

CGN Power

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Refer to important disclosures at the end of this report

DBS Group Research . Equity

21 July 2015

BUY (Initiate Coverage)

Last Traded Price: HK\$3.68 (HSI : 25,405)

Price Target: HK\$ 5.06 (38% upside)

Potential Catalysts: Better-than-expected utilisation hours, stronger-than-expected electricity tariff of Taishan Power Station, sooner-than-expected new approval of nuclear power projects

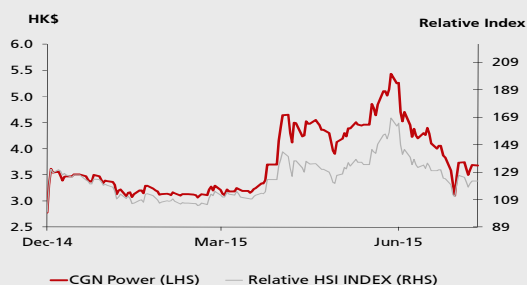
Where we differ: Our FY15/16F NP is 2%/1% below consensus

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Price Relative



Forecasts and Valuation

FY Dec (RMB m)	2014A	2015F	2016F	2017F
Turnover	20,793	22,906	27,184	36,292
EBITDA	13,920	15,366	18,261	23,479
Pre-tax Profit	7,800	8,453	10,489	13,645
Net Profit	5,713	6,125	7,461	9,705
Net Pft (Pre Ex.)	5,713	6,125	7,461	9,705
EPS (RMB)	0.17	0.14	0.17	0.22
EPS (HK\$)	0.21	0.18	0.21	0.28
EPS Gth (%)	11.9	(17.8)	21.8	30.1
Diluted EPS (HK\$)	0.21	0.18	0.21	0.28
DPS (HK\$)	0.00	0.05	0.06	0.08
BV Per Share (HK\$)	1.90	1.59	1.76	1.97
PE (X)	17.2	20.9	17.2	13.2
P/Cash Flow (X)	9.0	9.4	8.3	6.3
P/Free CF (X)	nm	nm	nm	nm
EV/EBITDA (X)	11.4	13.0	11.5	9.3
Net Div Yield (%)	0.1	1.4	1.7	2.3
P/Book Value (X)	1.9	2.3	2.1	1.9
Net Debt/Equity (X)	0.9	1.0	1.0	1.0
ROAE (%)	15.5	11.5	12.8	14.9

Earnings Rev (%):	New	New	New
Consensus EPS (RMB):	0.140	0.167	0.204
Other Broker Recs:	B: 14	S: 5	H: 4

ICB Industry: Utilities

ICB Sector: Electricity

Principal Business: In 2014, the company operated 11 nuclear power generating units with installed capacity of 11,624MW (7 units under subsidiaries and 4 units under associates/JV) and generated 52,176GWh of power, accounting for 54% and 49% market share in China, respectively.

Source of all data: Company, DBSV, HKEX

IN NUCLEAR POWER WE TRUST

The largest nuclear power producer in China with proven track record. In 2014, CGN Power had 11.6 GW installed nuclear power capacity and 9.8 GW of capacity under construction, accounting for 54% and 47% of China's total. The company's Daya Bay Power Station has been operating safely for more than 20 years since it commenced commercial operation in 1994.

Visible earnings growth. We project earnings to rise at 26% CAGR in FY15-17, driven by 26% CAGR in power generation and stable EBITDA margin. Besides, CGN Power is entitled to acquire nuclear projects being planned or constructed by its parent CGNPC, under the Non-competition Deed. We estimate the parent is constructing 2.16 GW of nuclear power capacity and expect there to be an aggregate 7.2 GW capacity under the parent to be approved for construction in 2016-17.

Key beneficiary of China's expanding nuclear power industry. Being a base-load utility, we deem nuclear power to be the most efficient, low-carbon power source with reduced greenhouse gas emissions for China to develop. The State Council targets China's installed nuclear capacity to reach 58 GW and those under construction to top 30 GW by 2020, implying that installed capacity to expand at 19% CAGR in FY14-20. The employment of Hualong One, jointly developed by CGN Group (incl. CGN Power) and China national Nuclear Corporation, is a third-generation technology that China owns complete intellectual property rights could facilitate China's nuclear exports overseas.

Valuation:

Initiated with BUY, DCF-based TP HK\$5.06. Our 12-month TP of HK\$5.06 is equivalent to 0.75x P/NPV. This implies 29x FY15F PE and 24x FY16F. We think the implied PE target valuation premium to non-nuclear utility peers is justified by nuclear power industry's significant entry barriers, the company's visible capacity growth and strong profitability over peers. The implied PE target valuation represents c.30% discount to the valuation of A-share pure nuclear player CNNP, which is trading at 43x FY15F PE.

Key Risks to Our View:

Business risks include power tariff risks, utilisation hours risks and execution risks include nuclear power projects construction delay and capex overrun.

At A Glance

Issued Capital - H shares (m shs)	11,164
- Non H shrs (m shs)	34,285
H shs as a % of Total	25
Total Mkt. Cap (HK\$m/US\$m)	167,251 / 21,578
Major Shareholders	
China General Nuclear Power (%)	85.1
Guangdong Hengjian Investment (%)	10.0
Major H Shareholders (%)	
Social Security Fund (%)	9.5
GIC Private Limited (%)	5.1
H Shares-Free Float (%)	85.5
3m Avg. Daily Val. (US\$m)	109.4

INVESTMENT THESIS

Profile	Rationale
<p>China's largest nuclear power producer. CGN Power is China's largest nuclear power producer based on 2014 installed capacity and power generation. In 2014, the company operated 11 nuclear power generating units with installed capacity of 11,624MW (incl. seven units under subsidiaries and four units under associates/JV) and generated 52,176GWh of power, accounting for 54% and 49% market shares in China respectively.</p>	<p>Visible earnings growth. We project earnings to rise at 26% CAGR in FY15-17, driven by 26% CAGR in power generation and stable EBITDA margin. Besides, CGN Power is entitled to acquire nuclear projects being planned or constructed by its parent CGNPC, under the Non-competition Deed.</p> <p>Key beneficiary of China's expanding nuclear power industry. Being a base-load utility, we deem Nuclear power to be the most efficient, low-carbon power source with reduced greenhouse gas emissions for China to develop. The State Council targets China's installed nuclear capacity to reach 58 GW and those under construction to top 30 GW by 2020, implying that installed capacity to expand at 19% CAGR in FY14-20.</p>
Valuation	Risks
<p>Our 12-month TP of HK\$5.06 is equivalent to 0.75x P/NPV. This implies 29x FY15F PE and 24x FY16F. We think the implied PE target valuation premium to non-nuclear utility peers is justified by nuclear industry's significant entry barriers, the company's visible capacity growth and strong profitability over peers. The implied PE target valuation represents c.30% discount to the valuation of A-share pure nuclear player CNNP, which is trading at 43x FY15F PE.</p>	<p>Business risks include power tariff risks, utilisation hours risks and execution risks include nuclear power projects construction delay and capex overrun.</p>

Source: DBS Vickers

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Investment Summary – Initiate with BUY**Initiate coverage with BUY, with a DCF-based TP HK\$5.06.**

Our 12-month target price is HK\$5.06, equivalent to 0.75x P/NPV and 29x FY15F PE and 24x FY16x PE. The target valuation premium to non-nuclear utilities takes into consideration nuclear power industry's significant entry barriers, CGN Power's visible capacity growth and strong profitability over wind and coal-fired peers. Our target valuation represents c.30% discount to valuation of A-share peer China National Nuclear Producer which is currently trading at 43x FY15F PE based on Bloomberg consensus. We derived the target price from a 10-year forecast ending 2024, based on: 1) L-T average electricity tariff of Rmb0.372/kWh; 2) power generation will grow at 16% CAGR in 2015-2020F driven by consolidated generation capacity's expansion at 14% CAGR during the periods. Power generation to grow at a 10% CAGR in 2020-2024F; and 3) 1% terminal growth rate.

China's nuclear industry outlook: i) installed capacity to grow at a 19% CAGR, ii) prepares to ship nuclear exports to overseas propelled by 'one-belt, one road' policy. The State Council in Nov 2014 unveiled the "Energy Development Strategy Action Plan 2014-2020", which pledges to modernise the country's energy structure. The action plan targets China's installed nuclear capacity to reach 58 GW and those under construction to top 30 GW by 2020. This compares to current figures of 20 GW and 21 GW respectively as of the end of 2014. This indicates China will have to ramp up the construction of new nuclear power stations by at least 38 GW in the coming five years. In addition to robust domestic demand, exports will become another growth driver. Chinese nuclear power companies are participating in overseas nuclear power projects, in virtue of foreign direct investment (through financing from Chinese government) and exports of China's nuclear power technologies. China now owns the complete intellectual property rights of Hualong One (HRP1000), a GIII nuclear power Tech jointly developed by the CGN Group and CNNC. The Tech will pave the way for China's nuclear power industry to go global.

Nuclear power in China – i) the most efficient, low carbon utility source, ii) enjoying grid dispatch priority over those using fossil fuels, iii) low penetration. Unlike coal-fired or natural gas utilities, nuclear power stations do not pollute the air or directly emit sulfur dioxide, nitrogen oxide or greenhouse gases. Unlike renewable energies like wind and solar whose supply are impacted by weather and seasonality,

nuclear power stations provide base-load power sources to meet twenty-four hours per day, seven days per week demand. Chinese power generation proportion of thermal coal decreased to 63% in 2014 from 75% in 2009 as the government has been encouraging the development of renewable and clean energies to replace fossil-fuel in response to severe air pollution. While Chinese nuclear power consumption grew 16% CAGR in 2009-2014, nuclear power only accounted for 2% of the country's power generation in 2014.

China's largest nuclear power producer. CGN Power is China's largest nuclear power producer based on 2014 installed capacity and power generation. In 2014, the company operated 11 nuclear power generating units with installed capacity of 11,624MW (incl. seven units under subsidiaries and four units under associates/JV) and generated 52,176GWh of power, accounting for 54% and 49% market shares in China respectively. On 2 Apr 2015, CGN Power completed the acquisition of a 41% stake of Taishan Nuclear, of which two power generating units are under construction with installed capacity of 1,750MW each. Following the stake purchase, CGN Power now holds 51% stake in Taishan Nuclear. In Jun 2015, the company's subsidiary Yangjiang Unit 2 (with installed capacity of 1,086MW) and JV Ningde Unit 3 (with installed capacity of 1,089MW) started commercial operation.

Competitive advantages – i) top nuclear power company with visible growth profile, ii) significant industry entry barriers, iii) strong support by the parent, iv) stable supply of raw material uranium and v) proven safety track record and improved operations. i) Based on nuclear projects under construction, we project CGN Power's installed capacity at end-FY15/16/17 to be 16.0 GW, 21.7 GW and 22.8 GW respectively; ii) The nuclear power industry in China has substantial barriers to entry including government approval, technology, human capital and financing. Nuclear power generation is a highly regulated business in China. Only three companies have been authorised to manage and operate nuclear power stations in China. They are CGN Power & the parent, CNNP (China National Nuclear Power) & the parent, and CPI (China Power Investment Corporation). In 2014, CGN Power and CNNP had an installed capacity of 11,624MW and 9,773MW of the nuclear power generating units in operation, accounting for 54% and 46% of installed nuclear power generating capacity in China. CPI is mainly a minority interest holder of the country's nuclear power stations under construction; iii) CGN Power is entitled to acquire or invest in the nuclear power projects that are being planned or constructed by the parent CGNPC, under the Non-competition Deed by the parent. iv)

Supply of uranium is also highly regulated in China. CGN secures natural uranium supply through CGN Uranium, a subsidiary of the parent. v) By employing French-derived nuclear reactor technologies and nuclear power plant management, CGN Power's Daya Bay Power Station has been in safe operation for more than two decades since its commenced commercial operation in 1994. In 2014, six mature operating units (those which completed three refueling cycles) of Daya Bay Base achieved top 10 percentile in 57% of the WANO (World Association of Nuclear Operators) indicators versus 50% in 2013.

Earnings to rise at a 26% CAGR in FY15-17 on the back of: i) average electricity tariff of Rmb0.371/kWh, Rmb0.372/kWh and Rmb0.372/kWh respectively, ii) power generation of 57,424 GWh, 68,001 GWh and 90,757 GWh respectively, and iii) EBITDA margin of 67%, 67% and 65% respectively.

Investment risks and earnings sensitivity. Investment risks include power tariff risks, utilisation rate risks and execution risk of nuclear power projects construction delay and capex overrun. For 2015, we expect every 1% change in electricity tariff to swing earnings by 2.6%, every 1% change in utilisation hour to swing earnings by 1.3% and every 1% change in unit fuel cost to swing earnings by 0.4%, every 25-bp change in finance cost to swing earnings by 2.9%.

SWOT Analysis

Strengths	Weakness
<ul style="list-style-type: none"> • Have 54% and 47% market shares of Chinese installed nuclear power capacity and capacity under construction respectively • Significant high industry barriers of entry including government approval, technology, human capital and financing • Is entitled to acquire or invest in the nuclear power projects planned or constructed by the parent CGNPC under the Non-competition Deed • Stable supply of raw material uranium • Proven safety track record and improved operation • Investment cost curve could adjust downwards with greater experience 	<ul style="list-style-type: none"> • Taishan nuclear power project employs EPR (Evolutionary/European Power Reactor) Technology, the first time that the company is using the third-generation Tech. The first-of-a-kind design typically has a lot of unforeseen hurdles to overcome, and this could drive up costs
Opportunities	Threats
<ul style="list-style-type: none"> • Low penetration of nuclear power in China • "Energy Development Strategy Action Plan 2014-2020" targets China's installed nuclear power capacity of 58 GW by 2020 vs 20 GW by 2014 • Hualong One, China's independent third-generation nuclear power technology, facilitates China's nuclear power 'go global' 	<ul style="list-style-type: none"> • Slower growth of China's power consumption • Lower-than-expected power demand in Liaoning (Northeast China), in winter season, local grid companies usually give priority to steam-electricity cogeneration companies which provide heat supply

Source: DBS Vickers

Company overview

Currently, CGN Power manages six subsidiary nuclear units under construction with aggregate installed capacity of 7,844 MW and four JV/associate units under construction with aggregate installed capacity of 4,446 MW. Additionally, the company provides custodian service management for the construction of two units at Guangxi Fangchenggang with aggregate installed capacity of 2,160MW, of which 60% is held by the parent company CGNPC (China General Nuclear Power Corporation).

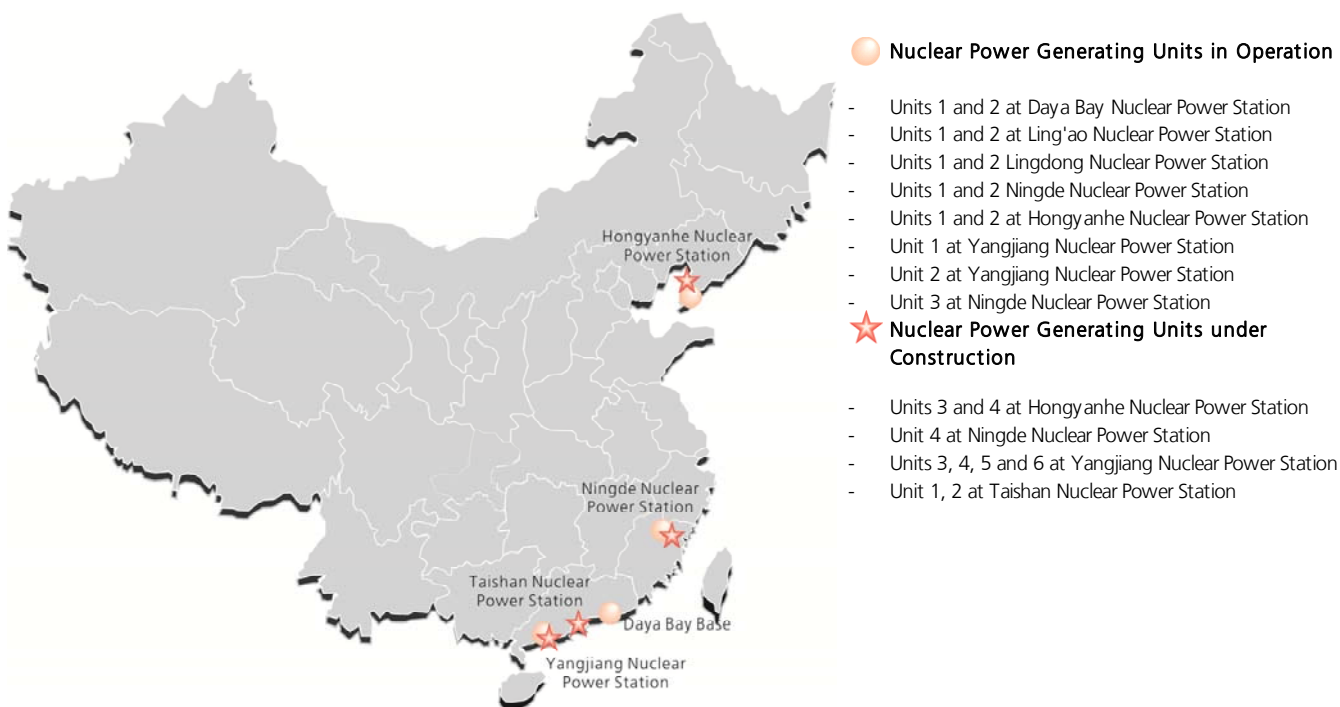
Corporate history. CGN Power was incorporated on 25 Mar 2014. The company is a subsidiary of CGNPC and the parent's sole platform for nuclear power development. This grants CGN Power the right to acquire or invest in the nuclear power projects that are being constructed or planned under the parent based on the Non-competition Deed. In 1987, the company's Daya Bay Nuclear Power Station started commercial operation (the first gigawatt capacity for commercial use in China). This provides experience in technology, engineering and operational management for CGN Power and China's subsequent nuclear power construction projects. In 2004, the commercial operation of the company's Lingdong Nuclear Power Station in Guangdong marked the first nuclear power station with GW-level in China that is designed, manufactured, constructed and operated with localisation.

