agreed to purchase 70% of the electricity generated by Daya Bay Nuclear Power Station. On Dec 31, 2013, a new agreement was signed, such that an additional 10% of the annual electricity sent out by Daya Bay Nuclear Power Station between 4Q14 and 2018 will be sold to HKNIC.

Exhibit 28: Revenue breakdown of the Group by source of income, FY13

Exhibit 29: Net power generation breakdown of CGN's majority-owned nuclear power-generating units, FY13





Source(s): The Company

Source(s): The Company



# Revenue to surge on increasing generating units

CGN operated and managed 11 operating nuclear power-generating units with a total installed generating capacity of 11,624 MW as of end-1H14. The Group plans to further expand the installed capacity through additions of nuclear power-generating units at its subsidiaries and acquiring new nuclear projects developed by the affiliated entities.

CGN has 9 nuclear power-generating units under construction via its subsidiaries and JV companies. The total installed capacity would be 9,846 MW. Furthermore, CGN acquired additional equity interests in the Taishan Nuclear Power Station, which has 2 nuclear power-generating units under construction by the affiliated entities controlled by CGN Group, the parent company of CGN. The planned aggregate installed capacity of the 2 new units is 3,500 MW.

Power plants operated and managed by CGN	Installed capacity (MW)	Net power generation in FY13 (GWh)	Net power generation in 1H14 (GWh)	Stake (%)	Status	(Expected) Start in operation
GNPJVC	1,968	14,241	8,253	75.00		
Daya Bay No. 1	984	7,150	4,130		In operation	1/2/1994
Daya Bay No. 2	984	7,091	4,123		In operation	1/5/1994
Ling Ao Nuclear Power Co., Ltd.	1,980	14,103	6,927	100.00		
Ling'ao No. 1	990	6,842	3,289		In operation	1/5/2002
Ling'ao No. 2	990	7,261	3,638		In operation	1/1/2003
Ling Dong Nuclear Power Co., Ltd.	2,174	15,812	7,189	93.20		
Lingdong No. 1	1,087	7,942	3,660		In operation	1/9/2010
Lingdong No. 2	1,087	7,870	3,529		In operation	1/8/2011
Yangjiang Nuclear Power Co., Ltd	6,516		2,384	78.20		
Yangjiang No. 1	1,086		2,384		In operation	1/3/2014
Yangjiang No. 2	1,086				Under Construction	2H15
Yangjiang No. 3	1,086				Under Construction	1H16
Yangjiang No. 4	1,086				Under Construction	2H17
Yangjiang No. 5	1,086				Under Construction	2H18
Yangjiang No. 6	1,086				Under Construction	2H19
Fujian Ningde Nuclear Power Co., Ltd.	4,356		2,191	32.29		
Ningde No. 1	1,089	6,272	847		In operation	1/4/2013
Ningde No. 2	1,089		1,344		In operation	24/4/2014
Ningde No. 3	1,089				Under Construction	2H15
Ningde No. 4	1,089				Under Construction	2H16
Liaoning Hongyanhe Nuclear Power Co., Ltd	4,476		3,582	38.15		
Hongyanhe No. 1	1,119	4,982	2,389		In operation	1/6/2013
Hongyanhe No. 2	1,119		1,193		In operation	23/11/2013
Hongyanhe No. 3	1,119				<b>Under Construction</b>	1H15
Hongyanhe No. 4	1,119				Under Construction	2H15
Taishan Nuclear Power Joint Venture Co., Ltd.	3,500			10.00		
Taishan No. 1	1,750				<b>Under Construction</b>	1H16
Taishan No. 2	1,750				Under Construction	2H16
Total capacity in operation	11,624					
Total capacity under construction	13,346					

Source(s): The Company

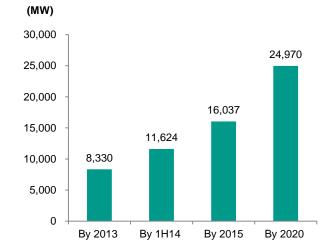


Based on our calculation, a total of 11 nuclear power-generating units with an aggregate installed capacity 13,346 MW are currently under construction. These projects are scheduled to be delivered in 2015-19. Upon completion, the total installed capacity under being operated and managed by CGN would increase from 11,624 MW at end-1H14 to 24,970 MW by end-2019.

Based on our estimates, the attributable installed capacity (the installed capacity of the nuclear power-generating units multiplied by the stake of CGN on the subsidiary, associated company or JV company) would increase from 7,888 MW at end-1H14 to 15,477 MW by end-2019E.

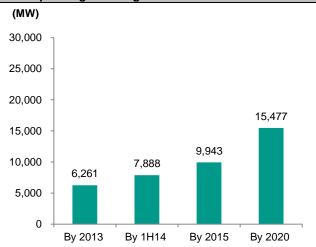
Four power generation units are scheduled to be delivered in 2015, to be followed four others in 2016. This should increase CGN's electricity output substantially and help drive revenue going forward.

Exhibit 31: Installed capacity of nuclear power-generating units operated and managed by CGN



Source(s): The Company, ABCI Securities

Exhibit 32: Attributable installed capacity of nuclear CGN's power-generating units



Source(s): The Company, ABCI Securities



# High utilization of nuclear power plants

Capacity factor, load factor and utilization hour are the main indicators of how well the nuclear power generating assets are being utilized to produce electricity - the main source of CGN's revenue and cash flow. The higher the figures, the higher the utilization and efficiency of the power-generating units a. Average utilization hour in CGN exceeded 7,500 in FY11-13 (assuming 365 days a year, the total number of hours in a year would be 365 days x 24 hrs = 8,760 hrs). Furthermore, the average capacity and load factor of CGN in FY11-3Q14 were high at above 85%.

According to NEA, utilization hour of a nuclear power plant was 7,893hrs on average in 2013, which were 1.57 times of thermal power, 2.38 times of hydropower, or 3.79 times of wind power. We believe the higher utilization hour of nuclear power is partly enabled by its lower sensitivity to natural environmental factors. Moreover, the fact that nuclear power enjoys dispatch priority over thermal power under policies to encourage the use of lean, low-carbon energy sources also support higher utilization of the nuclear power facilities. We believe the dispatch priority will continue in the future.