CGN Power was listed on the HKEX on 10 December 2014 and raised Rmb21.6bn. On 8 Jun 2015, the company was included into HSCEI Index.

Power generation bases. CGN Power operates 11 nuclear power generation units in three provinces (incl. Guangdong (GD), Fujian (FJ) and Liaoning (LN)). In GD, the company owns Daya Bay Power Station, Ling'ao Power Station, Lingdong Power Station, Yangjiang Power Station and Taishan Power Station. The company operates and manages Ningde Power Station in FJ and Hongyanhe Power station in LN. In 2014, Guangdong, Fujian and Liaoning accounted for 62%, 19% and 19% of the company's installed nuclear power capacity respectively. Daya Bay Nuclear Power Station accounts for around 27% of the company's installed capacity and has maintained a steady nuclear power tariff over the past two decades since 1994.

Sales and customers. In 2014, sales revenue of electricity generated by the nuclear power stations represented 93% of CGN Power's sales revenue. The company's major customers are mainly provincial power grid companies such as Guangdong Power Grid Corporation and HKNIC (Hong Kong Nuclear Investment Company). Daya Bay Nuclear Power Station sends out 80% and 20% of its annual electricity output to HK and Guangdong respectively under L-T agreement.

CGN Power: Nuclear power units outlay



Source: Company, DBS Vickers

Competitive Strengths

i) Top nuclear power company in China with visible growth profile. In 2014, CGN Power had 11.6 GW installed nuclear power capacity and 9.8 GW under construction capacity, accounting for 54% and 47% market shares in China respectively. This compares to competitor CNNP (China National Nuclear Producer) with installed capacity of 9.8 GW. Based on nuclear power projects under construction, we project the company's installed capacity at end-FY15/16/17 to be 16.0 GW, 21.7 GW and 22.8 GW respectively. China targets a 58 GW installed nuclear capacity by 2020, representing a CAGR of 19% in 2014-20.

ii) Supported by parent CGNPC with strong track record. CGN Power is entitled to acquire or invest in the nuclear power projects that are being planned or constructed by the parent CGNPC, under the Non-competition Deed by the parent. The parent is currently constructing Fangchenggang Units 1 & 2 nuclear power generating units with a total

installed capacity of 2.16 GW in Guangxi. The commercial operation of Units 1 & 2 is expected to start in 2H15 and 1H16 respectively. CGN Power owns the rights to acquire the power generating units once they are substantially completed or ready for commercial operation. We estimate an aggregate 7.2 GW capacity (incl. Fangchanggang Units 3 & 4, Lufeng Phase I and Xianning Phase I) under the parent to be approved for construction during 2016-17. This will sustain the company's power generation growth in the L-T.

We calculate net profit margins of CGN Power to be 10-18% higher than CNNP's over 2012-14. This is not only because CGN Power has a higher utilisation hours than CNNP's but also the parent of CGN Power is more focused on nuclear business over the parent of CNNP. While CGNPC is primarily focus on nuclear power and non-nuclear renewable business, CNNC is diversified in eight business segments which to some extent dilute the parent's business efforts in our view.

CGN Power: Nuclear power projects under development by parent company

Entity	Installed capacity on completion (MW)	Province/location	Beneficiary ownership	Status
Fangchenggang Nuclear Unit 1&2	2*1080	Guangxi	CGNPC (61%), Guangxi Investment Group (39%)	Unit 1 & 2 are expected to commence commercial operation in 2H15 and 1H16
Fangchenggang Unit 3&4	2*1080	Guangxi	CGNPC (61%), Guangxi Investment Group (39%)	Under approval (likely in 2H15)
CGN Lufeng Nuclear Unit 1&2	2*1250	Guangdong	CGNPC (100%)	Under approval (likely in 2016)
Xianning Nuclear Unit 1&2	2*1250	Hubei (inland)	CGNPC (60%), Hubei Energy Group (39%)	Under approval (likely in 2017)
Anhui Wuhu Nuclear Unit 1&2	2*1000	Anhui	CGNPC (51%), Shenergy (20%), Anhui Province Wenergy (15%), Shanghai Electric Power (14%)	Projects are at early stage of the preparatory phase
CGN Shaoguan Nuclear Unit 1&2	2*1250	Guangdong (inland)	CGNPC (100%)	Projects are at early stage of the preparatory phase
CGN Huizhou Nuclear Power	n.a.	Guangdong	CGNPC (100%)	Projects are at early stage of the preparatory phase
Lingwan Nuclear Power	n.a.	Guangdong	CGNPC (100%)	Projects are at early stage of the preparatory phase
Hubei Nuclear Power	n.a.	Hubei	CGNPC (60%), Hubei Energy (40%)	Projects are at early stage of the preparatory phase

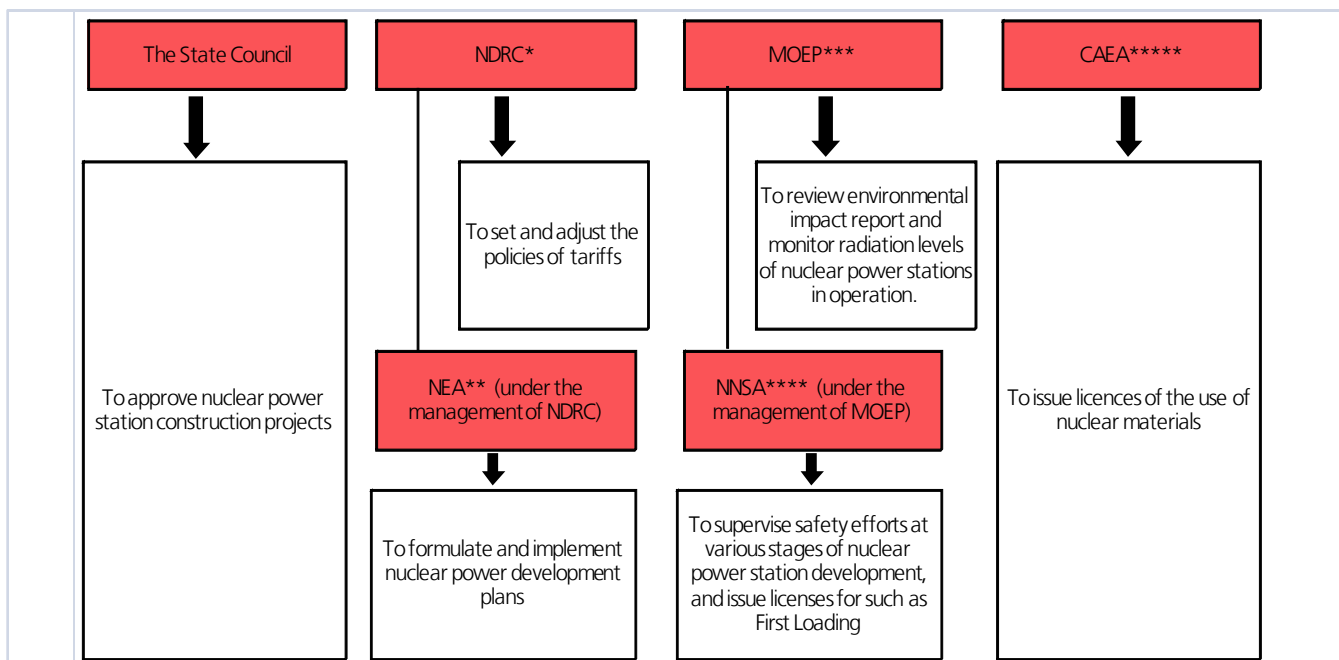
Source: Company, DBS Vickers

iii) **Significant industry entry barriers.** The nuclear power industry in China has substantial barriers to entry including government approval, technology, human capital and financing. Nuclear power generation is a highly regulated business in China. Only three companies have been authorised to manage and operate nuclear power stations in China. They are CGN Power & the parent, CNNP (China National Nuclear Power) & the parent, and CPI (China Power Investment Corporation). In 2014, CGN Power and CNNP had an installed capacity of 11,624MW and 9,773MW of the nuclear power generating units in operation, accounting for

54% and 46% of installed nuclear power generating capacity in China respectively. CPI is mainly a minority interest holder of the country's nuclear power stations in operation and under construction. In the foreseeable future, CGN Power, CNNP and CPI are likely to account for 40%, 40% and 20% of China's nuclear power industry investment respectively.

In terms of government's approval proceeds of nuclear power projects in China, please refer to chart "CGN Power: China nuclear power industry – government's approval proceeds".

CGN Power: China nuclear power industry – government’s approval proceeds



Source: Company, DBS Vickers

Note: *NDRC (National Development and Reform Commission)

**NEA (National Energy Administration)

***MOEP: Ministry of Environmental Protection of the PRC

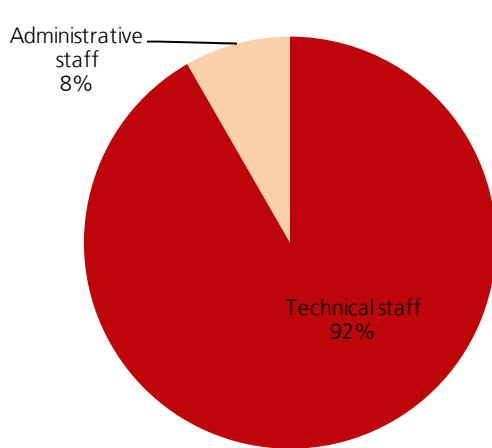
****NNSA: National Nuclear Safety Administration of the PRC

*****CAEA: China Atomic Energy Authority

Nuclear power industry relies on high-quality professionals. The employee training is expensive and time-consuming. According to the Regulations of PRC on the Safety Supervision and Administration of Civil Nuclear Facilities, operators of the control system of nuclear power stations should hold "Reactor Operator License". We estimate it

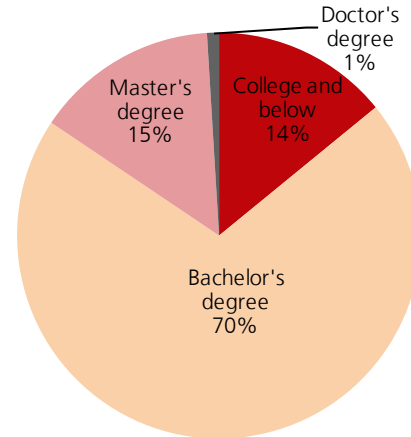
usually takes at least 7.5 years for a new recruit to be qualified for as a reactor-operator-licence holder. As of end-FY14, CGN Power owned 9,717 employees and 92% of the employees are technical staffs.

CGN Power: Employee structure by business type



Source: Company, DBS Vickers

CGN Power: Employee structure by education



Source: Company, DBS Vickers

With an investment of Rmb12-20bn for the construction of a GW-level capacity and a usual construction period of 60 months, the industry sets a high entry barrier for market participants of non-nuclear utilities.

iv) Stable supply of raw material uranium. Supply of uranium is highly regulated in China. In China, only two SOEs, namely CGN Uranium (a subsidiary of CGN Power's parent) and China Nuclear Energy Industry Company (a subsidiary of China National Nuclear Corporation, CNNC) have been awarded operational permits and licences to import and trade natural uranium and provide nuclear-related services. CGN Power procures natural uranium from overseas and domestic markets through CGN Uranium, a connected party of the company.

v) Proven safety track record and improved operations. By employing French-derived nuclear reactor technologies and nuclear power plant management, CGN Power's Daya Bay Power Station has been in safe operation for more than 20 years since its commenced commercial operation in 1994. Leveraging on the experiences of past outages and incidents, the Daya Bay base (incl. Daya Bay Power Station, Ling'ao Power Station and Lingdong Power Station) has been able to significantly reduce the time required for outage repairs and extend the length of refueling cycle. For instance, nowadays CGN Power is capable of extending the length of refueling cycle of its nuclear power generating units from approximately 280 days to over 430 days.

In 2014, six mature operating units (those which completed three refuelling cycles) of Daya Bay Base achieved top 10

percentile in 57% of the WANO (World Association of Nuclear Operators) indicators versus 50% in 2013. The other five new units (those which have not completed three refueling cycles after commercial operation) achieved top quarter percentile in 53% of the WANO indicators.

vi) Investment cost curve could adjust downwards with greater experience. CGN Power's Daya Bay Nuclear Power Station is the first gigawatt capacity for commercial use in China with localisation of the construction below 10%. With subsequent Ling'ao Nuclear Power's localisation of construction raised to 30%, we estimate that unit capital expenditure of Ling'ao station is around 35% lower than that of Daya Bay Station while the two stations use the same M310 nuclear reactor technology.

The company is employing ERP (Evolutionary/European Power Reactor) Tech, a third-generation French-derived Tech for Taishan Unit at a unit capex of Rmb20,909/kWh. Given Chinese government is promoting the employment of Hualong One, China's independent third-generation (GIII) nuclear power technology, we expect a certain amount of CGN Power's new start of nuclear project construction to apply Hualong One which is at an unit capex of c.Rmb16,000/kW. This could lead to a 24% reduction in unit capex over ERP reactor Tech's. We estimate 10% decrease in unit capex annually during 2015-2024 would swing DCF-based NPV by HK\$1.04/sh.

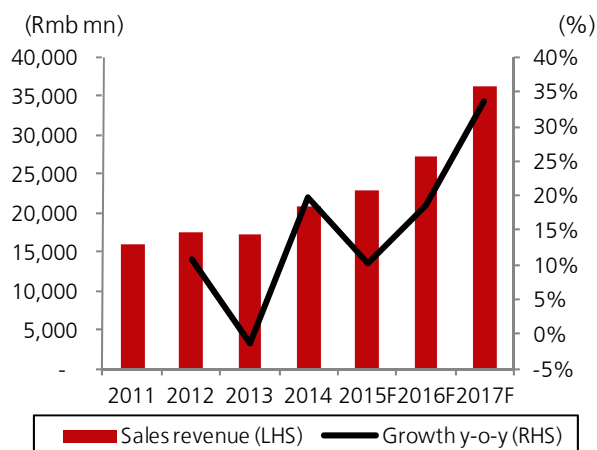
CGN Power

Revenue and profit

Sales of electricity. CGN Power derives substantially all of its sales revenue from selling electricity generated by the nuclear power stations. Sales of electricity represented 93% of the company's turnover in 2014. CGN Power's nuclear power stations are mainly subject to power purchase agreements with terms ranging from one to 20 years. The quantity of electricity sold is generally determined based on targets set forth by provincial-level government authorities. For example, Daya Bay Nuclear Power Station has secured a contract to sell 70% of its net power generation to Hong Kong until May 2034 and the sales ratio to HK will be further uplifted to 80% from 2015 to 2018.

In 2014, the company's sales revenue rose 20%, mainly driven by an 18% increase in net power generation.

CGN Power: Sales revenue in 2011-2017F



Source: Company, DBS Vickers

Capacity factor, utilisation hours and outage plan

Nuclear power is baseload power which is less affected by weather and seasonality, thus more stable than hydropower, wind, solar and other renewable energy resources. This translates into high load factor for nuclear power stations. Usually, the load factor of CGN Power's mature power units could reach up to around 85-90% (or 7,446-7,884 utilisation hours).

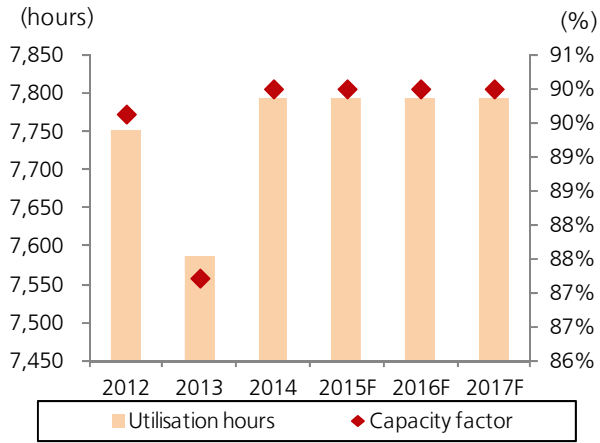
In 2014, CGN Power's mature power units (those which have completed operation through three fuel cycles after commercial operation) had an average load factor of 89% and average utilisation of 7,793 hours. This compares with an average load factor of 87% and average utilisation of 7,581 hours in 2013, as Daya Bay Unit 1 had not conducted outage in 2014.

In 2014, the company's new units (those which have not completed operation through three fuel cycles after commercial operation) had an average load factor of 79.5% and average utilisation of 6,939 hours. This compares with an average load factor of 97.4% and average utilisation of 8,534 hours in 2013. The decline in average load factor and utilisation hours is mainly because Ningde Unit 1 and Hongyanhe Unit 1 completed the first-time outages (similar to a 10-year outage) in 2014 compared to none in 2013, after they commenced commercial operation in Apr-2013 and Jun-2013 respectively.

Outage plan. The intervals for refuelling outages and the duration of each outage for nuclear power generating units determine capacity load. While the industry's refuelling outage takes around 45 days and a 10-year outage takes around 90 days usually, in comparison, CGN Power is capable of shortening the refuelling outage to 19 days and 10-year outage to 30 days for certain power generating units.

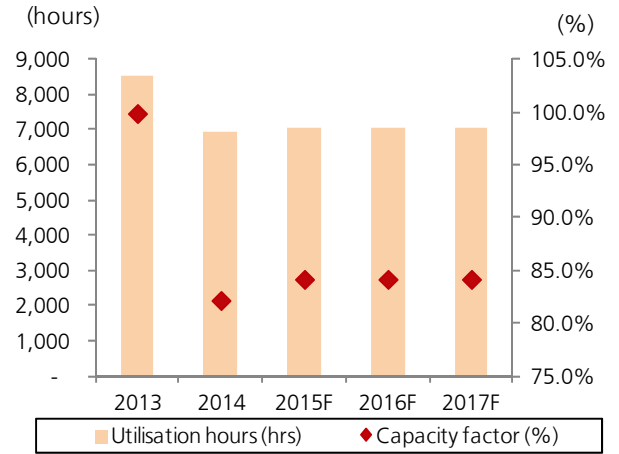
We project FY15 utilisation hours for mature power units to remain stable y-o-y, as per the company's guidance. We expect FY15 utilisation for new units to improve to 7,052 hours from 6,939 hours in FY14 to reflect smoother operation of Ningde Unit 1.

CGN Power: Capacity factor and utilisation hours of mature units



Source: Company, DBS Vickers

CGN Power: Capacity factor and utilisation hours of new units



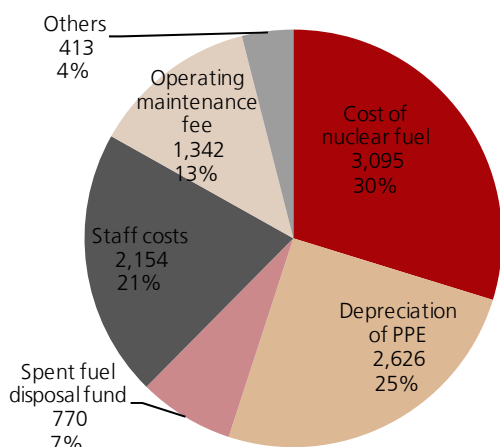
Source: Company, DBS Vickers

CGN Power

COGS

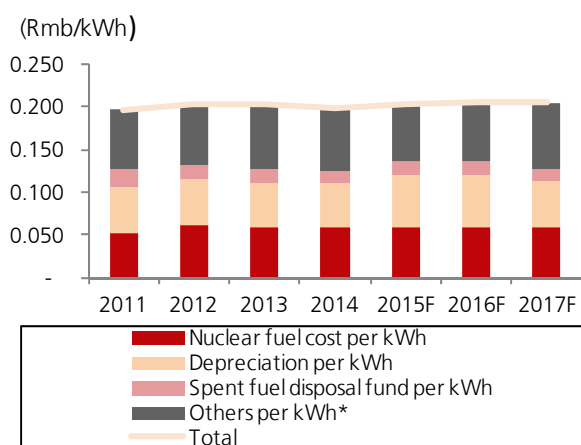
Fuel and depreciation are dominant cost inputs for nuclear power producer. Based on our analysis, we project the company's unit production cost to remain stable in 2015-2017F.

CGN Power: COGS breakdown in 2014 (Rmb mn, %)



Source: Company, DBS Vickers

CGN Power: Unit production cost in 2011-2014



Source: Company, DBS Vickers

COGS - uranium. In 2014, cost of nuclear fuel accounted for 30% of the company's COGS. We analyse nature uranium prices based on the followings:

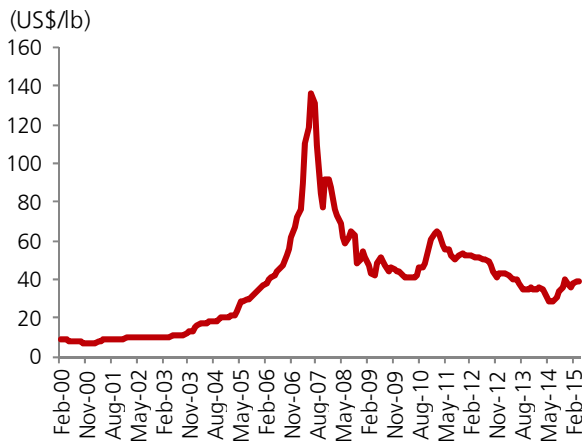
i) **A GW-level nuclear power capacity requires around 200 tonnes of natural uranium.** Normally, a GW-level nuclear power capacity requires around 25 tonnes of enriched uranium per annum, which uses around 200 tonnes of natural uranium (uranium oxide concentrate). Nuclear power stations use fuel assemblies manufactured by assembling fuel rods that contain enriched uranium, which is processed from natural uranium. Usually natural uranium, uranium enrichment and assembly processing accounts for 40%, 40% and 20% respectively of the nuclear fuel cost.

ii) **Majority of uranium mine output are profitable at current prices levels.** During the past decade, international spot price of natural uranium experienced substantial fluctuations. Uranium prices rocketed to US\$135/lb in 2007 due to acceleration of nuclear power development in China, India and Russia. During financial crisis in 2008, the prices troughed US\$45/lb in 2010. From 2010, uranium prices recovered to US\$73/lb in 2011. However, prices have sunk to US\$28/lb in 1H14 as global nuclear projects were halted in response to the Fukushima accident in 2011. Uranium prices

bottomed out in 2H14 buoyed by supply curtailment on weak prices and restocking of the utilities. Sitting at a current US\$39/lb, we estimate more than 90% of global uranium mine output is are profitable.

iii) **China has sufficient natural uranium stocks.** Natural uranium is principally used as the main raw material in the operation of nuclear power stations. Demand for natural uranium is fundamentally driven by installed nuclear capacity. Therefore nature uranium is much more predictable than the demand for other mineral commodities. In general, nuclear power generation companies need to procure uranium three to five years prior to use due to the time required for conversion, enrichment and related processing services.

Premised on the government's official target to top 58 GW installed nuclear capacity by 2020, we estimate that China's annual uranium requirement will grow faster than ex-China's combined requirement in the next five years. Based on the statistics of China petroleum and Chemical Industry Federation, we estimate that as of end-2014, China had an equivalent of eight years of uranium inventory (around 84,535 tonnes) based on 2020 consumption terms (around 10,600 tonnes). Based on the sufficient supply, we project CGN Power's fuel cost to remain stable going forward.

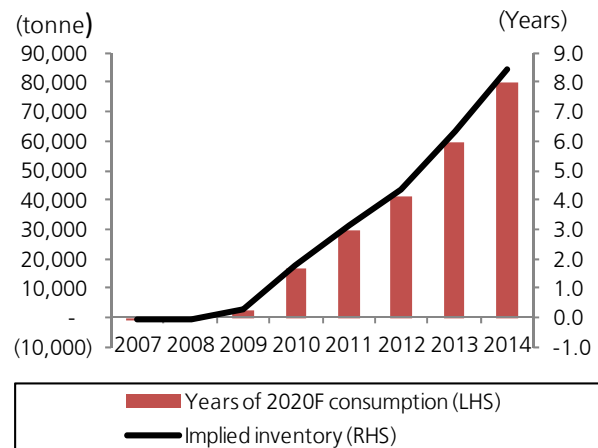
Natural uranium: Global spot prices in 2000-15

Source: Bloomberg, DBS Vickers

COGS - depreciation. In 2014, depreciation accounted for 25% of the company's COGS. Compared to traditional IPPs (coal-fired power plants), nuclear power generating units have high depreciation accountable of COGS because of the high unit capex. We estimate China's average capex for second-generation (GII) and upgraded second-generation (GII+) is around Rmb12,000/kW. This is higher than the prevalent investment of Rmb3,100-3,200/kW for thermal-coal power plants construction.

COGS – spent fuel disposal fund. In 2014, spent fuel disposal fund accounted for 7.4% of the company's COGS. Spent fuel means nuclear fuel has undergone nuclear fission in a reactor, and has been depleted to the level to be removed from the reactor. Nuclear power stations temporarily store spent fuel, after it has been removed from the reactor, in an on-site spent fuel pool located at the nuclear islands of nuclear power stations for power plant cooling, typically for approximately eight to ten years, which allows the radioactivity to decay naturally.

In accordance with the requirement of the Interim Measures on Spent Fuel issued by the MOFCOM (the Ministry of Commerce), the NDRC (National Development and Reform Commission) and the MIIT (Ministry of Industry and Information Technology), for PWR (pressurised water reactor) nuclear power generating units that have been in commercial operation for more than five years, provision for spent fuel disposal fund are made in the amount of Rmb0.026/kWh of electricity sold and are submitted to the relevant government authorities.

Natural uranium: As of end-2014, China had an implied inventory of around 8 years of projected 2020 consumption

Source: CEIC, DBS Vickers

On-grid tariffs and gross profit margin

CGN Power's average on-grid tariffs for installed capacity under consolidated subsidiaries have been stable in the past, based on steady on-grid tariffs sold to Guangdong Power Grid Corporation. While the company's unit production cost has been largely unchanged since 2011, the GP margin trend is in line with the on-grid tariff trend. We see limited downside risk to the company's average tariff, given favourable nuclear tariff over coal-fired tariff in key business exposure area. CGN Power's nuclear tariff in Guangdong is Rmb0.420-0.430/kWh (incl.VAT) in Guangdong compared to coal-fired tariff of Rmb0.473/kWh (incl.VAT).

On-grid tariffs for commercial operation after 1 Jan 2013. On 15 June 2013, NDRC set a national nuclear benchmark on-grid tariff of Rmb0.43/kWh (incl.VAT) for nuclear power generating units commencing operations after 1 Jan 2013. The electricity tariff of CGN Power's power stations commenced operations after 1 Jan 2013 is based on this benchmark tariff, which can be adjusted depending on the local benchmark on-grid tariff for coal-fired generating units.

If the national nuclear benchmark on-grid tariff is higher than the local benchmark on-grid tariff for coal-fired generating units (incl. the extra cost for desulfurisation and denitration), newly-built nuclear power stations' on-grid tariffs will be the same as the local benchmark on-grid tariff for the coal-fired generating units.

If the national nuclear benchmark on-grid tariff is lower than the local benchmark on-grid tariff for coal-fired generating units (incl. the extra cost for desulfurisation and denitration), the nuclear power generating units may be entitled to

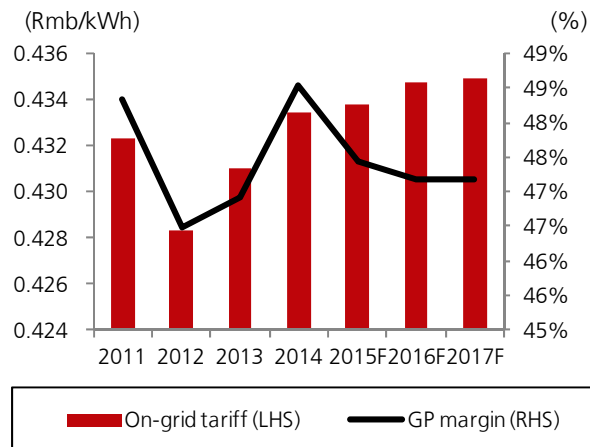
CGN Power

national nuclear on-grid tariffs provided that: i) the first group of nuclear power generating units, or ii) demonstration projects using technology improvements or upgrades, innovation or domestically manufactured key equipment.

On-grid tariff for commercial operation before 1 Jan 2013.

For nuclear power stations that began operations before 2013, China’s national pricing policy sets the on-grid tariff separately for each nuclear power station and allows for a reasonable profit, taking into account costs incurred by such nuclear power stations, including those related to construction and operation.

CGN Power: Average on-grid tariff vs GP margin



Source: Company, DBS Vickers

China on-grid tariff: Nuclear vs coal-fired power

	Coal-fired tariff downward adjustment in Apr 2015	Coal-fired tariff*	Nuclear tariff
	(Rmb/kWh, incl.VAT)	(Rmb/kWh, incl.VAT)	(Rmb/kWh, incl.VAT)
Northern China Grid:			
Beijing	0.017	0.375	n.m**
Tianjin	0.023	0.381	n.m**
Hebei (North)	0.017	0.397	n.m**
Hebei (South)	0.032	0.391	n.m**
Shanxi	0.023	0.354	n.m**
Shandong	0.020	0.419	n.a.***
Northeast Grid:			
Liaoning	0.018	0.386	0.414
Jilin	0.021	0.380	n.m**
Heilongjiang	0.020	0.386	n.m**
Inner Mongolia (East)	0.004	0.307	n.m**
West Inner Mongolia Grid:			
Inner Mongolia (West)	0.007	0.294	n.m**
East China Grid:			
Shanghai	0.023	0.436	n.m**
Jiangsu	0.021	0.410	0.455
Zhejiang	0.013	0.445	0.414-0.464
Anhui	0.022	0.407	
Fujian	0.030	0.407	0.414
Central China Grid:			
Hubei	0.018	0.442	n.m**
Hunan	0.022	0.472	n.m**
Henan	0.019	0.400	n.m**
Jiangxi	0.016	0.440	n.m**
Sichuan	0.015	0.440	n.m**
Chongqing	0.017	0.421	n.m**
Northwest Grid:			
Shaanxi	0.010	0.380	n.m**
Gansu	0.004	0.325	n.m**
Qinghai	0.017	0.337	n.m**
Ningxia	0.008	0.271	n.m**
Southern Grid:			
Guangdong	0.029	0.473	0.420-0.430
Guangxi	0.015	0.442	0.430
Yunnan	0.016	0.356	n.m**
Guizhou	0.010	0.371	n.m**
Hainan	0.025	0.453	0.430

Source: China Electricity Council, DBS Vickers

Note: *Coal-fired tariff incl. the extra cost for desulfurisation and denitration

**There is no nuclear power units under operation in the province

***Nuclear projects in Shandong incl. Haiyang Power Station and Shidaowan Power Station are expected to commence commercial operation in 2017

CGN Power**Financial analysis****Electricity and power generation assumptions**

We forecast sales revenue for FY15/16/17 to increase by 10%/19%/34% to Rmb22.9bn, Rmb27.2bn and Rmb36.3bn respectively, driven by 10%/18%/38% growth in net power generation. We project the company's consolidated installed capacity to be 8.3 GW, 12.9 GW and 14.0 GW at end-FY15/16/17 respectively.

Stable on-grid tariff. During 2011-2014, average on-grid tariff (excl.VAT) for CGN Power's consolidated power generating units was Rmb0.3695/kWh, Rmb0.3661/kWh, Rmb0.3684/kWh and Rmb0.3704/kWh respectively. Given nuclear on-grid tariffs are fixed by government pricing authorities and the central government's policy support to develop the nuclear industry, we expect on-grid tariff to remain stable for FY15 and FY16 at Rmb0.371/kWh and Rmb0.372/kWh respectively (see 'CGN Power: on-grid tariff for nuclear power generating units' chart for detailed on-grid tariff assumptions).

CGN Power: On-grid tariff for nuclear power generating units

	2011	2012	2013	2014	2015F	2016F	2017F	2018F
	(Rmb/kWh, incl.VAT)							
Consolidated subsidiaries?units:								
Daya Bay Unit 1	0.420	0.420	0.420	0.420	0.420	0.420	0.420	0.420
Daya Bay Unit 2	0.420	0.420	0.420	0.420	0.420	0.420	0.420	0.420
Ling'ao Unit 1	0.429	0.429	0.429	0.429	0.429	0.429	0.429	0.429
Ling'ao Unit 2	0.429	0.429	0.429	0.429	0.429	0.429	0.429	0.429
Lingdong Unit 1	0.430	0.430	0.430	0.430	0.430	0.430	0.430	0.430
Lingdong Unit 2	0.430	0.430	0.430	0.430	0.430	0.430	0.430	0.430
Yangjiang Unit 1	-	-	-	0.430	0.430	0.430	0.430	0.430
Yangjiang Unit 2	-	-	-	-	0.430	0.430	0.430	0.430
Yangjiang Unit 3	-	-	-	-	-	0.430	0.430	0.430
Taishan Unit 1	-	-	-	-	-	0.430	0.430	0.430
Taishan Unit 2	-	-	-	-	-	0.430	0.430	0.430
Ningde Nuclear's Units*:								
Ningde Unit 1	-	-	0.430	0.430	0.430	0.430	0.430	0.430
Ningde Unit 2	-	-	-	0.430	0.430	0.430	0.430	0.430
Ningde Unit 3	-	-	-	-	0.430	0.430	0.430	0.430
Ningde Unit 4	-	-	-	-	-	0.430	0.430	0.430
Hongyanhe Nuclear's Units**:								
Hongyanhe Unit 1	-	-	0.414	0.414	0.414	0.414	0.414	0.414
Hongyanhe Unit 2	-	-	-	0.414	0.414	0.414	0.414	0.414
Hongyanhe Unit 3	-	-	-	-	0.414	0.414	0.414	0.414
Hongyanhe Unit 4	-	-	-	-	0.414	0.414	0.414	0.414

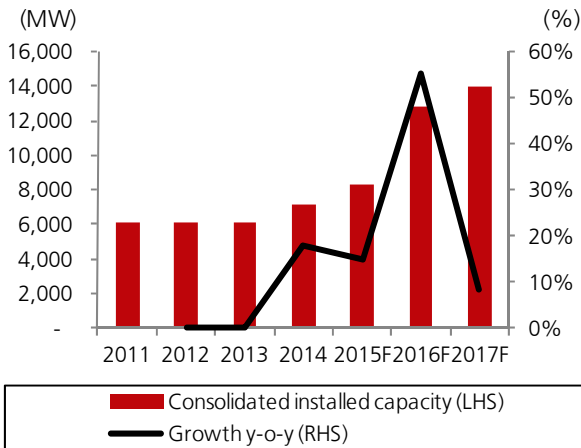
Source: Company, DBS Vickers

Note: *CGN Power's JV with 32.29% stakeholding, **CGN Power's Associate with 38.15% stakeholding

Consolidated nuclear power capacity to grow 15%/55% in FY15/16. We project the company's nuclear power capacity for consolidated subsidiaries for FY15/16F to grow 15%/55% y-o-y to 8.3 GW and 12.9 GW respectively. CGN Power currently operates eight subsidiaries. In June 2015, a subsidiary Yangjiang Unit 2 started commercial operation.

Additionally, CGN Power currently has six subsidiary units under construction. We factor in three subsidiary units for 2016 to start commercial operation.