Exhibit 33: Average	je utilizat	ion nour or	CGN		
	FY11	FY12	FY13	1H13	1H14
Utilization hour	7,773	7,750	7,586	3,565	3,883

Source(s): The Company

Exhibit 34: Net power ge managed by CGN	neration, ca	pacity fa	actor and	d load fa	ctor of o	peratin	ng nucl	ear pov	ver-gen	erating	units o	perate	d and
			Net F	ower Gei	neration		c	apacity	Factor			Load	I Factor
Nuclear Power-	Installed	<u>FY11</u>	FY12	FY13	<u>1H14</u>	<u>FY11</u>	FY12	FY13	<u>1H14</u>	<u>FY11</u>	FY12	FY13	<u>1H14</u>
Generating Units	capacity (MW)	(GWh)	(GWh)	(GWh)	(GWh)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(0/)
GNPJVC	1,968	15,336	15.251	14,241	8,253	(70)	(70)	(%)	(%)	(%)	(70)	(%)	(%)
	1,000	10,000	10,201	17,271	0,200								
Daya Bay No. 1	984	8,223	6,946	7,150	4,130	99.98	83.94	86.83	99.95	99.67	83.86	86.76	100.71
Daya Bay No. 2	984	7,113	8,305	7,091	4,123	86.56	99.97	85.93	99.95	86.17	100.45	86.04	100.55
Ling Ao Nuclear Power Company Limited	1,980	15,305	15,131	14,103	6,927								
Ling'ao No. 1	990	7,571	7,657	6,842	3,289	91.39	93.59	82.94	80.76	91.05	91.87	82.38	79.93
Ling'ao No. 2	990	7,734	7,474	7,261	3,638	94.05	91.25	88.58	89.38	93.12	89.70	87.28	88.33
Ling Dong Nuclear Power Co., Ltd.	2,174	9,878	14,731	15,812	7,189								
Lingdong No. 1	1,087	6,328	7,721	7,942	3,660	72.06	88.45	90.11	82.60	71.14	86.30	88.78	82.64
Lingdong No. 2	1,087	3,550	7,010	7,870	3,529	99.59	80.60	88.95	80.47	98.78	78.52	88.18	79.76
Yangjiang Nuclear Power Co., Ltd	1,086	-	-	-	2,384								
Yangjiang No. 1	1,086	-	-	-	2,384	-	-	-	100.09	-	-	-	99.97
Fujian Ningde Nuclear Power Co., Ltd.	2,178	-	-	6,272	2,191								
Ningde No. 1	1,089	-	-	6,272	847	-	-	99.95	19.55	-	-	98.51	19.48
Ningde No. 2	1,089	-	-	-	1,344	-	-	-	99.93	-	-	-	99.11
Liaoning Hongyanhe Nuclear Power Co., Ltd	2,238	-	-	4,982	3,582								
Hongyanhe No. 1	1,119	-	-	4,982	2,389	=	-	99.90	54.04	-	=	96.32	53.22
Hongyanhe No. 2	1,119			-	1,193				98.27	-	<del>-</del>	<b>-</b>	97.99
Average						90.61	89.63	87.22	90.46	89.99	88.45	86.57	90.27

Source(s): The Company



# Electricity tariff policy on nuclear power

The on-grid tariffs of electricity sold by the nuclear power stations to grid companies in China are approved or fixed by the relevant pricing authorities in the PRC based on various factors such as cost of production and cost of construction of the power-generating units.

For nuclear power stations that started operation before 2013, according to the Chinese national pricing policy, the on-grid tariff was set individually for each with reference to the cost related to the operation and construction. This on-grid tariff I pricing mechanism will likely persist in the future.

On June 15, 2013, the NDRC set a national nuclear benchmark on-grid tariff of RMB 0.43 / KWh for nuclear power-generating units commencing operations after Jan 1, 2013. The tariff received by these power stations is based on this benchmark tariff, which can be adjusted depending on the local benchmark on-grid tariff for coal-fired generating units.

Exhibit 35: On-grid tariffs for electricity sale in CO	GN's nuclea	r power-ge	nerating u	nits
Nuclear Power-generating units	FY11	FY12 (RMB / K	FY13 (Wh)	1H14
Guangdong Nuclear Power Joint Venture Co., Ltd Daya Bay No. 1 Daya Bay No. 2	0.420 0.420	0.420 0.420	0.420 0.420	0.420 0.420
<b>Ling Ao Nuclear Power Company Limited</b> Ling'ao No. 1 Ling'ao No. 2	0.429 0.429	0.429 0.429	0.429 0.429	0.429 0.429
<b>Ling Dong Nuclear Power Co., Ltd.</b> Lingdong No. 1 Lingdong No. 2	0.430 0.430	0.430 0.430	0.430 0.430	0.430 0.430
Yangjiang Nuclear Power Co., Ltd Yangjiang No. 1	-	-	-	0.430
Fujian Ningde Nuclear Power Co., Ltd. Ningde No. 1 Ningde No. 2	- -	- -	0.430	0.430 0.430
<b>Liaoning Hongyanhe Nuclear Power Co., Ltd</b> Hongyanhe No. 1 Hongyanhe No. 2	-	<u>-</u>	0.4142 -	0.4142 0.4142

Source(s): The Company

Going forward, we believe the tariff for nuclear power plants would continue. For the 3<sup>rd</sup>-generation nuclear plants, as construction cost increases on the more stringent safety standard requirement, we expect the tariff for these generation units would be higher than the current tariff set for the 2<sup>nd</sup>-generation plants.

To be conservative, we assume in our DCF model that the tariff for the  $3^{\rm rd}$ -generation power units to be the same as that of the  $2^{\rm nd}$ -generation at RMB 0.43/KWh. (Please refer to the chapter on the chapter of Valuation for more details.)

If the tariff for 3<sup>rd</sup>-generation units increases to RMB 0.50/KWh, we estimate CGN's overall revenue and net income for FY16E would increase 3.0% to RMB 29,224mn and 3.5% to RMB 7,200mn. (In our view, as the first 3<sup>rd</sup> generation plant of CGN is scheduled to operate in FY16E, changes in relevant tariff would not cause significant impacts in P&L for FY14-15E.)



### A stable cost structure

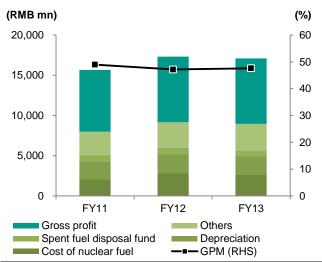
Thanks to the stable fuel supply, the unit production cost of CGN has been steady. The average cost of sales per power generation on-grid ranged from RMB 0.1816/KWh to RMB 0.2029/KWh in FY11-1H14.

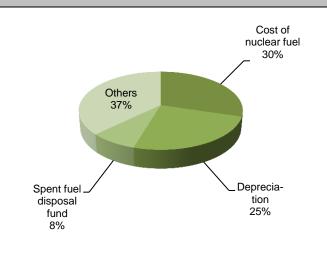
	FY11	FY12	FY13	1H14
Ex. tax surcharges revenue (RMB mn)	15,660	17,325	17,110	9,633
Less: Gross profit (RMB mn)	7,674	8,170	8,148	5,137
Cost of sales (RMB mn)	7,987	9,155	8,961	4,496
Net power generation (GWh)	40,519	45,113	44,157	24,753

Source(s): The Company, ABCI Securities

Exhibit 37: Revenue breakdown (cost of sales and gross profit) of CGN

Exhibit 38: Breakdown of CGN's cost of sales, FY13





Source(s): The Company

Source(s): The Company

#### Procurement of nuclear fuel and related services

The cost of nuclear fuel accounted for 30% of total cost of sales. The nuclear power stations use fuel assemblies manufactured by assembled fuel rods containing enriched uranium. CGN mainly entrusts CGN Uranium, a whollyowned subsidiary of CGNPC, to procure natural uranium, uranium conversion and enrichment services, fuel assembly processing services and other related services.