CGN Power: Installed capacity under consolidated subsidiaries at end of 2011-2017F



Source: Company, DBS Vickers

CGN Power: Capacity commissioning schedule

	2011	2012	2013	2014	2015F	2016F	2017F	2018F
Consolidated subsidiaries' units:								
Daya Bay Unit 1	984	984	984	984	984	984	984	984
Daya Bay Unit 2	984	984	984	984	984	984	984	984
Ling'ao Unit 1	990	990	990	990	990	984	984	984
Ling'ao Unit 2	990	990	990	990	990	984	984	984
Lingdong Unit 1	1,087	1,087	1,087	1,087	1,087	1,087	1,087	1,087
Lingdong Unit 2	1,087	1,087	1,087	1,087	1,087	1,087	1,087	1,087
Yangjiang Unit 1	-	-	-	1,086	1,086	1,086	1,086	1,086
Yangjiang Unit 2	-	-	-	-	1,086	1,086	1,086	1,086
Yangjiang Unit 3	-	-	-	-	-	1,086	1,086	1,086
Yangjiang Unit 4	-	-	-	-	-	-	1,086	1,086
Yangjiang Unit 5	-	-	-	-	-	-	-	1,086
Yangjiang Unit 6	-	-	-	-	-	-	-	-
Taishan Unit 1	-	-	-	-	-	1,750	1,750	1,750
Taishan Unit 2	-	-	-	-	-	1,750	1,750	1,750
Ningde Nuclear's Units*:								
Ningde Unit 1	-	-	-	1,089	1,089	1,089	1,089	1,089
Ningde Unit 2	-	-	-	1,089	1,089	1,089	1,089	1,089
Ningde Unit 3	-	-	-	-	1,089	1,089	1,089	1,089
Ningde Unit 4	-	-	-	-	-	1,089	1,089	1,089
Hongyanhe Nuclear's Units**:								
Hongyanhe Unit 1	-	-	-	1,119	1,119	1,119	1,119	1,119
Hongyanhe Unit 2	-	-	-	1,119	1,119	1,119	1,119	1,119
Hongyanhe Unit 3	-	-	-	-	1,119	1,119	1,119	1,119
Hongyanhe Unit 4	-	-	-	-	1,119	1,119	1,119	1,119
Hongyanhe Unit 5	-	-	-	-	-	-	-	-

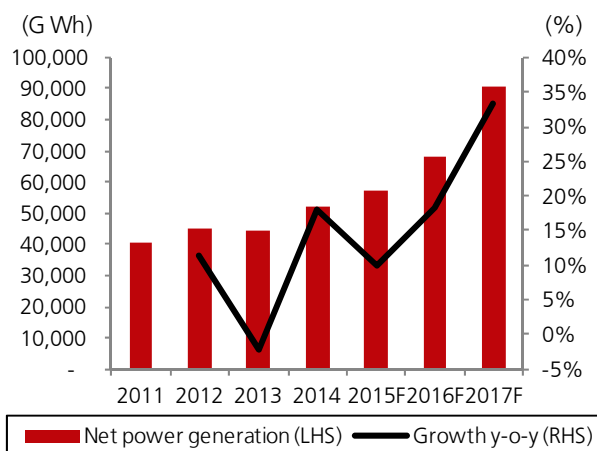
Source: Company, DBS Vickers

Note: *CGN Power's JV with 32.29% stakeholding, **CGN Power's Associate with 38.15% stakeholding

CGN Power

Net power generation to rise 10%/18% in FY15/16. We project CGN Power’s average capacity factor of mature units for both FY15/FY16 to remain stable at both 90%. And we forecast the average capacity factor of new units to improve to 84.2% in FY15 and stabilise in FY16 vs 81.5% in FY14. Therefore, we forecast net power generation in FY15/FY16/FY17 to expand to 57,424 GWh, 68,001 GWh and 90,757 GWh respectively vs 52,176 GWh in FY14.

CGN Power: Net power generation in 2011-2017F



Source: Company, DBS Vickers

Provision for spent fuel disposal fund included in COGS

Spent fuel disposal fund (a non-cash item) was Rmb770mn in FY14, accounting for 7.4% of the company’s COGS. Currently, the company’s Daya Bay Power Station and Ling’ao Power Station shoulder the 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. In accordance with the requirements of MOF, the NDRC and the MIIT, CGN Power contributes Rmb0.026/kWh to the provision for nuclear power generating units that have been in commercial operation for five years or longer. We forecast spent fuel disposal fund for FY15/16 to increase proportionately with the rise in sales revenue to Rmb851mn and Rmb1,007mn respectively.

Other income – VAT refunds

In China, sales of electricity is subject to a VAT rate of 17%. Nuclear power generating business is entitled to VAT refunds in the country. CGN Power’s Ling’ao and Lingdong Power Stations are both entitled to VAT refunds, at a rate that gradually decreases over a 15-year-period starting from the date of each nuclear power generating unit’s commencement of commercial operation. Based on sales revenue of electricity: the VAT refund rate was 75% for the first five years, 70% for the second five years and 55% for the third five years. We understand VAT rebate policy for Daya Bay Power Station had expired in 2014. Nevertheless, the company guided that power export VAT rebate policy released at end-FY14 should fully offset the impact of VAT refund policy expiration.

In 2014, CGN Power’s other income increased by 19% to Rmb1,799mn, mainly attributed to a 23% increase in VAT refunds, in tandem with electricity sales expansion. VAT refunds were proportionate to sales revenue at 7.5-7.7% in 2013-2014. We estimate the company’s blended VAT rebate rate for FY15/16 to be both 12.9%. (see ‘CGN Power: blended VAT rebate tax rates of subsidiaries’ chart). We project VAT refunds will account for 7.7% of sales revenue for FY15/16 and forecast the company’s other income to increase by 10%/19% to Rmb1,764mn and Rmb2,093mn respectively.

CGN Power: Blended VAT rebate rates of subsidiaries

Power station	Installed capacity	Date of commencement of commercial operation	VAT refunds period (1st 5-year of commercial operation)	VAT refund rates (%)	VAT refund periods (2nd 5-year)	VAT refund rates (%)	VAT refund periods (3rd 5-year)	VAT refund rates (%)
Daya Bay Unit 1	984	Feb-94	Feb-1994-to-Feb-1999	17%	Feb-1999-to-Feb-2004	17%	Feb-2004-to-Feb-2009	17%
Daya Bay Unit 2	984	May-94	May-1995-to-May-2000	17%	May-2000-to-May-2005	17%	May-2005-to-May-2010	17%
Ling'ao Unit 1	990	May-02	May-2002-to-May-2007	13%	May-2007-to-May-2012	12%	May-2012-to-May-2017	9%
Ling'ao Unit 2	990	Jan-03	Jan-2003-to-Jan-2008	13%	Jan-2008-to-Jan-2013	12%	Jan-2013-to-Jan-2018	9%
Lingdong Unit 1	1,087	Sep-10	Sep-2010-to-Sep-2015	13%	Sep-2015-to-Sep-2020	12%	Sep-2020-to-Sep-2025	9%
Lingdong Unit 2	1,087	Aug-11	Aug-2011-to-Aug-2016	13%	Aug-2016-to-Aug-2021	12%	Aug-2021-to-Aug-2026	9%
Yangjiang Unit 1	1,086	Mar-14	Mar-2014-to-Mar-2019	13%	Mar-2019-to-Mar-2024	12%	Mar-2024-to-Mar-2029	9%
Yangjiang Unit 2	1,086	2H15	2H15-2H20	13%	2H20-2H25	12%	2H25-2H30	9%
Yangjiang Unit 3	1,086	1H16	2H16-2H21	13%	2H21-2H26	12%	2H26-2H31	9%
DBSV's calculation and estimation for blended VAT refund rates of CGN Power						2014	2015F	2016F
						13.0%	12.9%	12.9%

Source: Company, DBS Vickers

Share of results of associate/JV

Fujian Ningde Nuclear Power Station is CGN Power's JV with 32.29% of its equity interest held by the company. Liaoning Hongyanhe (HYH) Power Station is CGN Power's associate with 38.14% of its equity interest held by the company. CGN Power manages the operation of associate/JV.

In 2014, the company commenced commercial operation of Ningde Unit 2 and HYH Unit 2. In early June 2015, the company started commercial operation of Ningde Unit 3. At present, CGN Power is managing the construction of four power units under associate/JV. We assume two power units and one power unit for 2016 will start commercial operation in FY15 and FY16 respectively.

We forecast share of results of associates and JV for FY15/16 to increase 53% and 36% to Rmb705mn and Rmb960mn respectively due to sequential commissioning of Ningde and HYH power units. We estimate the contribution of associate/JV results to account for 12%/13% of the company's net profit in FY15/16 vs 8% in FY14.

CGN Power: Results of associates/JVs

	2015F	2016F
Associates - Hongyanhe Nuclear (38.14% stake):		
Installed nuclear power capacity (MM) - annualised	2,611	3,917
Power generation (GWh) (assuming 6400 utilisation hours per annum)	16,710	25,066
Average electricity tariff (Rmb/kWh, excl.VAT)	0.354	0.354
Sales revenue (Rmb mn)	5,916	8,874
Net profit (Rmb mn) (assuming NP margin of 15.2%, approximate NP margin of CNNP)	899	1,349
Share of results of associates	343	514
JVs - Ningde Nuclear (32.29% stake):		
Installed nuclear power capacity (MM) - annualised	2,178	2,723
Power generation (GWh) (assuming 7000 utilisation hours per annum)	15,246	19,058
Average electricity tariff (Rmb/kWh, excl.VAT)	0.368	0.368
Sales revenue (Rmb mn)	5,603	7,004
Net profit (Rmb mn) (assuming a NP margin of 20%)	1,121	1,401
Share of results of JVs	362	452
Share of results of associates/JVs	705	967

Source: Company, DBS Vickers

CGN Power**Effective tax rate**

Pursuant to China's Enterprise Income Tax Law effective on 1 Jan 2008, high-tech companies supported by the State will be taxed at a decreased enterprise income tax rate of 15%. CGN Power's Daya Bay Power Station currently enjoys a preferential tax rate of 15%.

Besides, as per "Circular on the implementation of the Catalogue of the Key Public Infrastructure Projects Supported by the State and Entitled for Preferential Tax Treatment", the company's Lingdong Power Station and Yangjiang Power Station are entitled to a three-year tax holiday followed by a three-year 50% tax exemption from the first profit-making

year. We expect Taishan Power Station to enjoy the same tax holiday policy after the commercial operation start in 1H16/2H16.

We forecast an effective tax rate of 10.4% and 12.1% for FY15/16 (see below 'CGN Power: Effective tax rates' chart for details).

Net finance cost

We forecast the company's net finance cost for FY15/16 to decline to 3.6%/3.4% vs 4.2% in FY14, in tandem with China's interest rate cuts cycle.

CGN Power: Effective tax rates

	Commencement date of commercial operation/Expected date of commercial operation	Installed capacity (MW)	2011	2012	2013	2014	2015F	2016F
Daya Bay Unit 1	Feb-94	984	15%	15%	15%	15%	25%	25%
Daya Bay Unit 2	May-94	984	15%	15%	15%	15%	25%	25%
Ling'ao Unit 1	2-May	990	15%	15%	15%	15%	15%	15%
Ling'ao Unit 2	3-Jan	990	15%	15%	15%	15%	15%	15%
Lingdong Unit 1	Sep-2010	1,087	0%	0%	12.5%	12.5%	12.5%	25%
Lingdong Unit 2	Aug-2011	1,087	0%	0%	0.0%	12.5%	12.5%	12.5%
Yangjiang Unit 1	Mar-14	1,086				0%	0%	0%
Yangjiang Unit 2	2H15	1,086					0%	0%
Taishan Unit 1	1H16	1,750					0%	0%
Taishan Unit 2	2H16	1,750					0%	0%
Projected effective tax rate (%)							12.8%	14.4%

Source: Company, DBS Vickers

Earnings sensitivity

According to our estimates, CGN Power's earnings are most sensitive to changes in on-grid tariff and finance cost, the impact of key assumptions we have estimated below:

CGN Power: Earnings sensitivity

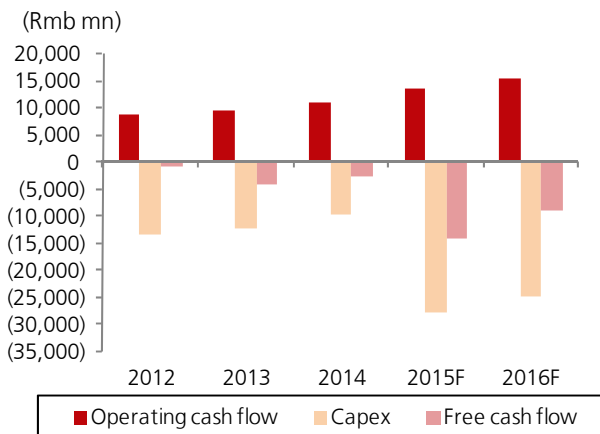
	FY15F
Net profit under base case scenario	6,125
1% increase in on-grid tariff	2.60%
1% increase in utilisation hours	1.30%
1% increase in unit fuel cost	-0.40%
1% increase in finance cost	-11.50%

Source: Company, DBS Vickers

Cash flow & balance sheet

Capex. The company's FY15 capex guidance is Rmb25bn. This combines: i) 41% stake increase in Taishan Nuclear Power Station for Rmb9.7bn; ii) Rmb5-6bn in connection with construction of Taishan Units 1 & Unit 2; and iii) Rmb9.2bn in connection with construction of Yangjiang Power Station. Our FY15/16F capex is Rmb28bn/Rmb25bn, taking consideration of potentially higher capital spending for construction of new units.

CGN Power: Capex vs free cash flow



Source: Company, DBS Vickers

Net gearing and ROE. We estimate net gearing for FY15/16 to increase to 98% and 104% respectively driven by high capital expenditure. We expect the company's ROE for FY15/16 to decline to 12% and 13.2% respectively vs 15.1% in FY14, factoring in higher unit capex of Taishan Power Station of c.Rmb20,000/kW, compared with the average unit capex of the company's other power stations of c.Rmb12,000/kW.

The company's non-Taishan Power Stations mainly apply second-generation (GII) nuclear power technology M310 and upgraded second-generation (GII+) technologies including CPR1000 and ACPR1000. The Taishan Power project employs ERP (Evolutionary/European Power Reactor), which is the third-generation (GIII) nuclear power technology developed by EDF (Electricite De France), one of the largest nuclear power operators in the world. Unit capex premium of GIII Tech over GII+ Tech reflects a higher safety standard which is designed to further reduce the risk of reactor core meltdown and the release of radiation into the environment.

Nuclear provision as liabilities. CGN Power's nuclear provisions are categorised into the following: i) provision for spent fuel disposal fund to be included in current liabilities; ii) provision for low- and medium-level radioactive waste management to be included in non-current liabilities; iii) provisions for decommissioning, which is calculated based on 10% of book value of the fixed assets upon the completion of nuclear power stations and discounted to its present value at a discount rate approximating to PBOC's five-year benchmark lending rate, to be included in non-current liabilities. We forecast CGN Power's nuclear provision per the chart below:

CGN Power: Nuclear provision

(Rmb mn)	Provision for spent fuel fund*	Provision for low- and medium-level radioactive waste management**	Provision for decommissioning**
2011	1,820	120	1,015
2012	1,153	131	1,086
2013	737	142	1,144
2014	770	155	1,371
2015F	855	168	1,556
2016F	1,094	181	1,546

Source: Company, DBS Vickers

Note: *included in current liabilities, **included in non-current liabilities

Dividend policy. Post CGN Power's IPO on 10 Dec 2014, the company has proposed a Rmb114mn dividend for FY14, translating into an annualised payout ratio of 33%. Going forward, the company is expected to distribute no less than 33% of its net profit for a given year as cash dividend.

CGN Power

1H15 power generation updates

CGN Power's 1H15 power generation is in line with expectation. The company recently announced gross power generation for 1H15 increased by 19.2% to 36,309 GWh.

By region, aggregate power generation of subsidiaries decreased by 2.7% y-o-y to 24,090 GWh due to 10-year outage repair sessions of Daya Bay Power Station scheduled in 1H15. The 1H15 consolidated power generation accounted for 42% of our FY15F of 57,424 GWh, in line with our expectations. We are comfortable with our FY15F consolidated power generation premised on higher capacity factor of Daya Day Station in 2H15 and positive contribution

of Yangjing Unit 2 which started commercial operation in early-Jun 2015.

In 1H15, aggregate power generation of associates/JV increased by 114% y-o-y to 12,219 GWh due to positive contribution of Ningde Unit 2 and Hongyanhe Unit 2 which commenced commercial operation on 25 Mar and 13 May in 2014 respectively. The 1H15 power generation under JV/associates accounted for 38% of our FY15F of 31,956 GWh, in line with our expectations. We are comfortable with our FY15F power generation under JV/associates premised on incremental contribution of Ningde Unit 3 which started commercial operation in early-Jun 2015 and Hongyanhe Unit 3 & 4 which are expected to start commercial operation in 2H15.

CGN Power: On-grid power generation in 1H15

Power Station	1H15 (GWh)	1H14 (GWh)	y-o-y %	Comments on 1H15
Daya Bay Nuclear Power Station	6,367	8,253	-22.9%	Refueling outage of Daya Bay Nuclear Power Station in 1H15 took more time y-o-y
Ling'ao Nuclear Power Station	7,506	6,927	8.4%	
Lingdong Nuclear Power Station	7,008	7,189	-2.5%	
Yangjiang Nuclear Power Station	3,209	2,384	34.6%	Yangjiang Unit 1 started commercial operation on 25 Mar 2014; unit 2 started commercial operation on 5 Jun 2015. Refueling outage of Yangjiang Nuclear Power Station in 1H15 took more time y-o-y
Ningde Nuclear Power Station	7,232	2,125	240.3%	Ningde Unit 2 started commercial operation on 4 May 2014; Unit 3 started commercial operation on 10 Jun 2015. Refueling outage of Ningde Nuclear Power Station in 1H15 took less time than that for the same period of 2014.
Hongyanhe Nuclear Power Station	4,987	3,582	39.2%	Hongyanhe Unit 2 started commercial operation on 13 May 2014. Affected by the winter heating supply period in Northeast China, HYH Nuclear Power Station temporarily conducted load shedding during certain time period in 1H15. Meanwhile, the company adjusted refuelling outage strategy so that certain overhauling projects in the originally planned refueling outage were conducted earlier in this period.
Total	36,309	30,460	19.2%	
Subsidiaries	24,090	24,753	-2.7%	
JV/associates	12,219	5,707	114.1%	
Total	36,309	30,460	19.2%	

Power Station	1Q15 (GWh)	1Q14 (GWh)	y-o-y %	Comment on 1Q15
Daya Bay Nuclear Power Station	3,489	4,123	-15.4%	
Ling'ao Nuclear Power Station	3,900	3,598	8.4%	
Lingdong Nuclear Power Station	2,633	3,287	-19.9%	
Yangjiang Nuclear Power Station	616	158	289.9%	Yangjiang Unit 1 commenced commercial operation on 25 Mar 2014, was in commercial operation for only 7 days in 1Q14 compared to 26 days in 1Q15
Ningde Nuclear Power Station	3,259	656	396.6%	Ningde Unit 2 commenced operation on 4 May 2014
Hongyanhe Nuclear Power Station	1,945	1,921	1.2%	
Total	15,841	13,742	15.3%	
Subsidiaries	10,637	11,166	-4.7%	
JV/associates	5,203	2,577	101.9%	
Total	15,841	13,742	15.3%	

Power Station	2Q15 (GWh)	2Q14 (GWh)	y-o-y %
Daya Bay Nuclear Power Station	2,877	4,131	-30.3%
Ling'ao Nuclear Power Station	3,606	3,329	8.3%
Lingdong Nuclear Power Station	4,375	3,902	12.1%
Yangjiang Nuclear Power Station	2,594	2,226	16.5%
Ningde Nuclear Power Station	3,973	1,469	170.5%
Hongyanhe Nuclear Power Station	3,042	1,661	83.1%
Total	20,468	16,718	22.4%
Subsidiaries	13,453	13,587	-1.0%
JV/associates	7,015	3,130	124.1%
Total	20,468	16,718	22.4%

Source: Company, DBS Vickers

Valuation and recommendation

We initiate coverage of CGN Power with a BUY rating and 12-month target price of HK\$5.06, equivalent to 0.75x P/NPV, implying 29x FY15F and 24x FY16F PE. The target valuation premium to non-nuclear utilities takes into consideration nuclear power industry's significant entry barriers, CGN Power's visible capacity growth and strong profitability over non-nuclear peers. Our target valuation represents a c.30% discount to valuation of A-share peers China National Nuclear Producer trading at 43x FY15F PE currently.

We expect earnings to increase at a 26% CAGR in FY15-17 driven by power generation to rise at a 26% CAGR. We forecast FY15/16 net profit to increase by 7%/22% to Rmb6,125mn and Rmb7,461mn respectively. Our projections are premised on the following:

- i) Average electricity tariff of Rmb0.371/kWh and Rmb0.372/kWh for the respective years, reflecting a stable on-grid tariff for nuclear power generating units in business exposure areas of the company's subsidiaries and associates/JV. The on-grid tariff of Taishan power station will be equivalent to those of nuclear power stations in operation in Guangdong. Taishan Units 1 & Unit 2 are expected to start commercial operation in 1H16 and 2H16 respectively;
- ii) Power generation of 57,424 GWh (up 10% y-o-y) and 68,001 GWh (up 18% y-o-y) for the respective years, based on consolidated power generation capacity of 8.3 GW at end-FY15 and 12.9 GW at end-FY16 respectively;

- iii) EBITDA margin of 67% for both years.

We rely on DCF valuation methodology to measure the NPV of future cash flow streams under different power generation and capex assumptions. We derived the target price from a 10-year forecast ending 2024, based on: 1) L-T average electricity tariff of Rmb0.372/kWh; 2) power generation will grow at 16% CAGR in 2015-2020F driven by consolidated generation capacity to expand at a 14% CAGR during the periods. Power generation will grow at a 10% CAGR in 2020-2024F; and 3) 1% terminal growth rate.

Our WACC of 6.1% is derived from: 1) risk-free rate of 3.6% based on annualised average yield of China's 10-year government bonds, 2) market risk premium of 6.1%, 3) beta of 1.6, and 4) a debt-to-equity of 75:25.

We deem our power generation forecasts to be conservative in the context of China's installed nuclear power capacity target 58 GW by end-FY20 and 200 GW by end-FY30 versus 20 GW by end-FY14. This implies the industry's capacity to grow at a 19% CAGR during FY14-FY20 and a 13% CAGR during FY20-FY30, in pursuant that nuclear power will account for 3%/8% of China's total power capacity by FY20/FY30 vs a 1.5% contribution in 2014. We project Chinese installed nuclear power capacity will achieve 58 GW and 200 GW at end-FY20/FY30, when the country's total power capacity to reach 1,960 GW and 2,622 GW during the same periods.

CGN Power: DCF valuation

	FY14	FY15F	FY16F	FY17F	FY18F	FY19F	FY20F	FY21F	FY22F	FY23F	FY24F
Sales revenue (Rmb m)	20,793	22,906	27,184	36,292	41,705	45,023	48,333	53,167	58,483	64,332	70,765
y-o-y %		10%	19%	34%	15%	8%	7%	10%	10%	10%	10%
Power generation (GWh)	52,176	57,424	68,001	90,757	104,266	112,536	120,811	132,893	146,182	160,800	176,880
y-o-y %		10%	18%	33%	15%	8%	7%	10%	10%	10%	10%
EBIT	11,004	11,653	13,851	18,375	21,050	22,717	24,371	26,808	29,489	32,437	35,681
Add: D&A	2,939	3,738	4,439	5,143	5,847	6,552	7,257	7,983	8,781	9,659	10,625
EBITDA	13,943	15,391	18,291	23,519	26,897	29,269	31,627	34,790	38,269	42,096	46,306
y-o-y %											
Add: provision for nuclear	783	855	1,094	1,240	1,240	1,424	1,570	1,968	2,720	2,940	3,160
Less: Tax	(925)	(1,082)	(1,510)	(1,965)	(2,574)	(2,814)	(3,053)	(3,358)	(3,694)	(4,063)	(4,469)
Less: MI	(1,162)	(1,246)	(1,518)	(1,975)	(2,587)	(2,828)	(3,068)	(3,378)	(3,716)	(4,087)	(4,496)
Add: change in WC	(5,551)	77	(271)	(154)	(1,515)	(510)	(546)	(614)	(360)	(1,003)	(1,126)
Add: capex	(9,887)	(28,000)	(25,000)	(25,000)	(25,000)	(25,000)	(25,000)	(17,000)	(17,000)	(17,000)	(17,000)
FCF	(2,800)	(14,005)	(8,915)	(4,334)	(3,539)	(460)	1,532	12,409	16,220	18,883	22,375
Discount factor		1	1.06	1.13	1.19	1.27	1.34	1.43	1.51	1.61	1.70

WACC:

Risk-free rate	3.6%
Market risk premium	6.1%
Equity beta	1.6
Cost of equity	13.3%
Cost of debt (pre-tax)	4.2%
Cost of debt (after-tax)	3.7%
Target equity weight	25%
Target debt weight	75%
Tax rate	11.9%
WACC	6.1%
Terminal growth	1%

DCF valuation

Sum of PV of FCF	15,845
PV of terminal value	281,313
Enterprise value	297,158
Less: net debt FY15F	62,849
Equity Value	234,309
No. of ordinary shares (m), fully dilute	43,455
Value per share (Rmb)	5.39
Exchange-rate forecast: Rmb: HK\$	1.25
NPV/Value per share (HK\$)	6.74
Target price (HK\$)	5.06

Source: Company, DBS Vickers

CGN Power

Peers comparison with other utilities

Gross profit margin comparison with CNNP. CGN Power's gross margins stabilised at 46-49% during 2011-2014, which is higher than A-share nuclear peer CNNP's (China National Nuclear Power, NR, 601985.CH) gross margin of 38%. CGN's better GP margin over CNNP is due to i) lower proportionate depreciation of COGS as CGN Power uses straight-line depreciation method and CNNP uses units of production depreciation method for its nuclear facilities; and ii) higher utilisation hours over CNNP.

GP margin comparison with non-nuclear utilities. CGN Power's GP margin is also higher than non-nuclear peers including China Longyuan (916.HK, NR, the largest wind operator in China) with a gross profit margin of 38% and Huaneng Power International (600011.CH, NR, the largest coal-fired power operator in China) with a gross profit margin of 24%. This is mainly owing to lower proportionate fuel cost of COGS for nuclear power, as fuel cost accounts for c.30% of CGN Power's COGS. In comparison, thermal coal cost accounts for c.65-70% of COGS of coal-fired power segments of Huaneng Power and China Longyuan. Besides, depreciation cost only accounts for 25% of CGN

Power's COGS while it makes up for 46% of Longyuan's COGS.

Net profit margin and utilisation rate comparison with non-nuclear utilities. CGN Power's unit NP of Rmb0.1095/kWh is approximately China Yangzta Power's (600900.CH, NR, the largest hydropower operator in China) and higher than those of China Longyuan and Huaneng Power, as nuclear power is a baseload power entailing high utilisation hours. In 2014, CGN Power's utilisation rate for mature units was 7,793 hours and for new nuclear units was 7,052 hours. This compares with utilisation rates of 4,430 hours/1,980 hours/4,618 hours for the largest hydro, wind and coal-fired power companies in China.

Besides, the ratios of finance expense a percentage of sales revenue for wind power operators are usually higher than that for nuclear operators because of higher net gearing ratio.

To put these into perspective, we expect CGN power's operation data to continue outperforming peers, premised on stable nuclear electricity tariff, high utilisation hours, low exposure to fuel cost volatility and sustainable VAT refund supported by favourable Chinese government's policy towards nuclear power development.

CGN Power: Operation data comparison with peers

Company	CGN Power	China National Nuclear Power	China Yangtze Power	China Longyuan Power	Huaneng Power International
Ticker	1816.HK	601985.CH	600900.CH	916.HK	600011.CH/902.HK
Business nature	Pure nuclear power player	Pure nuclear power player	Primary hydropower player	Primary Windpower player	Primary coal-fired power player
Company nature	SOE	SOE	SOE	SOE	SOE
FY14 sales revenue (Rmb mn)	20,793	18,801	26,898	18,207	125,407
Common Size (as % of sales revenue):					
Sales revenue	100.0	100.0	100.0	100.0	100.0
COGS	51.5	62.4	38.8	61.7	75.7
-Fuel cost	14.9	14.0	n.m	21.9	51.6
-Depreciation & Amortisation	12.6	20.9	23.1	27.5	9.3
-Other COGS	24.0	27.5	15.6	12.3	14.8
Gross profit	48.5	37.6	61.2	38.3	24.3
SG&A	7.1	5.6	2.0	2.1	2.9
Finance cost	15.4	10.4	12.7	17.3	6.1
EBIT	52.9	43.2	69.9	39.6	21.2
EBITDA	67.1	64.1	93.1	67.1	30.7
Net profit to shareholders	27.5	13.1	44.0	14.0	8.4
Power generation (GWh)	52,176	52,776	116,641	31,704	294,388
Utilisation rate (hours)	7,793*	5,399	4,430	1,980**	4,618
Installed capacity under consolidated subsidiaries (GW)	7.2	9.8	25.3	15.7	78.7
Average electricity tariff (Rmb/kWh)	0.370	0.377	0.225	0.543	0.455
Unit COGS (Rmb/kWh)	0.205	0.238	0.089	0.354	0.323
Unit fuel cost (Rmb/kWh)	0.059	0.053	n.m	n.m***	0.201
Black spread (Rmb/kWh)	0.311	0.324	n.m	n.m	0.254
Unit NP (Rmb/kWh)	0.109	0.050	0.101	0.081	0.036
ROE (%)	15.5%	11.6%	14.4%	8.0%	13.4%
Net gearing (%)	88%	630%	42%	204%	133%

Source: Companies, DBS Vickers

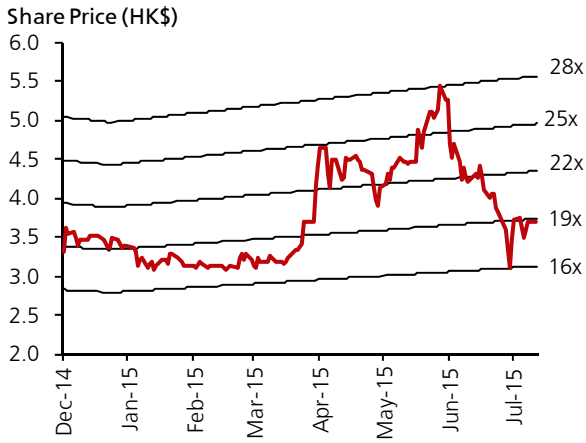
Note: *In 2014, CGN Power's utilisation for mature nuclear units was 7,793 hours and for new nuclear units was 7,052 hours

**In 2014, China Longyuan's utilisation for wind power was 1,980 hours and for coal-fired power was 5,142 hours

***In 2014, 28% of the company's electricity sales was for coal-fired power based on sales volume

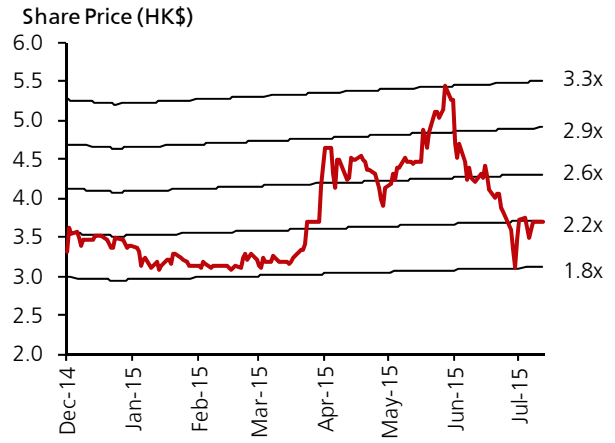
CGN Power

PE band chart



Source: Thomson Reuters, DBS Vickers

PB band chart



Source: Thomson Reuters, DBS Vickers

Peers comparison

Company Name	Code	Currency	Price	Mkt Cap	Fiscal Yr	PE		Yield	P/Bk		EV/EBITDA		ROE		
						15F	16F	15F	15F	16F	15F	16F	15F	16F	
			Local\$	US\$m		x	x	%	x	x	x	x	%	%	
A-share peers with nuclear exposure:															
Dongfang Electric	600875	CH	CNY	17.19	6,468	Dec	25.4	24.9	0.6	1.8	1.7	9.5	10.0	6.7	7.0
Shanghai Electric Gp	601727	CH	CNY	14.18	29,277	Dec	70.2	69.9	0.4	5.1	4.8	20.4	20.0	6.5	6.3
GD Orient Zirconic Industry	002167	CH	CNY	7.94	794	Dec	36.1	38.4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Zhejiang Jiuli Hi-Tech Metals	002318	CH	CNY	48.1	2,607	Dec	56.3	43.5	0.7	6.2	5.4	n.a.	n.a.	10.6	12.5
Anhui Yingliu Erml	603308	CH	CNY	26.28	1,693	Dec	72.0	55.9	0.5	5.6	5.0	n.a.	n.a.	7.0	9.3
Sichuan Danfu Compr	002366	CH	CNY	56.97	1,225	Dec	76.0	49.1	0.0	6.0	5.4	n.a.	n.a.	8.0	11.0
Jiangsu Shentong Valve	002438	CH	CNY	32.61	1,092	Dec	85.8	55.3	0.2	6.7	6.1	n.a.	n.a.	8.2	11.5
China National Nuclear Producer	601985	CH	CNY	11.36	28,469	Dec	50.9	42.1	0.4	4.8	4.4	n.a.	n.a.	9.6	9.5
A-share average							60.3	48.1	0.4	5.2	4.7	15.0	15.0	7.8	9.6
China Wind/Hydro/Gas IPPs:															
China Longyuan Power	916	HK	HKD	9.18	9,519	Dec	16.0	13.8	1.2	1.6	1.5	9.1	8.1	10.5	11.1
Huaneng Renewables	958	HK	HKD	3.33	4,180	Dec	14.7	11.8	1.1	1.4	1.3	10.0	8.2	10.3	11.8
China Yangtze Power	600900	CH	CNY	14.73	39,131	Dec	20.1	19.9	2.3	2.6	2.4	12.2	11.9	13.2	12.4
SDIC Power Holdings	600886	CH	CNY	15.16	16,564	Dec	16.1	15.3	2.1	3.7	3.2	8.7	8.2	25.0	21.9
Towngas China	1083	HK	HKD	7.09	2,437	Dec	14.0	12.2	1.6	1.3	1.2	12.1	10.3	8.8	9.4
Enn Energy Holdings	2688	HK	HKD	48.15	6,729	Dec	16.3	14.0	1.9	2.9	2.5	6.7	5.9	20.0	19.9
China Gas Holdings	384	HK	HKD	12.8	8,261	Mar	16.0	13.6	1.5	3.0	2.5	11.4	10.0	19.4	19.8
China Resources Gas Gp.	1193	HK	HKD	22.45	6,442	Dec	16.6	14.3	1.3	2.7	2.4	9.6	8.4	17.0	17.3
CGN Meiya Power Holdings	1811	HK	HKD	2.78	1,539	Dec	13.8	11.6	1.4	1.8	1.5	1.6	0.5	14.5	14.8
Non-nuclear power average							16.0	14.0	1.6	2.3	2.1	9.0	7.9	15.4	15.4
Global utility with nuclear exposure:															
EDF	EDF	FP	EUR	21.55	43,398	Dec	10.7	10.9	5.8	1.1	1.1	3.9	3.8	10.8	10.5
Areva	Areva	FP	EUR	8.152	3,383	Dec	n.a.	69.1	0.0	n.a.	n.a.	25.2	17.4	(5.7)	32.1
Exelon	EXC	N	USD	33.39	28,757	Dec	13.6	13.7	3.7	1.1	1.1	7.3	7.0	8.5	8.2
E On Se Spn	EONGY	US	USD	13.54	27,094	Dec	16.1	15.2	4.0	n.a.	n.a.	n.a.	n.a.	5.1	n.a.
Fortum OYJ	FUM1V	FH	EUR	15.91	15,306	Dec	16.9	17.6	8.2	1.0	1.0	8.4	8.8	6.5	5.7
Global utility with nuclear exposure average							14.3	25.3	4.3	1.0	1.0	11.2	9.3	5.0	14.1
CGN Power*			HKD	3.68	21,578	Dec	20.9	17.2	1.4	2.3	2.1	13.0	11.5	11.5	12.8
CGN Power (at target valuation)*						Dec	28.7	23.6	1.0	3.2	2.9	16.1	14.1		

FY15: FY16; FY16: FY17

Source: Thomson Reuters, *DBS Vickers

CGN Power

Nuclear power generating principles, main reactor type and technologies

Nuclear power generating principles. Nuclear power is thermal energy released from the nuclear fission of uranium. During nuclear fission, thermal energy is generated as neutron particles strike the nucleus of a uranium atom to trigger a controlled chain reaction. As a result of the reaction, steam is produced, which drives the steam turbine, thereby generating electricity.