In China, only certain affiliates of CNNC are qualified to provide commercial uranium conversion and enrichment services, and fuel assembly processing services. CGN enters into long-term contracts with affiliates of CNNC via CGN Uranium.

Under the nuclear fuel procurement and supply services agreements between CGN's nuclear power stations and CGN Uranium, each nuclear power station is required to notify CGN Uranium of its power generating plan for the next 5 years and update CGN Uranium annually. The nuclear fuel procurement and supply services agreements with CGN Uranium generally have a term of 10 years and are renewable by mutual agreement before expiration.



Exhibit 39: Cost of sales breakdown and cost per power generation									
	FY11	FY12	FY13	1H14					
Net power generation (GWh)	40,519	45,113	44,157	24,753					
Cost of sales breakdown (RMB mn)									
Cost of nuclear fuel	2,099	2,785	2,658	1,350					
Depreciation	2,234	2,413	2,240	1,189					
Spent fuel disposal fund	796	789	732	395					
Others	2,857	3,170	3,332	1,562					
Cost per net power generation (RMB / KWh):									
Cost of nuclear fuel	0.0518	0.0617	0.0602	0.0545					
Depreciation cost	0.0551	0.0535	0.0507	0.0480					
Spent fuel disposal fund	0.0196	0.0175	0.0167	0.0160					
Others	0.0705	0.0702	0.0754	0.0631					

Source(s): The Company, ABCI Securities

#### Cost of depreciation

CGN adopts a unit-of-production depreciation method for the nuclear power generating equipment and facilities. The depreciation charges of these equipment and facilities correlates positively with the net power generation over the same period. Based on our calculation, the depreciation cost per net power generation ranged from RMB 0.0518 /KWh to RMB 0.0617 /KWh in FY11-1H14. Looking forward, we estimate that the depreciation cost per net power generation would stay flat at ~RMB 0.06/KWh in FY14-16E.

#### Spent fuel disposal fund

The provision for spent fuel disposal fund covers the future disposal costs for the fuel used until the end of the accounting period. For PWR nuclear power-generating units in operation for more than 5 years, provisions for spent fuel disposal fund are made in the amount of RMB 0.026 /KWh of actual net power generation and are submitted to the relevant governmental authorities. For generating units that are in operation for less than 5 years, provisions for spent fuel disposal fund are made starting from the 6<sup>th</sup> year onward. With the new power-generating units coming on stream in 2015-16, the unit spent fuel disposal provision expense would be diluted in the coming years.



## Favorable tax policy expected to continue

According to China's 12<sup>th</sup> five-year power development plan, the government aims to increase installed capacity of nuclear power industry from 10,820 MW in 2010 to 40,000 MW in 2015, representing a CAGR of 29.9%.

By 2015, the government targets to have 18mn kW of nuclear power capacity under construction. Hence, nuclear power capacity under construction in 2015 will represent 45% of the expected installed capacity of the same year, implying significant capacity growth beyond 2015. By 2020, the government aims to have 58,000 MW of installed capacity in operation and 30,000 MW under construction.

Under the advocacy of a low-carbon economy, we believe the Chinese government would maintain a favorable tax policy on nuclear players to enhance their profitability and attract more investment in the future.

#### **VAT Refunds:**

Sale of electricity is currently subject to a VAT rate of 17% in China. However, a preferential tax scheme has been in place to allow nuclear plants operators to be partially refunded after the taxes are collected during the first 15 years of operation.

For the first 5 years, 75% of the VAT collected is refundable; in the following 5 years, 70% of the VAT collected is refundable; for the last 5 years of the 15-year period, 55% of the VAT collected is refundable. After that, there will be no applicable refund policy with respect to the VAT collected.

For GNPJVC, it was entitled to full exemption of the VAT for selling electricity to GNIC and HKNIC. Meanwhile, GNIC, the subsidiary of CGN, was entitled to full exemption of VAT for selling electricity to HKNIC and full refund of VAT for selling electricity to Guangdong Grid.

## Income tax holiday:

The preferential tax treatments applicable to certain subsidiaries of CGN are summarized as follows:

Two of CGN's subsidiaries located in Shenzhen Special Economic Zone were taxed at an income tax rate of 24% in 2011. Other subsidiaries qualified as High-New Technology Enterprises were entitled to a preferential tax rate of 15% in 2011-2013 and the 3 months ended Mar 31, 2014. Two of CGN's nuclear power station operating companies are enterprises engaged in public infrastructure projects and therefore, income tax will be exempted for 3 years starting from their first profit-making year, which was 2010 and 2014, respectively, and are subject to an income tax at 12.5% in the subsequent 3 years.

With the tax holiday and VAT refund in place for the new power-generating units, we expect the effective tax rate would be diluted, raising profit margins for nuclear operators in FY14-16.

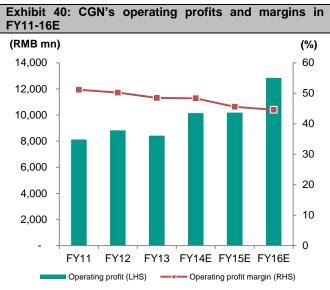


# Income to start surging in FY16

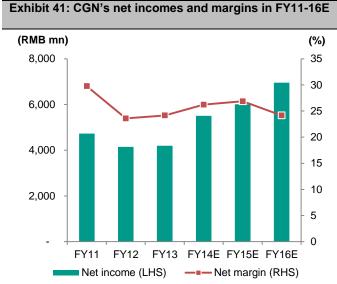
As mentioned, delivery of new power generation units is expected to peak in 2H15 and 1H16. Together with the preferential tax incentives, we believe revenue and net income would start surging in FY16.

#### Upside potential:

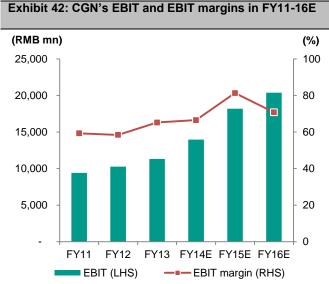
- Tariff adjustment for 3<sup>rd</sup>-generation power plants to compensate for increased construction cost
- Assets injection from parent group to CGN (non-competing agreement)

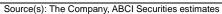


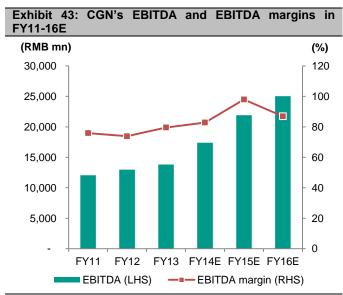
Source(s): The Company, ABCI Securities estimates



Source(s): The Company, ABCI Securities estimates







Source(s): The Company, ABCI Securities estimates

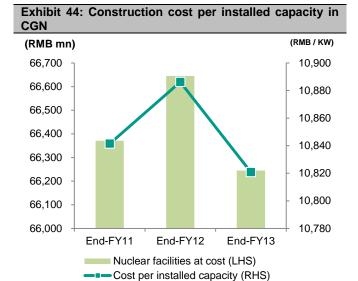


# **CAPEX** plan for projects under construction

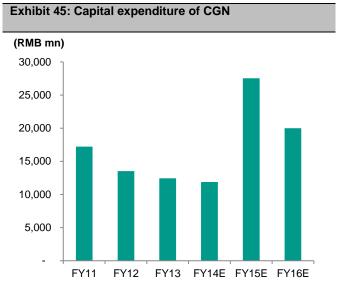
Nuclear power generation industry is a capital-intensive industry. Initial investment in constructing the power-generating units is high. Altogether, CGN has 13 nuclear power-generating units under construction with a total installed capacity of 15,506 MW; these units are scheduled to be delivered in 2015-19. Hence, CGN's capital expenditure (CAPEX) for the FY14E-16E would remain high in our view.

Total CAPEX in FY11-13 and 1H14 were RMB 17,217mn, RMB 13,522mn, RMB 12,429mn and RMB 4,083mn, respectively. CGN estimates that the CAPEX for the 2H14 and FY15 will amount to RMB 7,462mn and RMB 28,450mn (including the CAPEX for acquiring an additional 41% stake in Taishan Nuclear Capital investments with two nuclear power generation units under construction). It implies that the expected CAPEX for FY14 would be RMB 11,545mn.

The total value of nuclear facilities at cost (construction cost plus capitalized interest cost before depreciation) was RMB 66,245mn at end-FY13, and the consolidated installed capacity was 6,122 MW at end-FY13. According to our estimates, the capital investment for the existing nuclear power-generating units was RMB 10,849/KW. Taking into account of the cost inflation, we expect the construction cost of the 2<sup>nd</sup>-generation nuclear facilities under construction to be RMB 12,000/KW. For the 3<sup>rd</sup>-generation nuclear facilities, we expect construction cost would increase to RMB 20,000/KW due to the enhanced safety features. Therefore, we expect the CAPEX for FY16E to be ~RMB 20,000mn.







Source(s): The Company, ABCI Securities estimates



# **Major Risk Factors**

## **Delay and cost overrun**

Nuclear power generation is a capital-intensive industry. Developing new nuclear power projects or expanding the existing nuclear power stations requires substantial capital. Cost overrun on the projects under construction could create huge financial burden to CGN. If cash generated from operations is insufficient to fulfill the capital needs, CGN may need to rely substantially on debt financing, which in turn will inflate interest cost.

Furthermore, any delay in project commencement can affect cash flow from operation and CGN's valuation. Our valuation estimates are based on the expected date of operation commencement and expected total capital expenditure for the nuclear power-generating units.

# Potential risks and liabilities associated with the nuclear power generation business

A significant quantity of radioactive substances is contained in the nuclear reactors of a nuclear power station, which could present possible radioactive threats to human, the environment, and society under certain circumstances. CGN is obliged to handle, store, transport and dispose of radioactive materials, such as low- and medium-level radioactive waste and spent fuel, along with other hazardous materials, which includes traces of explosive or flammable materials used in the electricity generating activities.

CGN has adopted stringent risk control procedures across the preparatory, construction, operation and decommissioning phases of the nuclear power stations to protect the public and the environment from the threat of radiation.

To reduce financial risks, nuclear power stations are covered by relevant industry insurances. As claims may arise over property loss resulting from nuclear radiation, these nuclear insurances include property insurance and 3<sup>rd</sup>-party liability insurance for nuclear power stations, nuclear fuel plants and all other civil nuclear facilities.

## Insurance providers offer the following types of insurance:

**Nuclear materials damage and loss insurance**, which covers the loss of nuclear facilities caused by natural disasters, nuclear radiation and the breakdown of infrastructure and equipment

Third-party liability for nuclear damage, which covers the insurance amount nuclear facilities operators required under regulatory requirements. According to the Official Reply of the State Council concerning Nuclear Damage Compensation Issues (Letter No. 64 [2007]) (《國務院關於核事故損害賠償責任問題的批覆》《國函[2007]64 號》), the maximum compensation payable per nuclear incident is RMB 300mn, the typical upper limit for the specific type of insurance. CGN's subsidiaries, the operators of the nuclear power stations, have purchased relevant insurances for the nuclear power stations in operation.

**Transportation liability insurance**, which covers liability arising during the transportation of nuclear substances



# Gearing may stay high; net current liabilities may persist in future

As mentioned, nuclear power generation industry is capital-intensive. To expand the business scale, CGN's borrowings would remain high in the future.

As of June 30, 2014 interest-bearing debt amounted to RMB 80,837mn. The net gearing ((total debt – cash and cash equivalent)/ total equities) of CGN was trending up during FY11-13.

Exhibit 46: Total interest-bearing debt and net gearing of CGN

(RMB mn)

(%)

80,000

60,000

40,000

20,000

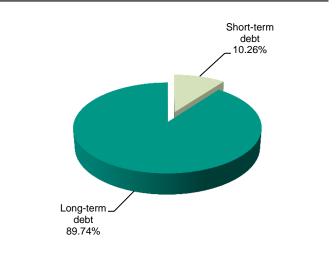
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End-FY12

End-FY13

Net gearing (RHS)

Exhibit 47: Breakdown of long- and short-term debts of CGN at end-1H14



Source(s): The Company, ABCI Securities

Total debt (LHS)

End-FY11

Source(s): The Company, ABCI Securities

All things being equal, if interest rates had been 10 basis points higher/lower for cash and cash equivalents, CGN's post-tax profit for FY11-13 and 1H14 would have increased/decreased by ~RMB 8.41mn, ~RMB 4.68mn, ~RMB 5.49mn and ~RMB3.23mn, respectively.

# **High concentration of customers**

0

End-1H14

Other than HKNIC, all other companies that purchase power from nuclear power stations operated and managed by CGN are ultimately owned by 2 state-owned enterprises: State Grid Corporation of China and China Southern Power Grid. Currently, all of CGN's nuclear power stations do not sell electricity to any other companies or individual end-users. Therefore, the revenue and earnings are substantially influenced by local grid companies in the PRC.