Major nuclear power reactors in the world use PWR technology. The nuclear reactor is the most critical device in a nuclear power station. It is loaded with nuclear fuel for large,

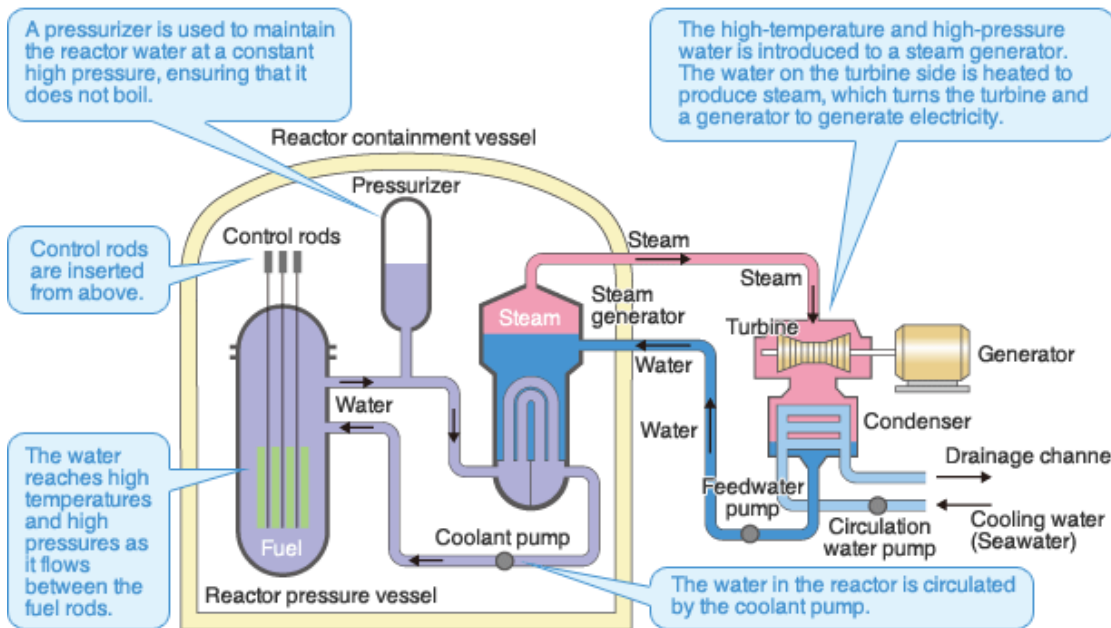
controlled fission chain reactions. Reactor coolants transfer heat from the nuclear reactor’s core to electrical generators and the environment.

Commercial nuclear power reactors are classified based on the reactor coolant and neutron energy. Most power-generating nuclear reactors in operation and under construction in the world use PWR (pressurised water reactor) technology. PWR technology uses light water (i.e., ordinary water), which does not boil in the reactor, and uses enriched uranium as fuel. Currently, around 63% of the world’s nuclear power generating units in operation use PWR technology.

Nuclear power industry: A nuclear power station using PWR technology

Pressurized water reactor (PWR)

The interior of the reactor is maintained at a high pressure to prevent water from boiling despite its high temperature; a steam generator produces steam using water other than the water flowing inside the reactor.



Source: Google picture, DBS Vickers

Nuclear power technologies in China

Nuclear reactor technology is the core of nuclear power Tech. There are currently four generations of nuclear power technology. No clear-cut boundary exists between each generation, because subsequent generations of Techs are developed based on preceding ones and include many technical elements of the preceding generation.

Almost all of the nuclear power generating units in China currently use second-generation (GII, eg. M310) or improved

second generation (GII+, e.g. CPR 1000, ACPR 1000) Tech. According to CNEA (China Nuclear Energy Association) report, for GII PWR nuclear power stations, equipment in nuclear islands, conventional islands and BOP (balance of plant) systems (incl. the pressure vessel, steam generator, reactor components, and control rod driving mechanism and nuclear-class pump valve) can be provided by domestic China suppliers. The localisation ratio of most GII PWR nuclear power stations is currently at 60-80% in China.

Nuclear industry: Features and reactor types of the four generations of nuclear power technology

Generation	Starting Time	Main Features	Main Reactor Types
First Generation	1950s	These nuclear power stations were research prototypes built in the developmental stages of nuclear power, and proved that nuclear power generation was technically feasible.	U.S. Shipping Port nuclear power station, Dresden nuclear power station; British Calder Hall graphite gas-cooled dual-use production and power generation reactor; former Soviet Union APS-1 pressure tube type graphite watercooled reactor nuclear power station; and Canadian NPD natural uranium heavy-water reactor nuclear power station
Second-Generation	1960s	Manufactured based on first generation research prototypes, further proving the technical and economic feasibility of nuclear power generation. Most of the nuclear power units in operation in the world use second-generation technologies. Second-generation nuclear power units are safer, more reliable and cost-effective than the first-generation units.	PWR (pressurised water reactor); BWR (boiling water reactor); PHWR (pressurised heavy-water reactor); GCR (gas-cooled reactor); and LWGR (light water graphite reactor)
Third-Generation	1980s	After the Three Mile Island and Chernobyl nuclear power station accidents, organizations in the United States and Europe separately issued user requirements to help prevent and mitigate severe accidents. Nuclear power units meeting either of the two standards were classified as third-generation. These units were designed to further reduce the risk of reactor core meltdown and the release of radiation into the environment, thereby improving public confidence in the safety of nuclear power.	ABWR; Advanced Passive PWR (AP600/AP1000); EPR; and Hualong One
Fourth-Generation	2000s	This generation is still being studied for feasibility, with the goal of developing a next-generation nuclear power system with improved safety, economics and sustainability and improved safeguards against nuclear proliferation and terrorist attacks.	N.A.

Source: China Nuclear Energy Association, DBS Vickers

CGN Power's technology. All of the company's nuclear power generating units use technologies derived from mature French M310 PWR reactor Tech developed by EDF. CGN Power and its parent has implemented technical improvements on the basis of the original M310 reactor technology used by the Daya Bay Nuclear Power Station to create the CPR1000 technology, an upgraded second-generation nuclear power technology, and the ACPR1000 technology, which has the principal technological and safety features of the third-generation nuclear power technology.

China owns the complete intellectual property rights of Hualong One, a third-generation nuclear Tech. CGN participated in the R&D of Hualong One, a third-generation (GIII) nuclear power Tech jointly developed by the CGN Group (incl. CGN Power) and CNNC (China National Nuclear Corporate, the parent of China National Nuclear Power). Hualong One Tech is a combination of CGN's ACPR1000+ Tech and CNNC's AP1000 Tech. AP1000 is a GIII Tech derived from mature US PWR reactor Tech developed by Westinghouse.

CGN Power

CGN Power: description of nuclear power stations and nuclear power generating units

Entity	Province	Beneficial Ownership (Directly and Indirectly) as of Jun-2015	Nuclear Power Generating Unit	Nuclear Tech	FCD (First Concrete Date)	Date of Commencement of Commercial Operation	Installed Capacity on Completion (MW)	Status as of end-2014	Expected date of commencement of commercial operation
Consolidated Subsidiaries									
Guangdong Nuclear Power Joint Venture Co., Ltd.		75.00%	Daya Bay Unit 1	M310	Aug-87	Feb-94	984	In Operation	-
			Daya Bay Unit 2	M310	Aug-87	May-94	984	In Operation	-
Ling'ao Nuclear Power Co., Ltd.		100.00%	Ling'ao Unit 1	M310	May-97	May-02	990	In Operation	-
			Ling'ao Unit 2	M310	Nov-97	Jan-03	990	In Operation	-
Lingdong Nuclear Power Co., Ltd.		93.14%	Lingdong Unit 1	CPR1000	Dec-05	Sep-10	1,087	In Operation	-
			Lingdong Unit 2	CPR1000	Jun-06	Aug-11	1,087	In Operation	-
Yangjiang Nuclear Power Co., Ltd.		78.20%	Yangjiang Unit 1	CPR1000	Dec-08	Mar-14	1,086	In Operation	-
			Yangjiang Unit 2	CPR1000	Jun-09	Jun-15	1,086	In Operation	-
			Yangjiang Unit 3	CPR1000	Nov-10	-	1,086	Under Construction	1H16
			Yangjiang Unit 4	CPR1000	Nov-12	-	1,086	Under Construction	2H17
			Yangjiang Unit 5	ACPR1000	Sep-13	-	1,086	Under Construction	2H18
			Yangjiang Unit 6	ACPR1000	Dec-13	-	1,086	Under Construction	2H19
Taishan Nuclear Power Joint Venture Co., Ltd.		51.00%	Taishan Unit 1	EPR	Oct-09		1,750	Under Construction	1H16
			Taishan Unit 2	EPR	Apr-10		1,750	Under Construction	2H16
JVs									
Fujian Ningde Nuclear Power Co., Ltd.		32.29%	Ningde Unit 1	CPR1000	Feb-08	Apr-13	1,089	In Operation	-
			Ningde Unit 2	CPR1000	Nov-08	May-14	1,089	In Operation	-
			Ningde Unit 3	CPR1000	Jan-10	Jun-15	1,089	In Operation	-
			Ningde Unit 4	CPR1000	Sep-10	-	1,089	Under Construction	2H16
Associates									
Liaoning Hongyanhe Nuclear Power Co., Ltd.		38.14%	Hongyanhe Unit 1	CPR1000	Aug-07	Jun-13	1,119	In Operation	-
			Hongyanhe Unit 2	CPR1000	Mar-08	May-14	1,119	In Operation	-
			Hongyanhe Unit 3	CPR1000	May-09	-	1,119	Under Construction	2H15
			Hongyanhe Unit 4	CPR1000	Aug-09	-	1,119	Under Construction	2H15
			Hongyanhe Unit 5	CPR1000	Mar-15	-	1,119	Under Construction	1H2020

Source: Company, DBS Vickers

CGN Power: Main features of French gigawatt-level PWR Tech that CGN is using

Type of Technology	Main Features of Technology	Generation of Technology	Time CGN Powr commenced Use	CGN Power's Technical and Safety related Improvements
MB10	<ul style="list-style-type: none"> • A gigawatt-level PWR (Pressurized Water Reactor) technology developed in France, which was improved on the basis of CPY reactor model • Safe and mature technology widely adopted in the United States and France • Among the 58 nuclear power generating units in operation in France, 34 adopt the same MB10 model as the units at our Daya Bay Nuclear Power Station and Ling'ao Nuclear Power Station 	Second	1984	<ul style="list-style-type: none"> • CGN Power made a series of major technical improvements and 16 safety-related improvements in MB10 to create the CPR 1000 technology.
CPR1000	<ul style="list-style-type: none"> • An improved Chinese gigawatt-level PWR technology developed based on the MB10 technology • Designed, manufactured, constructed and operated by the CGN Group and us in a self-reliant manner • Safe and mature technology, and the prevailing nuclear power technology in the PRC • Greater safety and reliability compared to MB10 	Second (improved)	2005	<ul style="list-style-type: none"> • CGN Power enhanced the safety, reliability and costeffectiveness of the CPR1000 technology to create the ACPR1000 technology.
ACPR1000	<ul style="list-style-type: none"> • Developed based on the CPR1000 technology, a gigawatt-level PWR technology featuring the main safety technical characteristics of the thirdgeneration nuclear power technology that meets the latest post-Fukushima PRC safety regulatory requirements • Designed, manufactured, constructed and operated by the CGN Group and us in a self-reliant manner • Greater safety and reliability compared to CPR1000 	Second (improved with the 2013 principal technological and safety features of the third generation)		<ul style="list-style-type: none"> • CGN Power made 31 technical improvements on CPR1000 to create the ACPR1000 technology.
EPR	<ul style="list-style-type: none"> • A nuclear power technology jointly developed by France and Germany • Larger capacity, greater safety and greater resource efficiency compared to second-generation technologies 	Third	2009	

Source: Company, DBS Vickers

CGN Power

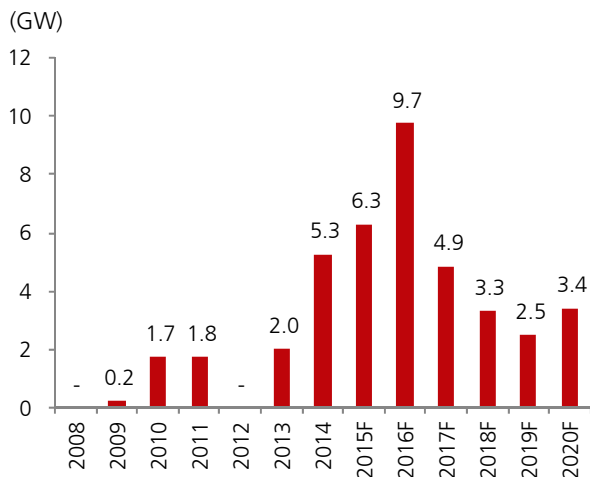
China nuclear power industry

China’s nuclear power installed capacity to grow at 19% CAGR. In November 2014, the State Council unveiled “Energy Development Strategy Action Plan 2014-2020”, which pledges to modernise the country’s energy structure. The action plan targets China’s installed nuclear capacity to reach 58 GW and those under construction to top 30 GW by 2020. This compares to China’s installed capacity of the nuclear power generating units in operation and capacity under construction of 20 GW and 21 GW at end-FY14. This indicates China will have to ramp up the construction of new

nuclear power stations by at least 38 GW in aggregate in the following five years.

Based on yearly estimation, we project China’s new nuclear capacity addition in 2015/2016/2017 to be 6.3/9.7/4.9 GW. We forecast there will be an aggregate 30.1 GW new nuclear capacity additions in 2015-2020 based on 27 nuclear power units under construction at present (refer to ‘China nuclear industry: installed capacity in operation and capacity under construction details as of end-1H15’). We expect Chinese government will accelerate approvals of new nuclear projects in 2H15 to 2016 to meet the capacity target set for 2020.

China nuclear power industry: Addition of installed capacity



Source: China Electricity Council, DBS Vickers

China nuclear power industry: Installed capacity in operation and capacity under construction as of end-1H15

Entity	Province	Installed capacity (MW)	Major shareholders	Commencement date of commercial operation	Expected commencement date of commercial operation
In operation:					
Hongyanhe Unit 1&2	Liaoning	2*1119	CPI (45%), CGN Power (38.14%)	Jun-2013	n.m
Daya Bay Unit 1&2	Guangdong	2*984	CGN Power (75%)	Feb-94/May-94	n.m
Lingdong Nuclear Power Unit 1&2	Guangdong	2*1087	CGN Power (93.14%)	Sep-2010	n.m
Ling'ao Nuclear Power Unit 1&2	Guangdong	2*990	CGN Power (100%)	May-02	n.m
Ningde Unit 1&2	Fujian	2*1089	CGN Power (32.29%)	Apr-13/May-14	n.m
Yangjiang Unit 1	Guangdong	1*1086	CGN Power (78.20%)	Mar-2014	n.m
Fangjiashan Unit 1&2	Zhejiang	2*1089	CNNP (72%)	Dec-14/Jan-15	n.m
Fuqing Phase I Unit 1	Fujian	1*1089	CNNP (51%)	Nov-14	n.m
Qinshan phase II Unit 1&2	Zhejiang	2*650	CNNP (50%)	Apr-02/May-04	n.m
Qinshan phase II Unit 3&4	Zhejiang	2*660	CNNP (56%)	Oct-10/Dec-2011	n.m
Qinshan Phase I	Zhejiang	1*310	CNNP (100%)	Apr-94	n.m
Qinshan Phase III Unit 1&2	Zhejiang	2*728	CNNP (51%)	Dec-02/Jul-03	n.m
Tianwan Unit 1&2	Jiangsu	2*1060	CNNP (50%)	May-07/Aug-07	n.m
Yangjiang Unit 2	Guangdong	1*1086	CGN Power (78.2%)	Jun-2015	n.m
Ningde Phase I Unit 3	Fujian	1*1089	CGN (32.29%)	Jun-2015	n.m
Subtotal		23,592			
Under construction:					
SNPTC advanced demonstration power plant	Shandong	1*1400	State Nuclear Power Technology Corporation (75%)	n.m	n.a.
Shidaowan	Shandong	1*200	Huaneng Power Intl. (50%)	n.m	2017
Haiyang Nuclear Phase I Unit 1&2	Shandong	2*1250	CPI (65%)	n.m	End-2015/2016
Hongyanhe Phase I Unit 3&4	Liaoning	2*1119	CPI (45%), CGN Power (38.14%)	n.m	2H15
Hongyanhe Unit 5	Liaoning	1*1119	CPI (45%), CGN Power (38.14%)	n.m	2H20
Ningde Phase I Unit 4	Fujian	1*1089	CGN Power (32.29%)	n.m	2H16
Yangjiang Unit 3&4&5	Guangdong	3*1086	CGN Power (78.2%)	n.m	1H16/2H17/2H18
Yangjiang Unit 6	Guangdong	1*1086	CGN Power (78.2%)	n.m	2H19
Taishan Phase I Unit 1&2	Guangdong	2*1750	CGN Power (51%)	n.m	1H16/2H16
Fangchenggang Phase I Unit 1&2	Guangxi	2*1080	CGNPC* (61%)	n.m	2H15/1H16
Fuqing Phase I Unit 2	Fujian	1*1080	CNNP (51%)	n.m	2015
Fuqing Phase II Unit 3	Fujian	1*1080	CNNP (52%)	n.m	2016
Fuqing Phase II Unit 4	Fujian	1*1080	CNNP (53%)	n.m	2017
Fuqing Phase III Unit 5	Fujian	1*1150	CNNP (54%)	n.m	2020
Fuqing Phase III Unit 6	Fujian	1*1150	CNNP (55%)	n.m	2020
Sanmen Phase I Unit 1&2	Zhejiang	2*1250	CNNP (51%)	n.m	2017
Changjiang Unit 1&2	Hainan	2*650	CNNP (51%)	n.m	2015/2016
Tianwan Unit 3&4	Jiangsu	2*1126	CNNP (50%)	n.m	2018
Subtotal		30,142			

Source: CGN Power, CNNP (China National Nuclear Producer), CPI (China Power Investment Corporation), China Nuclear Energy Association, DBS Vickers

*CGNPC stands for China General Nuclear Power Corporation, the parent of CGN Power

Nuclear safety. The Fukushima accident was a serious INES Level 7 nuclear accident caused by the tsunami which was induced by the level 9.0 earthquake at the Fukushima Daiichi Nuclear Power Station in Japan on 11 Mar 2011. After the event, the Chinese government temporarily suspended the approvals of new nuclear power stations and conducted a detailed safety review of nuclear power stations in operation. It was not until Oct 2012 that the State Council decided to

steadily resume the construction of nuclear power generating units. In November 2012, CGN Power's Yangjiang Nuclear Power station obtained approval to start construction. Subsequently in December 2014, the National Nuclear Safety Administration approved the construction of Tianwan Phase II nuclear project.

The choice of nuclear power. Unlike coal-fired or natural gas utilities, nuclear power stations do not pollute the air or

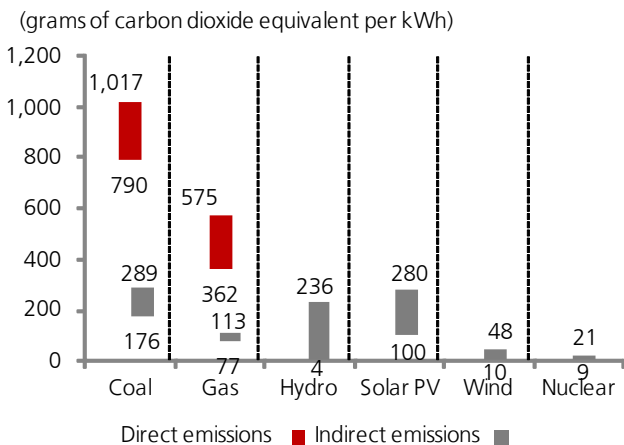
CGN Power

directly emit sulfur dioxide, nitrogen oxide or greenhouse gases. According to "Notice on the Measures for Energy Conserving Electricity Dispatch issued by NDRC and other departments and circulated by the General Office of the State Council", electricity generated using nuclear power is entitled to grid dispatch priority over electricity generated using fossil fuel.

Unlike renewable energies like wind and solar whose supply are impacted by weather and seasonality, nuclear power stations provide base-load power sources to meet twenty-four hours per day, seven days per week demand.

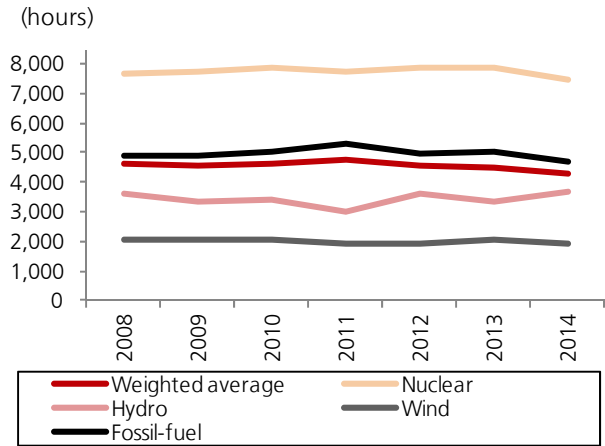
Thus, we deem nuclear power to be most efficient, low-carbon utility source with reduced greenhouse gas emissions for China to develop.

Nuclear industry: Range of greenhouse gas emissions of different electricity generation types



Source: International Atomic Energy Agency, DBS Vickers

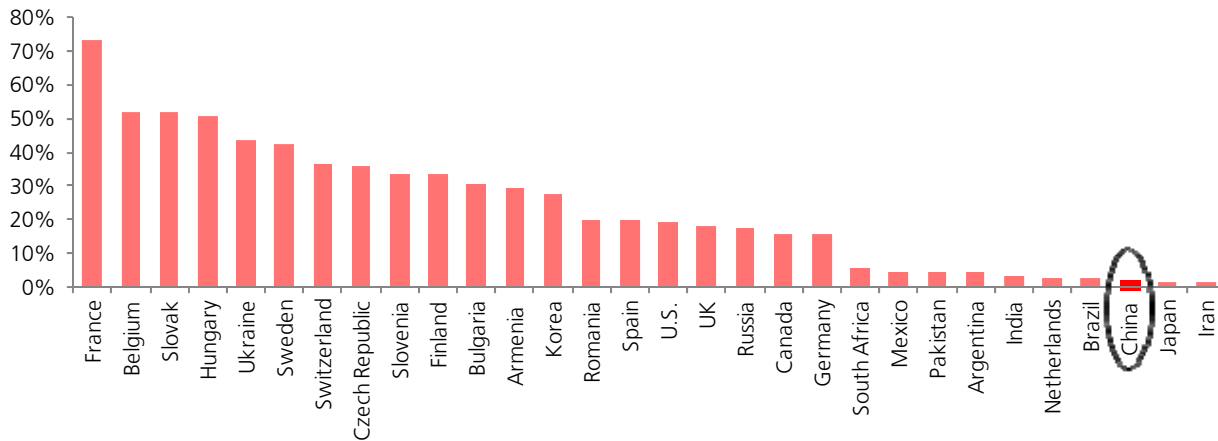
China nuclear power industry: Average number of hours of various types of energy generating units*



Source: China Electricity Council, DBS Vickers

Note: *denotes the energy generating units with a minimum capacity of 6,000 kW

Low penetration of nuclear power in China. According to data from IAEA (International Atomic Energy Agency), nuclear generation accounted for 11.3% of total global generation in 2013; nuclear power generation accounted for more than 20% of total generation in 13 countries, and 73.3% of power generation in France. In comparison, China's nuclear power generation only accounted for 2.0% of total generation in 2014, according to statistics from China Electricity Council.

Nuclear industry: Nuclear power % of total power supply in 2014

Source: World Nuclear Association, DBS Vickers

China's growing presence in global nuclear industry. As of end-FY14, China had 22 nuclear power units out of the world's 437 units in operation. There were 71 nuclear power units under construction over FY14, of which China accounted for 27 units. In 2014, the world saw the commencement of commercial operation of five nuclear power units, which were all from China, including Fangjiangshan Unit 1 & Fuqing Unit 1 owned by CNNP (China National Nuclear Producer), and Yangjiang Unit 1, Ningde Unit 2, Hongyanhe Unit 2 owned by CGN Power.

In the U.S, the government unveiled "The all-of-the above energy strategy as a path to sustainable economic growth" which makes a strong commitment to support nuclear power development given its low-carbon emission contribution. Currently, there are five nuclear power units under construction in the United States, of which four employ GIII Tech AP1000 and one employs GII+ Tech.

In EU, countries in East Europe which used to rely heavily on coal-fired utilities, such as Poland, Hungary, Czech Republic and Romania, are developing their own nuclear power industries to meet the requirement of Euro's FY30 energy development target.

In UK, the government will be leveraging on the development of nuclear power in response to the declining oil output of UK North Sea. The construction of a nuclear power plant at Hinkley Point C (HPC), initiated by the UK and French governments, has been approved by the EU.

Global nuclear power industry: Top 10 countries with the largest nuclear generating capacity under construction as of end-1H14

Country	Number of nuclear power units under construction	Equivalent total installed capacity (GW)	Installed capacity % total
China	28	30,748	41%
Russia	10	9,066	12%
Korea	5	6,600	9%
United States	5	6,218	8%
India	6	4,300	6%
United Arab Emirates	2	2,800	4%
Japan	2	2,756	4%
Taiwan	2	2,700	4%
Ukraine	2	2,000	3%
Finland	1	1,720	2%
Rest of the world	8	5,845	8%
World Total	71	74,753	100%

Source: International Atomic Energy Agency, China Nuclear Energy Association, DBS Vickers

China prepares to ship nuclear exports overseas. Chinese nuclear power companies are participating in nuclear power projects construction overseas, by virtue of foreign direct investment (through financing from the Chinese government) and China's nuclear power technology exports.

For instance, In June 2014, CGNPC (the parent of CGN) announced its partnership with EDF (Electricity of France) to

CGN Power

develop the HPC project in UK Somerset. In Oct 2014, CGNPC was selected as the lead investor of Cernavoda Units 3 & 4 projects in Romania. In June 2015, CGNPC signed joint statement on civil nuclear energy cooperation with French nuclear companies EDF and Areva to co-support and participate in Sizewell C Project in UK Suffolk County and promote the application of Hualong One Technology (HRP 1000).

China owns the complete intellectual property rights of Hualong One, a GIII nuclear power Tech jointly developed by

the CGN Group and CNNC. The Tech will further pave the way for China's nuclear power industry to go global. According to Xing Ji, chief designer of Huanglong One nuclear reactor, CNNC is negotiating for projects in Saudi Arabia, South Africa, Singapore and Sudan, all of which are interested in Hualong One Tech. CGNPC is also negotiating to exports of Chinese nuclear Tech to South Africa, Romania, Turkey, Czech Republic and Poland.

China nuclear power industry: Government policies

Date	Policies
Nov-14	The State Council unveiled "Energy Development Strategy Action Plan 2014-2020", which pledges to modernise the country's structure. The action plan targets China's installed nuclear capacity will reach 58 GW and those under construction will top 30 GW by 2020.
Jun-14	Chinese president Xi Jinping re-emphasised the importance of construction of nuclear power stations in the eastern coastal areas during the 6th Central Finance and Economy Leadership group meeting.
May-14	The NDRC promulgated the "Guiding Opinion on Strengthening and Improving the Adjustment and Management of Power Generation Operation" which reiterated the priority on grid connection should first be given to renewable energies, including hydro, nuclear, co-generation units and comprehensive resource utilisation power generation units, and various levels of government authorities should actively promote the replacement of coal-fired power generating units with clean energy generating units.
Apr-14	Chinese premier Li Keqiang presided over the opening of the first meeting of the new session of the National Energy Commission and expressed the government's intention to construct new nuclear power stations in coastal regions applying the highest international safety standards.
Mar-14	PRC government's 2014 work report indicated that China would commence work on a number of additional nuclear power projects.
Aug-07	The State Electricity Regulatory Commission published the "Notice on the Measures for Energy Conserving Electricity Dispatch issued by the NDRC and other departments and circulated by the General Office of the State Council". Pursuant to the notice, nuclear power's dispatch priority ranks behind renewable energy such as wind, solar, hydropower, but generally ahead of electricity generated using fossil fuels.

Source: Company, DBS Vickers

China power industry

China's power consumption in 2014 increased by 3.8% y-o-y to 5,523 TWh, mainly driven by power consumption growth in the secondary industry (+3.8%) and tertiary industry (+6.2%). China's power generation over 2014 rose 5.1% to 5,432 TWh, attributing to 77%/17%/2%/3% of thermal (incl. gas)/hydro/nuclear/wind power respectively. This is mainly driven by power generation growth in Hydropower (+24.6%), wind power (+11.6%) and nuclear power (+8.7%).

The "Energy Development Strategy Action Plan (2014-2020)" stated a cap set on annual primary energy consumption at 4.8 billion tones of the standard coal equivalent until 2020.

This implies annual growth of primary energy consumption should not exceed 3.5% for the next five years.

Traditionally, coal has constituted the main energy source in China, accounting for 75% of the country's primary energy consumption in 2009. China's substantial reliance on coal leads to severe pollution. As a result, Chinese government has been diversifying modes of power generation by encouraging the development of nuclear, wind and solar utilities. Resultant power generation proportion of thermal coal decreased gradually to 63% in 2014 and we foresee the proportion could further decline to 54% in 2020 (Refer 'China Power Industry: China power capacity breakdown' chart for our detailed estimates).

China power industry: China power capacity and demand forecasts

	2007	2008	2009	2010	2011	2012	2013	2014	2015F	2020F**
China power capacity (GW):										
Thermal coal	536	581	631	684	732	781	815	854	883	1,030
% y-o-y		8%	9%	8%	7%	7%	4%	5%	3%	3%
% total power	75%	73%	72%	71%	69%	68%	65%	63%	60%	55%
Gas	18	20	21	26	33	38	47	62	67	96
% y-o-y		11%	5%	24%	27%	15%	24%	32%	8%	8%
% total power	3%	3%	2%	3%	3%	3%	4%	5%	5%	5%
Hydro	145	172	197	216	231	249	280	302	320	360
% y-o-y		18%	15%	10%	7%	8%	13%	8%	6%	2%
% total power	20%	22%	23%	22%	22%	22%	22%	22%	22%	19%
Nuclear	9	9	9	11	13	13	15	20	29	58
% y-o-y		0%	3%	19%	16%	0%	16%	36%	44%	15%
% total power	1%	1%	1%	1%	1%	1%	1%	1%	2%	3%
Wind	4	9	16	30	45	61	75	96	110	200
% y-o-y		122%	80%	83%	52%	35%	24%	27%	15%	13%
% total power	1%	1%	2%	3%	4%	5%	6%	7%	8%	11%
Others*	1	2	0	0	2	3	15	27	51	126
Total	713	793	874	966	1,056	1,145	1,247	1,360	1,460	1,870
% y-o-y		11%	10%	11%	9%	8%	9%	9%	7%	5%
China power consumption (TWh)	3,257	3,427	3,660	4,200	4,703	4,966	5,322	5,523	5,740	7,119
% y-o-y		5%	7%	15%	12%	6%	7%	4%	4%	4%

Source: World Nuclear Association, DBS Vickers

Note: *Others incl. solar, biomass and other, ** % y-o-y for 2020F denotes 5-year CAGR during 2015-2020F

Investment Risks

Business risks:

i) Power tariff risk. On 15 June 2013, NDRC set a national nuclear benchmark on-grid tariff of Rmb0.430/kWh (incl.VAT) for nuclear power generating units commencing after 1 Jan 2013. The tariff of Chinese nuclear power units based on this benchmark could be adjusted as per local coal power tariff. CGN Power's associate/JV namely Ningde Power Station and Hongyanhe Power Station, are exposed to Fujian and Liaoning. In Apr 2015, coal power tariff was cut to Rmb0.407/kWh (incl.VAT) in Fujian and Rmb0.386/kWh (incl.VAT) in Liaoning. In 2014, power demand in Fujian increased by 9.2% y-o-y vs industry's average growth of 3.8%, indicating better economic activities over the country's average. Thus, we believe the power tariff risk for Ningde Power Station is quite limited. In 2014, power demand in Liaoning inched up 1.5% which is lower than the industry's average. In foreseeable future, we expect power consumption in Liaoning to be supported by incremental demand from cross-regional UHV (ultra high voltage) lines such as Liaoning-to-North China power transmission line, Xilingol League-to-Shandong power transmission line and Xilingol League-to-Jiangsu power transmission line. These will help power exports of Liaoning province. Thus, we believe the power tariff risk for Ningde Power Station is also quite low.

Our base-case scenario for Taishan's electricity tariff is Rmb0.43/kWh (incl.VAT). Based on Taishan's high per unit capital expenditure of Rmb20,909/kW, we think Taishan's actual electricity tariff is likely to reach Rmb0.51/kWh (incl.VAT) allowing for a reasonable IRR, taking into consideration the central government's encouragement the employment of GIII reactor Tech. If Taishan's electricity tariff sets at Rmb0.51/kWh (incl.VAT) instead of Rmb0.43/kWh (incl.VAT), it could positively swing FY16F earnings by 16%.

ii) Utilisation hours risk. Load factor is the actual power generation as a percentage of rated generating capacity in a

specific time. The load factor is impacted by capacity factor (reflecting the company's outage repairs plan) and power demand as well.

In FY14, the capacity factor and load factor of the company's JV Hongyanhe Power station was 71.48% and 67.17% respectively. We think this was mainly due to weaker power consumption in winter season as local grid companies usually give priority to steam-electricity cogeneration companies which provide heat supply during chilly weather. Premised on expectation that the commencement of UHV lines connecting Liaoning and Shandong will help uplift provincial power consumption, we see the company's utilisation hours in Liaoning in the following years will remain stable y-o-y. Thus, we deem the utilisation risk to be moderate.

Execution risk. Normally, it takes around 52-76 month to complete the construction of a GW-level capacity. CGN Power has a proven track record of strong execution of nuclear power plant construction. We estimate CGN Power's construction period of GW-level capacity is normally between 55-60 months. Nevertheless, sometimes, the facility anomalies could swing the commencement date of commercial operation. For instance, Ningde Unit 1 found anomalies in part of the components after its first-time outage in Apr 2014, and the company shut the capacity down and replaced the components and restarted the operation in 2H14. We deem equipment-related issues (incl. delivery delays, increase in procurement cost and quality problem), and unexpected engineering & design challenges will lead to the budget overrun of a nuclear power project.