# **Financial Statements**

Consolidated income statement (2011A-2016E)

FY Ended Dec 31 (RMB mn)	2011A	2012A	2013A	2014E	2015E	2016E
Revenue	15,881	17,575	17,365	20,993	22,361	28,807
Power Generation	14,972	16,514	16,268	19,876	21,186	27,611
Service revenue	755	796	843	851	896	902
Others	154	265	254	267	280	294
Less: Tax surcharge	221	250	255	298	342	432
Less: Cost of sales and services	7,987	9,155	8,961	10,264	11,262	14,745
Gross profit	7,674	8,170	8,148	10,431	10,757	13,629
Less: SG&A	812	921	1,031	1,887	2,363	3,380
Add: VAT Refunds	1,009	1,263	1,299	1,607	1,793	2,592
Add: Other income and gains	255	310	3	· <u>-</u>	-	· -
Operating profit (RMB mn)	8,125	8,823	8,419	10,151	10,187	12,842
Add: Share of results of associates and JV	153	(9)	293	381	1,051	1,752
Less: Net financial cost	1,946	2,946	2,642	2,262	2,657	4,834
Pre-tax profit	6,332	5,868	6,070	8,270	8,581	9,760
Less: Income tax	936	890	998	1,676	1,570	1,569
Net profit	5,396	4,977	5,071	6,594	7,011	8,191
Attributable to:						
Non-controlling interests	669	833	877	1,089	1,107	1,266
Owners of the Company	4,727	4,145	4,195	5,504	5,904	6,925
FD EPS (RMB)			0.122	0.121	0.130	0.152
FD DPS (RMB) <sup>1</sup>			0.048	0.040	0.043	0.050

Note 1: The DPS for FY14E is excluding the special dividend distributed to CGNPC Source(s): Company, ABCI Securities estimates

Consolidated balance sheet (2011A-2016E)

As of Dec 31 (RMB mn)	2011A	2012A	2013A	2014E	2015E	2016E
Current assets	26,287	27,096	21,761	46,633	35,827	35,906
Cash and equivalent	12,347	7,734	9,400	28,872	17,654	9,577
Trade and bill receivables	1,659	1,837	1,629	2,566	1,898	3,855
Inventories	7,531	7,514	8,384	9,612	10,135	15,720
Other current assets	4,749	10,011	2,347	5,582	6,140	6,754
Non-current assets	87,421	95,167	105,914	118,675	207,902	224,538
Property, plant and equipment	70,068	79,185	87,042	95,023	183,357	198,800
Intangible assets	1,059	1,697	1,772	1,778	1,784	1,790
Long term investments	329	2,289	2,658	5,923	6,516	7,167
Interests in associates and JV	13,980	9,197	11,093	12,385	12,271	12,446
Other non-current assets	1,983	2,800	3,350	3,565	3,973	4,335
Total assets	113,708	122,263	127,675	165,308	243,729	260,444
Current liabilities	40,546	39,887	26,462	30,816	43,685	48,261
Trade and bill payables	1,761	3,678	2,161	2,901	2,654	4,618
Construction payables	5,225	6,695	7,246	7,126	8,264	9,000
Short term borrowings	11,125	23,589	13,098	16,435	27,979	29,375
Other current liabilities	22,434	5,925	3,958	4,354	4,789	5,268
Non-current liabilities	49,619	58,226	69,521	75,421	122,565	129,212
Long-term borrowings	41,712	49,802	60,721	65,741	111,918	117,499
Other non-current liabilities	7,907	8,424	8,800	9,680	10,647	11,712
Total liabilities	90,165	98,114	95,983	106,236	166,251	177,473
Minority interests	6,091	7,845	8,640	9,239	21,742	22,259
Shareholders' equities BVPS (RMB)	17,452	16,304	23,052 0.670	49,832 1.096	55,736 1.226	60,713 1.336

Source(s): Company, ABCI Securities estimates



Consolidated cash flow statement (2011A-2016E)

FY ended Dec 31 (RMB mn)	2011A	2012A	2013A	2014E	2015E	2016E
Profit before tax	6,332	5,868	6,070	8,270	8,581	9,760
Changes in depreciation and amortization	2,633	2,704	2,488	3,426	3,717	4,651
Changes in working capital	39	(2,540)	(1,169)	(1,425)	(1,602)	(5,576)
Financial income	(168)	(172)	(161)	(188)	(465)	(272)
Financial cost	2,114	3,118	2,804	2,45Ó	3,122	5,107
Others	(732)	(318)	(539)	(710)	(2,007)	(400)
Net operating cash flow	10,21 <b>8</b>	8,660	9,493	11,82 <b>4</b>	11,346	13,269
Interest received	168	172	162	188	465	272
Deposit paid for PP&E	(12,436)	(7,805)	(9,932)	(11,877)	(14,621)	(20,000)
Increase in stake of JV	-	_	_	-	(12,924)	-
Decrease (increase) in deposits and others	450	(7,346)	5,288	-	-	-
Net investing cash flow	(11,818)	(14,979)	(4,482)	(11,689)	(27,080)	(19,728)
Capital injection	10,629	4,078	2,708	=	-	-
Net debt financing	11,707	20,555	427	8,358	8,909	6,977
Dividend payout	(2,769)	(9,843)	(1,655)	(5,991)	(1,948)	(2,285)
Interest paid	(3,030)	(4,329)	(5,179)	(5,692)	(9,504)	(10,594)
Others	(10,845)	(9,160)	(238)	22,388	6,755	3,950
Net financing cash flow	5,692	1,301	(3,937)	19,062	4,212	(1,952)
Net change in cash	4,092	(5,018)	1,074	19,197	(11,522)	(8,410)
Cash at the beginning (excluding restricted deposits)	6,195	10,453	5,434	6,640	25,837	14,315
Effects of exchange rate changes	166	(1)	132	· -	· -	, -
Cash at the end	10,453	5,434	6,640	25,837	14,315	5,904

Source(s): Company, ABCI Securities estimates

Key operating and financial ratios (2011A-2016E)

FY ended Dec 31	2011A	2012A	2013A	2014E	2015E	2016E
Sales mixed (%)						
Power Generation	94.27	93.96	93.68	94.68	94.74	95.85
Service revenue	4.75	4.53	4.86	4.05	4.01	3.13
Others	0.97	1.51	1.46	1.27	1.25	1.02
Profit & loss ratios (%)						
Gross profit margin	48.32	46.49	46.92	49.69	48.10	47.31
Net profit margin	29.77	23.58	24.16	26.22	26.40	24.04
Effective tax rate	14.78	15.18	16.45	20.27	18.29	16.08
Growth (%)						
Revenue		10.67	(1.20)	20.89	6.52	28.82
Gross profit		6.47	(0.27)	28.01	3.12	26.71
Operating profit		8.59	(4.58)	20.58	0.35	26.07
Net profit		(12.33)	1.20	31.23	7.26	17.28
Balance sheet ratios						
Current ratio (x)	0.65	0.68	0.82	1.51	0.82	0.74
Quick ratio (x)	0.46	0.49	0.51	1.20	0.59	0.42
Cash ratio (x)	0.30	0.19	0.36	0.94	0.40	0.20
Trade and bill receivables days	39	36	36	37	37	37
Trade and bill payables turnover days	47	73	83	90	90	90
Inventory turnover days	346	300	324	320	320	320
Total debt / equity ratio (%)	247.92	326.80	250.38	139.11	180.56	177.02
Net debt / equity ratio (%)	195.54	294.83	220.74	90.24	157.78	165.47
Returns (%)						
ROAE		24.56	21.32	15.10	11.19	11.89
ROAA		4.22	4.06	4.50	3.43	3.25
Payout ratio		237.56	39.41	33.00	33.00	33.00