Force majeure. Major accidents at nuclear power generation facilities in any country or region, like the 2011 incident in Fukushima Japan may lead authorities to substantially tighten nuclear power station operating requirements to cease the construction or commencement of operations of new nuclear power stations.

CGN Power: Key Management Team

Name	Age	Current appointment	Experience
Mr. Zhang Shanming	50	Chairman and Non-executive Director	Mr. Zhang Shanming (張善明), aged 50, is the Chairman of the Board and a non-executive Director of CGN Power, and is also a member of the Nomination Committee. He was appointed as the company's Chairman and non-executive Director on March 24, 2014. Mr. Zhang has more than 30 years of experience in the nuclear power industry. He served as the chairman of the board of directors of China Nuclear Power Engineering Co., Ltd. from February 2006 to June 2008, as the chairman of the board of directors of China Nuclear Power Technology Research Institute from May 2008 to June 2011, and as the chairman of the board of directors of Daya Bay Nuclear Power Operations and Management Co., Ltd. from February 2009 to June 2011. He has been the general manager of China General Nuclear Power Corporation since August 23, 2010 up to now. Mr. Zhang obtained a bachelor of engineering degree in thermal power of power station from Zhejiang University in July 1984, a master of business administration degree from Shanghai Jiao Tong University in July 2002, and a doctor of economics degree in finance from Wuhan University in June 2012. Mr. Zhang attended training on operations management and safety supervision in EDF (Electricity of France) in France and in General Electric (UK) from April 1989 to December 1990. Mr. Zhang is entitled to special allowance of the State Council. He won WANO Nuclear Excellence Award in May 2013 and was recognized as a National Outstanding Entrepreneur in May 2014. Mr. Zhang was accredited as a professorship-level senior engineer by CGNPC in December 2001.
Mr. Gao Ligang	49	ED, President	Mr. Gao Ligang (高立剛), aged 49, is the executive Director and President of CGN Power. He was appointed as the company's ED and President on March 24, 2014. Mr. Gao has more than 26 years of experience in the nuclear power industry. He worked successively as the chairman of the board of directors and general manager at Yangjiang Nuclear Power Co., Ltd. from December 2007 to October 2013. He also served as general manager at Guangdong Taishan Nuclear Co., Ltd. (now known as Taishan Nuclear Power Joint Venture Co., Ltd.) from December 2007 to October 2011, and has been the chairman of the board of directors of Taishan Nuclear since December 2007 up to now. Mr. Gao also served as the deputy general manager of CGNPC from April 2011 to March 2014. 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 in January 1988. Mr. Gao is entitled to special allowance of the State Council. Mr. Gao was accredited as a professorship-level senior engineer by CGNPC in December 2001.
Mr. Yue Linkang	59	CFO	Mr. Yue Linkang (岳林康), aged 59, is the CFO of CGN Power. He was appointed as the company's CFO on March 24, 2014. Mr. Yue worked successively as deputy chief accountant, chief accountant and chief economist at CGNPC from January 2003 to May 2014. Mr. Yue graduated from Tsinghua University with a bachelor of engineering degree in reactors in July 1982 and obtained a master of engineering degree in industrial management engineering from Tsinghua University in December 1984. Mr. Yue has been serving as the executive councilor of the seventh council of the Shenzhen Accounting Association since December 2008 up to now and as deputy chairman of experts panel of nuclear energy branch under China Electric Power Development Promotion Commission since August 2014 up to now. Mr. Yue was accredited as senior economist and senior accountant by CNNC (China National Nuclear Corporation) and the third Assessment Committee of Senior Accountant Qualification of Guangdong Province in September 1994 and December 2002, respectively.
Mr. Shu Guogang	50	VP	Mr. Shu Guogang (束國剛), aged 50, is the VP of CGN Power and the general manager of the nuclear engineering unit. He was appointed as the company's VP on March 24, 2014. Mr. Shu worked as general manager at CNPRI from August 2007 to June 2008. He has also been the general manager of the CGN Engineering since September 2008 up to now. Mr. Shu graduated from University of Science and Technology Beijing (formerly known as Beijing Iron and Steel Institute) with a bachelor of engineering degree in metallic materials in July 1984 and a master of engineering degree in metallic materials and heat treatment in December 1987 and a doctor of engineering degree in high voltage and insulation technology from Wuhan University in June 2004. Mr. Shu was accredited as a researcher-level senior engineer by the Ministry of Electric Power Industry in May 1999.

Source: Company, DBS Vickers

CGN Power: Key Management Team (continued)

Name	Age	Current appointment	Experience
Mr. Su Shengbing	52	VP	Mr. Su Shengbing (蘇聖兵), aged 52, is the VP of CGN Power and the general manager of the nuclear operation unit. He was appointed as the company's VP on March 24, 2014. Mr. Su served as deputy general manager at Liaoning Hongyanhe Nuclear Power Co., Ltd. from August 2006 to May 2010, as deputy director of the general office and director of the research center at CGNPC from May 2010 to June 2011, and as deputy general manager at GNIC from June 2011 to September 2012. Mr. Su has been the general manager of China Nuclear Power Operations Co., Ltd. since September 2012 up to now. Mr. Su graduated from Xi'an Jiao Tong University with a bachelor of engineering degree in nuclear reactor engineering in July 1982 and a master of engineering degree in industrial engineering from Huazhong University of Science and Technology in June 2008. Mr. Su was accredited as a researcher-
Mr. Fang Chunfa	45	Board secretary	Mr. Fang Chunfa (方春法), aged 45, is the Board Secretary and general manager of the investor relations department. He was appointed as the company's Board Secretary on March 24, 2014 and our Company Secretary on April 15, 2014. Mr. Fang worked successively as secretary to the board, deputy branch manager, branch manager, assistant of manager, deputy manager of the administration department, deputy manager and manager of the strategic & business department at DNMC from March 2003 to August 2011, and as the director of the research center of CGNPC from August 2011 to May 2014. Mr. Fang graduated from Beijing Foreign Studies Institute with major in English language in July 1989, and obtained a master of business administration degree from Huazhong University of Science and Technology in June 2009. Mr. Fang was accredited as a senior engineer by CGNPC in December 2003.

Source: Company, DBS Vickers

Appendix II: Daya Bay Power Station Outlay

CGN Power: Daya Bay Power Station outlay 1-2



Source: Company, DBS Vickers

CGN Power: Daya Bay Power Station outlay 2-2



Source: Company, DBS Vickers

Key Assumptions

FY Dec	2012A	2013A	2014A	2015F	2016F	2017F
Power generation (GWh)	45,113	44,157	52,176	57,424	68,001	90,757
Average electricity tariff (Rmb/kWh)	0.366	0.368	0.370	0.371	0.372	0.372
Unit COGS (Rmb/kWh)	0.203	0.203	0.205	0.204	0.205	0.205
Unit fuel cost (Rmb/kWh)	0.062	0.060	0.059	0.060	0.060	0.060

Sensitivity Analysis

	2015F
Average electricity tariff +/- 1%	NP +/- 2.6%
Utilisation hours +/- 1%	NP +/- 1.3%
Finance cost +/- 1%	NP +/-11.5%

Segmental Breakdown (RMB m)

FY Dec	2013A	2014A	2015F	2016F	2017F
Revenues (RMB m)					
Sales of electricity	16,268	19,327	21,291	25,267	33,733
Service revenue	843	1,214	1,337	1,587	2,119
Sales of other goods	254	252	278	329	440
Total	17,365	20,793	22,906	27,184	36,292

Source: Company, DBS Vickers

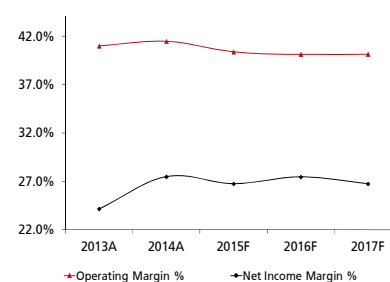
CGN Power

Income Statement (RMB m)

FY Dec	2012A	2013A	2014A	2015F	2016F	2017F
Revenue	17,575	17,365	20,793	22,906	27,184	36,292
Cost of Goods Sold	(9,405)	(9,217)	(10,703)	(12,040)	(14,360)	(19,165)
Gross Profit	8,170	8,148	10,090	10,866	12,824	17,126
Other Opg (Exp)/Inc	(921)	(1,031)	(1,469)	(1,618)	(1,920)	(2,563)
Operating Profit	7,249	7,117	8,621	9,248	10,904	14,563
Other Non Opg (Exp)/Inc	1,721	1,448	1,898	1,675	1,958	2,559
Associates & JV Inc	(9)	292	461	705	960	1,214
Net Interest (Exp)/Inc	(3,094)	(2,788)	(3,181)	(3,175)	(3,332)	(4,691)
Dividend Income	0	0	0	0	0	0
Exceptional Gain/(Loss)	0	0	0	0	0	0
Pre-tax Profit	5,868	6,070	7,800	8,453	10,489	13,645
Tax	(890)	(998)	(925)	(1,082)	(1,510)	(1,965)
Minority Interest	(833)	(877)	(1,162)	(1,246)	(1,518)	(1,975)
Preference Dividend	0	0	0	0	0	0
Net Profit	4,145	4,195	5,713	6,125	7,461	9,705
Net Profit before Except.	4,145	4,195	5,713	6,125	7,461	9,705
EBITDA	11,666	11,348	13,920	15,366	18,261	23,479
Growth						
Revenue Gth (%)	10.7	(1.2)	19.7	10.2	18.7	33.5
EBITDA Gth (%)	5.7	(2.7)	22.7	10.4	18.8	28.6
Opg Profit Gth (%)	5.7	(1.8)	21.1	7.3	17.9	33.6
Net Profit Gth (%)	(12.3)	1.2	36.2	7.2	21.8	30.1
Margins & Ratio						
Gross Margins (%)	46.5	46.9	48.5	47.4	47.2	47.2
Opg Profit Margin (%)	41.2	41.0	41.5	40.4	40.1	40.1
Net Profit Margin (%)	23.6	24.2	27.5	26.7	27.4	26.7
ROAE (%)	24.6	21.3	15.5	11.5	12.8	14.9
ROA (%)	3.5	3.4	4.0	3.6	3.9	4.4
ROCE (%)	6.5	5.4	5.9	5.2	5.2	6.1
Div Payout Ratio (%)	237.5	39.4	2.0	30.0	30.0	30.0
Net Interest Cover (x)	2.3	2.6	2.7	2.9	3.3	3.1

Source: Company, DBS Vickers

Margins Trend



Interim Income Statement (RMB m)

FY Dec	1H2013	2H2013	1H2014	2H2014
Revenue	8,171	9,194	9,754	11,039
Cost of Goods Sold	(4,095)	(5,122)	(4,617)	(6,086)
Gross Profit	4,076	4,072	5,137	4,953
Other Oper. (Exp)/Inc	(448)	(583)	(586)	(883)
Operating Profit	3,628	3,489	4,551	4,070
Other Non Opg (Exp)/Inc	1,339	109	768	1,130
Associates & JV Inc	118	174	(194)	655
Net Interest (Exp)/Inc	(1,406)	(1,382)	(1,499)	(1,682)
Exceptional Gain/(Loss)	0	0	0	0
Pre-tax Profit	3,679	2,391	3,626	4,174
Tax	(532)	(467)	(537)	(388)
Minority Interest	(495)	(382)	(518)	(644)
Net Profit	2,653	1,542	2,572	3,141
Net profit bef Except.	2,653	1,542	2,572	3,141

Growth

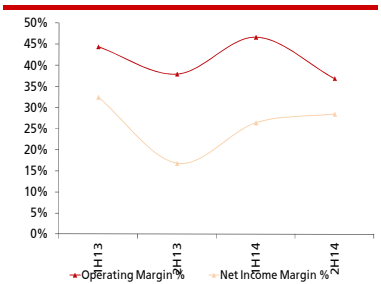
Revenue Gth (%)	N/A	N/A	19.4	20.1
Opg Profit Gth (%)	N/A	N/A	25.4	16.7
Net Profit Gth (%)	N/A	N/A	(3.1)	103.7

Margins

Gross Margins (%)	49.9	44.3	52.7	44.9
Opg Profit Margins (%)	44.4	37.9	46.7	36.9
Net Profit Margins (%)	32.5	16.8	26.4	28.5

Source: Company, DBS Vickers

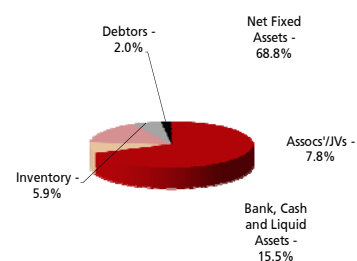
Margins Trend



CGN Power**Balance Sheet (RMB m)**

FY Dec	2012A	2013A	2014A	2015F	2016F	2017F
Net Fixed Assets	79,185	87,042	93,983	116,456	133,131	149,206
Invt in Associates & JVs	9,197	11,093	11,893	13,243	19,195	31,942
Other LT Assets	6,786	7,779	8,900	7,000	7,430	7,855
Cash & ST Invt	5,434	6,640	26,712	26,233	30,530	26,041
Inventory	7,514	8,384	9,337	9,967	10,770	11,116
Debtors	3,012	2,772	3,220	3,415	4,037	4,718
Other Current Assets	11,136	3,964	2,881	2,800	2,800	2,800
Total Assets	122,263	127,675	156,926	179,115	207,892	233,677
ST Debt	23,589	13,098	10,871	13,576	13,576	13,576
Creditors	11,183	10,350	6,166	6,983	7,898	8,624
Other Current Liab	5,115	3,015	6,523	6,797	7,299	7,774
LT Debt	49,802	60,721	68,200	75,499	89,503	93,507
Other LT Liabilities	8,424	8,800	5,751	12,084	19,654	32,720
Shareholder's Equity	24,150	23,052	50,789	55,498	61,235	68,698
Minority Interests	0	8,640	8,628	8,678	8,728	8,778
Total Cap. & Liab.	122,263	127,675	156,926	179,115	207,892	233,677
Non-Cash Wkg. Capital	5,363	1,756	2,749	2,402	2,409	2,235
Net Cash/(Debt)	(67,957)	(67,179)	(52,358)	(62,841)	(72,548)	(81,041)
Debtors Turn (avg days)	58.8	60.8	52.6	52.9	50.0	44.0
Creditors Turn (avg days)	533.3	584.2	388.2	289.1	273.8	215.0
Inventory Turn (avg days)	409.8	431.3	416.6	424.4	381.5	284.9
Asset Turnover (x)	0.1	0.1	0.1	0.1	0.1	0.2
Current Ratio (x)	0.7	0.8	1.8	1.6	1.7	1.5
Quick Ratio (x)	0.2	0.4	1.3	1.1	1.2	1.0
Net Debt/Equity (X)	2.8	2.1	0.9	1.0	1.0	1.0
Net Debt/Equity ex MI (X)	2.8	2.9	1.0	1.1	1.2	1.2
Capex to Debt (%)	10.6	13.5	15.6	31.4	24.3	23.3
Z-Score (X)	NA	NA	NA	NA	NA	NA

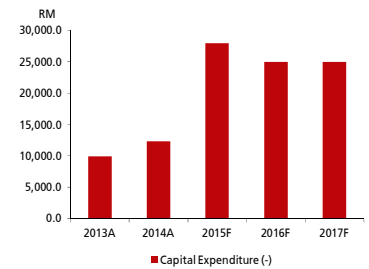
Source: Company, DBS Vickers

Asset Breakdown

Cash Flow Statement (RMB m)

FY Dec	2012A	2013A	2014A	2015F	2016F	2017F
Pre-Tax Profit	5,868	6,070	7,800	8,453	10,489	13,645
Dep. & Amort.	2,704	2,832	2,939	3,738	4,439	5,143
Tax Paid	(726)	(580)	(742)	(1,082)	(1,510)	(1,965)
Assoc. & JV Inc/(loss)	9	(292)	(461)	(705)	(960)	(1,214)
(Pft)/ Loss on disposal of FAs	(408)	39	(116)	25	25	25
Chg in Wkg.Cap.	(2,561)	(1,163)	(2,197)	(863)	(1,603)	(1,541)
Other Operating CF	3,774	2,588	3,733	4,054	4,549	6,191
Net Operating CF	8,660	9,493	10,955	13,620	15,429	20,284
Capital Exp.(net)	(7,805)	(9,932)	(12,301)	(28,000)	(25,000)	(25,000)
Other Invts.(net)	0	0	0	0	0	0
Invts in Assoc. & JV	(1,754)	(1,626)	(627)	(1,761)	(3,391)	(5,501)
Div from Assoc & JV	0	22	289	288	288	288
Other Investing CF	(5,420)	7,055	1,297	3,371	1,032	1,042
Net Investing CF	(14,979)	(4,482)	(11,343)	(26,101)	(27,071)	(29,171)
Div Paid	(9,843)	(1,655)	(5,247)	(1,838)	(2,238)	(2,912)
Chg in Gross Debt	20,554	428	2,168	10,004	14,004	4,004
Capital Issues	2,823	1,832	31,727	10,500	11,000	11,500
Other Financing CF	(12,233)	(4,541)	(8,174)	(6,650)	(6,812)	(8,180)
Net Financing CF	1,301	(3,937)	20,474	12,016	15,954	4,412
Currency Adjustments	0	0	0	0	0	0
Chg in Cash	(5,018)	1,075	20,086	(465)	4,311	(4,475)
Opg CFPS (RMB)	0.45	0.39	0.39	0.33	0.39	0.50
Free CFPS (RMB)	0.03	(0.02)	(0.04)	(0.33)	(0.22)	(0.11)

Capital Expenditure



Source: Company, DBS Vickers

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STRONG BUY (>20% total return over the next 3 months, with identifiable share price catalysts within this time frame)

BUY (>15% total return over the next 12 months for small caps, >10% for large caps)

HOLD (-10% to +15% total return over the next 12 months for small caps, -10% to +10% for large caps)

FULLY VALUED (negative total return i.e. > -10% over the next 12 months)

SELL (negative total return of > -20% over the next 3 months, with identifiable catalysts within this time frame)

Share price appreciation + dividends

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