Source(s): Company, ABCI Securities estimates



# **Appendix 1: Shareholding Structure**

## Shareholding structure at the end of 2014

Shareholding structure at the end of 2014							
	Issued	% to	% to				
	shares	issued	issued				
	(mn shares)	shares	H-shares				
Domestic shares shareholders:							
CGNPC	29,176.641	64.20%	-				
Hengjian	3,428.513	7.54%	-				
CNNC	1,679.971	3.70%	-				
Total unlisted shares	34,285.125	75.44%	-				
H-share shareholders:							
18 cornerstone investors (subscribed at	3,713.105	8.17%	33.26%				
@HK2.78/share in the global offering;							
locked up till Jun 8, 2015)							
NSSF (transferred from domestic shares	1,014.875	2.23%	9.09%				
shareholders)							
Other public shareholders	6,435.645	14.16%	57.65%				
Total listed H shares	11,163.625	24.56%	100.00%				
Total issued shares	45,448.750	100.00%	-				

CGNPC: China General Nuclear Power Corporation (中国广核集团有限公司)

Hengjian: Guangdong Hengjian Investment Holdings Co Ltd (广东恒健投资控股有限公司), a Guangdong Provincial Government owned enterprise CNNC: China National Nuclear Corporation (中国核工业集团公司)

NSSF: National Council for Social Security Fund of the PRC (全国社会保障基金理事会)

Source(s): CGN, HK Exchanges website



# Appendix 2: China's nuclear power generators in operation

Exhibit 48: Nuclear			,	•		In Commercial		
Nuclear plants	Reactors	Reactor Type	Reactor Model	Capacity * (MW)	Construction Start	Operation since	Main Owners	Plant Location
Daya Bay NPP	No.1	PWR	M310	984	Aug-1987	Feb-1994	CGN	Guangdong
(大亚湾核电站)	No.2	PWR	M310	984	Apr-1988	May-1994	CGN	Guangdong
Ling Ao,Ling Dong NPP	No.1	PWR	M310	990	May-1997	May-2002	CGN	Guangdon
(岭澳核电站)	No.2	PWR	M310	990	Nov-1997	Jan-2003	CGN	Guangdon
(NOO BA)	No.3	PWR	CPR1000	1,086	Dec-2005	Sep-2010	CGN	Guangdon
	No.4	PWR	CPR1000	1,086	Jun-2006	Aug-2011	CGN	Guangdon
Yangjiang NPP (阳江核电站)	No.1	PWR	CPR1000	1,086	Dec-2008	Mar-2014	CGN	Guangdon
Hongyanhe NPP	No.1	PWR	CPR1000	1,119	Aug-2007	Jun-2013	CGN	Liaonin
(红沿河核电站)	No.2	PWR	CPR1000	1,119	Mar-2008	Jun-2014	CGN	Liaonin
Ningde NPP	No.1	PWR	CPR1000	1,089	Feb-2008	Apr-2013	CGN	Fujia
(宁德核电站)	No.2	PWR	CPR1000	1,089	Nov-2008	May-2014	CGN	Fujia
Qinshan NPP 1 (秦山一核)	No.1	PWR	CNP300	310	Mar-1985	Apr-1994	CNNP	Zhejian
Qinshan NPP 2	No.1	PWR	CNP600	650	Jun-1996	Apr-2002	CNNP	Zhejian
(秦山二核)	No.2	PWR	CNP600	650	Apr-1997	Apr-2004	CNNP	Zhejian
,	No.3	PWR	CNP600	660	Apr-2006	Oct-2010	CNNP	Zhejian
	No.4	PWR	CNP600	660	Jan-2007	Dec-2011	CNNP	Zhejian
Qinshan NPP 3	No.1	PHWR	CANDU6	728	Jun-1998	Dec-2002	CNNP	Zhejian
(秦山三核)	No.2	PHWR	CANDU6	728	Sep-1998	Jul-2003	CNNP	Zhejian
Tianwan NPP	No.1	PWR	VVER V428	1,060	Oct-1999	May-2007	CNNP	Jiangs
(田湾核电站)	No.2	PWR	VVER V428	1,060	Sep-2000	Aug-2007	CNNP	Jiangs
Fuqing NPP (福清核电站)	No.1	PWR	CPR1000	1,080	Nov-2008	Nov-2014	CNNP	Fujia
Total Of which, managed by				19,208	% to capacity			
CGN CNNP				11,622 7.586	60.5% 39.5%			

CNNP: China National Nuclear Power Co Ltd

\* Gross capacity
Source(s): IAEA-PRIS (Updated on 2015-01-13), CGN, CNNP



# Appendix 3: China's nuclear power generators under construction

Nuclear plants	Reactors	Reactor	Reactor	Capacity *	Construction	Expected commercial	Main	Plant
E I' OI NED	N. 4	Type	Model	(MW)	Start	Operation#	Owners	Location
Fang Jia Shan NPP (方家山核电站)	No.1 No.2	PWR PWR	CPR1000 CPR1000	1,080 1,080	Dec-2008 Jul-2009	Mar-2014 Apr-2015	CNNP CNNP	Zhejiang Zhejiang
(万水田核电和)	140.2	1 7717	011(1000	1,000	001 2003	7tp1 2010	Oldidi	Znojiang
Tianwan NPP	No.3	PWR	VVER V428	1,126	Dec-2012	Oct-2018	CNNP	Jiangsı
(田湾核电站)	No.4	PWR	VVER V428	1,126	Sep-2013	Jul-2019	CNNP	Jiangsı
Sanmen NPP	No.1	PWR	AP1000	1,250	Apr-2009	Jun-2015	CNNP	Zhejiano
(三门核电站)	No.2	PWR	AP1000	1,250	Dec-2009	Dec-2015	CNNP	Zhejiang
( , , , , , , , , , , , , , , , , , , ,				,				, ,
Fuqing NPP	No.2	PWR	CPR1000	1,080	Jun-2009	Jun-2015	CNNP	Fujiai
(福清核电站)	No.3	PWR	CPR1000	1,080	Dec-2010	Oct-2016	CNNP	Fujiar
	No.4	PWR	CPR1000	1,080	Nov-2012	Sep-2018	CNNP	Fujiai
Changjiang NPP	No.1	PWR	CNP600	650	Apr-2010	Feb-2016	CNNP	Hainaı
(海南昌江核电站)	No.2	PWR	CNP600	650	Nov-2010	Sep-2016	CNNP	Hainaı
Yangjiang NPP	No.2	PWR	CPR1000	1,086	Jun-2009	Jul-2015	CGN	Guangdon
(阳江核电站)	No.3	PWR	CPR1000	1,086	Nov-2010	Apr-2016	CGN	Guangdon
(四年1次电却)	No.4	PWR	CPR1000	1,086	Nov-2012	Nov-2017	CGN	Guangdon
	No.5	PWR	ACPR1000	1,086	Sep-2013	Sep-2018	CGN	Guangdon
	No.6	PWR	ACPR1000	1,086	Dec-2013	Aug-2019	CGN	Guangdon
Hongyanhe NPP	No.3	PWR	CPR1000	1,119	Mar-2009	Mar-2015	CGN	Liaonin
(红沿河核电站)	No.4	PWR	CPR1000	1,119	Aug-2009	Aug-2015	CGN	Liaonin
N. I NDD	N. O	DIAID	0001000	4 000		0 0045	0011	<b>-</b> "
Ningde NPP	No.3	PWR	CPR1000	1,089	Jan-2010	Sep-2015	CGN	Fujia
(宁德核电站)	No.4	PWR	CPR1000	1,089	Sep-2010	Jul-2016	CGN	Fujia
Taishan NPP	No.1	PWR	EPR1750	1,750	Nov-2009	Feb-2016	CGNPC	Guangdon
(台山核电站)	No.2	PWR	EPR1750	1,750	Apr-2010	Jul-2016	CGNPC	Guangdon
Fangchenggang NPP	No.1	PWR	CPR1000	1.080	Jul-2010	May-2016	CGNPC	Guang
(防城港核电站)	No.2	PWR	CPR1000	1,080	Dec-2010	Oct-2016	CGNPC	Guang
Haiyang NPP	No.1	PWR	AP1000	1,250	Sep-2009	Jul-2015	CPIC	Shandon
(山东海阳核电站)	No.2	PWR	AP1000	1,250	Jun-2010	Apr-2016	CPIC	Shandon
(				,				
Shidao Bay NPP (石岛湾核电)	No.1	HTGR	HTR PM	211	Dec-2012	Oct-2018	CHG	Shandon
Total				29,669				
Of which, owned by				,	% of capacity			
CNNP				11,452	38.6%			
CGN & CGNPC				15,506	52.3%			
CPIC				2,500	8.4%			
CHG				211	0.7%			

\*Gross capacity

#Forecast by ABCI Securities
CGNPC is the parent company of CGN.

CPIC: China Power Investment Corp
CHG: China Huaneng Group
Source(s): IAEA-PRIS (Update on 2015-01-13), CGN, CNNP, CPIC and CHG



# **Appendix 4: Location of nuclear power plants in China**

Exhibit 50: Lo	cation of NPP in Chi	na				
	Gross capacity		Gross capacity		Overall in operation	
	in operation		under construction		or under construction	
Province	(MW)	Prop.	(MW)	Prop.	(MW)	Prop.
Guangdong	7,206	37.5%	8,930	30.2%	16,136	33.1%
Fujian	3,258	17.0%	5,418	18.3%	8,676	17.8%
Hainan	, <u>-</u>	0.0%	1,300	4.4%	1,300	2.7%
Guangxi	-	0.0%	2,160	7.3%	2,160	4.4%
Zhejiang	4.386	22.8%	4.660	15.7%	9.046	18.5%
Jiangsu	2,120	11.0%	2,252	7.6%	4,372	9.0%
Shandong	, <u>-</u>	0.0%	2.711	9.2%	2.711	5.6%
Liaoning	2,238	11.7%	2,160	7.3%	4,398	9.0%
Total	19,208	100.0%	29,591	100.0%	48,799	100.0%

Source(s): IAEA-PRIS (Updated on 2015-01-13)

# **Appendix 5: Economic growth of provinces** where NPPs are located

Exhibit 51: GDI	P growth (%YoY	) of provinces	with existing	or new nuclea	ar plants
Provinces	2010	2011	2012	2013	1H14
Guangdong	12.2	10.0	8.2	8.5	7.5
Fujian	13.8	12.2	11.4	11.0	9.7
Hainan	15.8	12.0	9.1	9.9	8.0
Guangxi	14.2	12.3	11.3	10.2	8.5
Zhejiang	11.8	9.0	8.0	8.2	7.2
Jiangsu	12.6	11.0	10.1	9.6	8.9
Shandong	12.5	10.9	9.8	9.6	8.8
Liaoning	14.1	12.1	9.5	8.7	7.2
National	10.3	9.2	7.8	7.7	7.4

Source(s): NBSC

# **Appendix 6: Power consumption growth of provinces where NPPs are located**

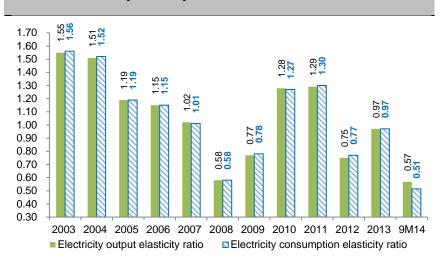
Exhibit 52: Power consumption of provinces with existing or new nuclear plants							
Provinces	2010	2011	2012	2013	1H14		
Guangdong	12.5	8.4	5.0	4.6	7.2		
Fujian	16.0	15.1	4.2	7.7	7.9		
Hainan	18.2	16.6	12.3	9.5	9.6		
Guangxi	15.9	12.0	3.7	7.2	5.7		
Zhejiang	14.3	10.5	3.0	7.6	3.6		
Jiangsu	16.4	10.9	7.0	8.2	6.0		
Shandong	12.2	10.4	4.4	7.6	4.0		
Liaoning	15.4	8.6	2.1	5.7	2.7		
National	11.1	11.7	5.5	7.5	5.3		

Source(s): Statistics Bureau of Guangdong Province; Fujian Provincial Bureau of Statistics; NBSC; NEA



# **Appendix 7: Elasticity ratio of electricity output and consumption**

## **Exhibit 53: Electricity Elasticity Ratios**



Remarks:

Electricity output elasticity ratio= Average power output growth/average economic growth Electricity consumption elasticity ratio= Average power consumption growth/Average economic growth

growth Source(s): NBSC, ABCI Securities



# Appendix 8: Utilization hour of power generation equipment (Capacity > 6000 KW) in 2012-13 and Jan-Sep 2014 in selected provinces

	Exhibit 54: Utilization hour of power generation equipment (Capacity > 6000							
KW) in 2012 and								
Provinces (hrs)	Overall	Nuclear	Thermal	Hydro	Wind			
In 2012:								
Guangdong	4,958	7,752	4,977	2,515	2,109			
Fujian	4,258	-	4,341	4,171	2,794			
Liaoning	4,119	-	4,558	2,954	1,762			
Guangxi	3,982	-	4,698	3,321	1,408			
Jiangsu	5,617	8,121	5,734	1,012	2,112			
Zhejiang	5,004	7,878	5,268	2,011	2,311			
Hainan	4,735	-	5,325	2,965	1,568			
Shandong	4,749	-	4,962	29	1,975			
Nationwide	4,579	7,855	4,982	3,591	1,929			
In 2013:								
Guangdong	4,650	7,543	4,577	2,645	2,514			
Fujian	4,500	8,471	4,852	3,263	2,745			
Liaoning	4,006	8,438	4,353	2,901	1,924			
Guangxi	3,823	Note *	4,729	2,836	2,000			
Jiangsu	5,545	8,344	5,690	998	1,902			
Zhejiang	4,996	7,869	5,296	1,803	2,284			
Hainan	4,676	Note *	5,184	2,893	1,969			
Shandong	4,815	Note *	5,064	355	2,008			
Nationwide	4,511	7,893	5,012	3,318	2,080			

<sup>\*</sup> New nuclear plants under construction in Guangxi, Hainan & Shandong Source(s): NEA

Exhibit 55: Utiliza	ation hour of	nower gene	eration equipm	ent	
(Capacity > 6000			ranon oquipin	····	
Provinces (hrs)	Overall	Nuclear	Thermal	Hydro	Wind
Guangdong	3,320	5,430	3,336	1,404	1,806
Fujian	3,322	4,683	3,516	2,814	1,619
Liaoning	2,975	5,215	3,357	1,380	1,066
Guangxi	2,935	Note *	2,997	2,885	1,455
Jiangsu	3,779	6,040	3,881	729	1,549
Zhejiang	3,206	5,762	3,261	1,615	1,255
Hainan	3,792	Note *	4,321	2,374	1,113
Shandong	3,565	Note *	3,796	362	1,267
Nationwide	3,204	5,506	3,512	2,723	1,340
Change (YoY)					
Guangdong	-3.2%	-5.2%	-3.7%	-0.2%	-1.5%
Fujian	0.4%	-15.2%	1.4%	-0.7%	-4.6%
Liaoning	-0.4%	-26.8%	3.2%	-41.9%	-18.2%
Guangxi	0.0%	Note *	-14.2%	24.2%	-15.1%
Jiangsu	-9.4%	0.7%	-9.2%	-2.7%	1.7%
Zhejiang	-16.0%	0.8%	-19.4%	5.1%	-22.4%
Hainan	7.6%	Note *	10.0%	15.5%	-17.6%
Shandong	-0.7%	Note *	0.7%	55.4%	-15.8%
M 2 11		<b>5.0</b> 01			10.00
Nationwide	-5.2%	-5.0%	-4.9%	3.2%	-12.0%

<sup>\*</sup> New nuclear plants under construction in Guangxi, Hainan & Shandong Source(s): NEA



# **Appendix 9: Power dispatching priority list**

Exhibit 56: Power dispatching priority list		
Priority Order	Source of Power	
1	Non-adjustable power generation units utilizing renewable energy sources	
2	Adjustable power generation units utilizing renewable energy sources and garbage power generation units meeting the requirements of environmental protection (E.g. hydropower, biomass and geothermal energy, as well as environmental friendly garbage incineration power-generating units)	
3	Nuclear power-generating units	
4	Coal cogeneration units operating in method of determining electricity based on heat and resources comprehensive utilization power generation units	
5	Gas-fired and coal gasified power-generating units	
6	Other coal-fired power-generating units, including cogeneration units without heat load	
7	Oil-fired power generation units	

Source(s):The Provisional Measures on the Dispatch of energy Saving Power Generation (pilot) promulgated by the General Office of the State Council and effective on Aug 2, 2007

# **Appendix 10: On-grid Tariff Mechanism for Nuclear Power**

Exhibit 57: Circular on Relevant Issues Concerning Improving On-grid Tariff Mechanism for Nuclear Power (《关于完善核电上网电价机制有关问题的通知》)		
Items	Details	
1	The newly constructed nuclear power-generating units shall comply with the benchmark tariff policy, and the national amount is RMB 0.43 ratified by current social average production cost of nuclear power and supply and demand condition in power market.	
2	The newly constructed nuclear power-generating units where the national benchmark tariff of nuclear power is higher than benchmark tariff of local coal power generation units shall comply with the benchmark tariff policy on the local coal power generation units.	
3	The tariff of the first nuclear power-generating unit(s) or demonstration project(s) taking the task of nuclear power technology import, independent innovation, localization of major special equipment, where the national benchmark tariff of nuclear power is lower than benchmark tariff of local coal power generation units, could be promoted properly on the base of the national benchmark tariff of nuclear power, and the tariff program shall be present by provincial price bureau and approved by the NDRC.	
4	The national benchmark tariff of nuclear power shall be relatively stable, and adjusted timely on the basis of assessment of nuclear power benchmark tariff according to nuclear technology progress, cost variance, supply and demand condition variance in power market.	
5	Nuclear power-generating units which put into production after Jan 1, 2013 conform to the above-mentioned policy. Tariff for nuclear power-generating units that enter into production before Jan 1, 2013 still conform to the former policy.	

Source(s): NDRC June 15, 2013



# Appendix 11: China's 12th five-Year power development plan

Exhibit 58: China's 12th five-Year power development plan					
At year-end	2010A (000' MW)	2013A (000' MW)	2015 Target (000' MW)	2010-15 CAGR (%)	2013-15 CAGR (%)
Total Installed Capacity	970	1,247.38	1,490	9.0%	9.3%
Of which:					
Coal-fired Power	660	862.38	960	7.8%	8.5%
Gas-fired Power	26.4	002.38	56	16.2%	6.5%
Hydropower	220	280.02	290	5.7%	1.8%
Wind Power	31	75.48	100	26.4%	15.1%
Nuclear Power	10.8	14.61	40	29.9%	65.5%
Solar Power	0.9	n/a	21	89.5%	n/a
(1,000 bn kWhr)	2010A	2013A	2015E		
National electricity	4.2	5.32	6.15	7.9%	7.5%

Remark: The government aims to increase installed capacity of nuclear power industry to 40.00mn kW in 2015 with 18mn kW under construction. By 2020, the government aims to have 58mn kW of installed nuclear power capacity in operation and 30mn kW under construction.

Source(s): NDRC



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### **Definition of equity rating**

Rating	Definition
Buy	Stock return ≥ Market return rate
Hold	Market return – 6% ≤ Stock return < Market return rate
Sell	Stock return < Market return – 6%

Stock return is defined as the expected % change of share price plus gross dividend yield over the next 12 months

Market return: 5-year average market return rate from 2007-2011

Time horizon of share price target: 12-month

#### Definition of share price risk

Rating	Definition
Very high	2.6 ≤180 day volatility/180 day benchmark index volatility
High	1.5 ≤ 180 day volatility/180 day benchmark index volatility < 2.6
Medium	1.0 ≤180 day volatility/180 day benchmark index volatility < 1.5
Low	180 day volatility/180 day benchmark index volatility < 1.0

We measure share price risk by its volatility relative to volatility of benchmark index. Benchmark index: Hang Seng Index.

Volatility is calculated from the standard deviation of day to day logarithmic historic price change. The 180-day price volatility equals the annualized standard deviation of the relative price change for the 180 most recent trading days closing price.

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