



*China Nuclear Energy International
Development Alliance (CNEIDA)*

Nuclear Power Equipment Manufacturing and Localization in China

**Sao Paulo, Brazil
Oct, 2015**



Nuclear equipment manufacturing capacity and achievement

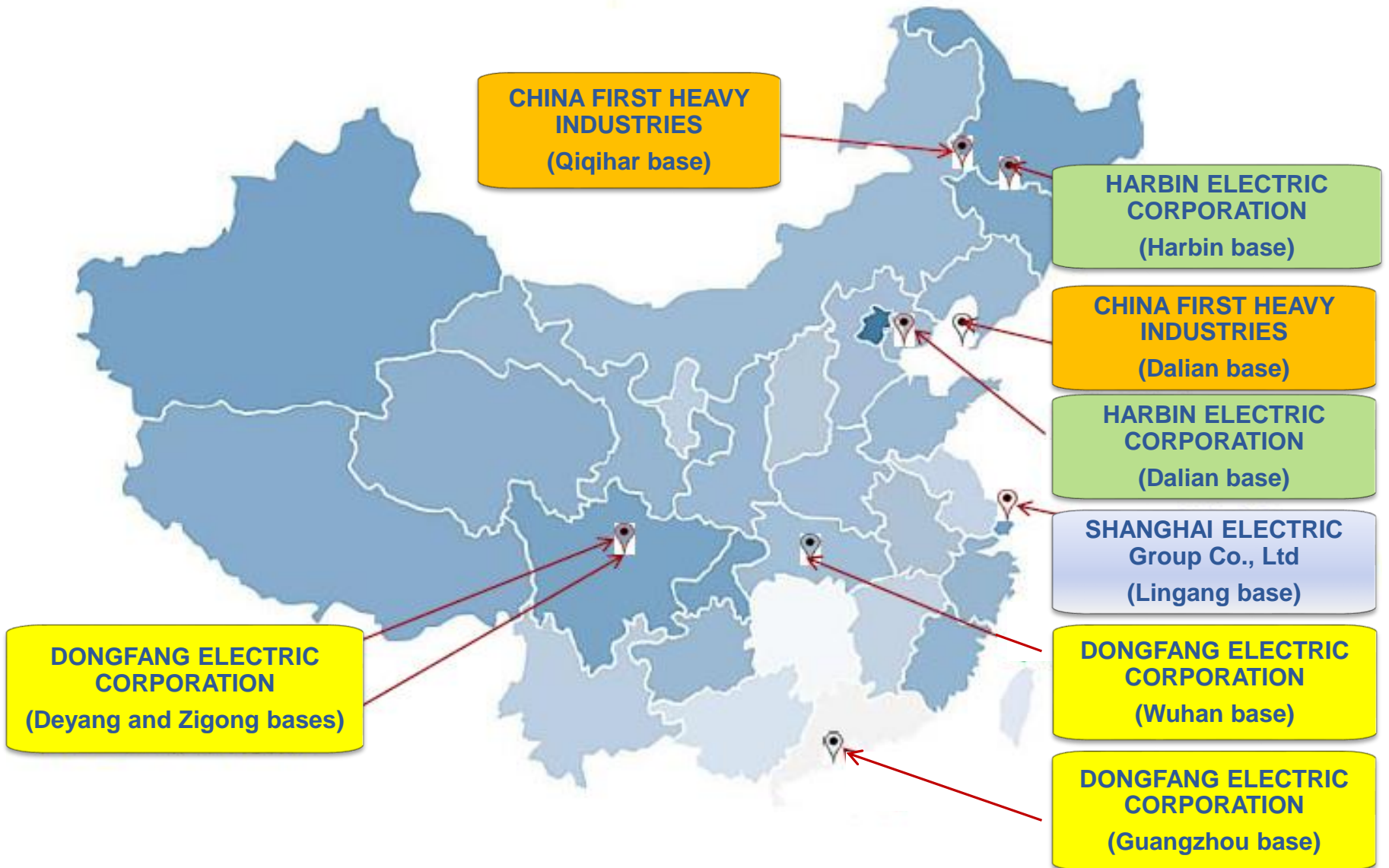
- (I) Proven nuclear equipment manufacturing capacity
- (II) Complete nuclear product industry chain
- (III) Supply experience for nuclear products under multiple technologies



DEC- An example of nuclear equipment supplier in China

- (I) DEC and it's nuclear power business
- (II) Localization and Innovation

(I) Proven NP manufacturing capacity



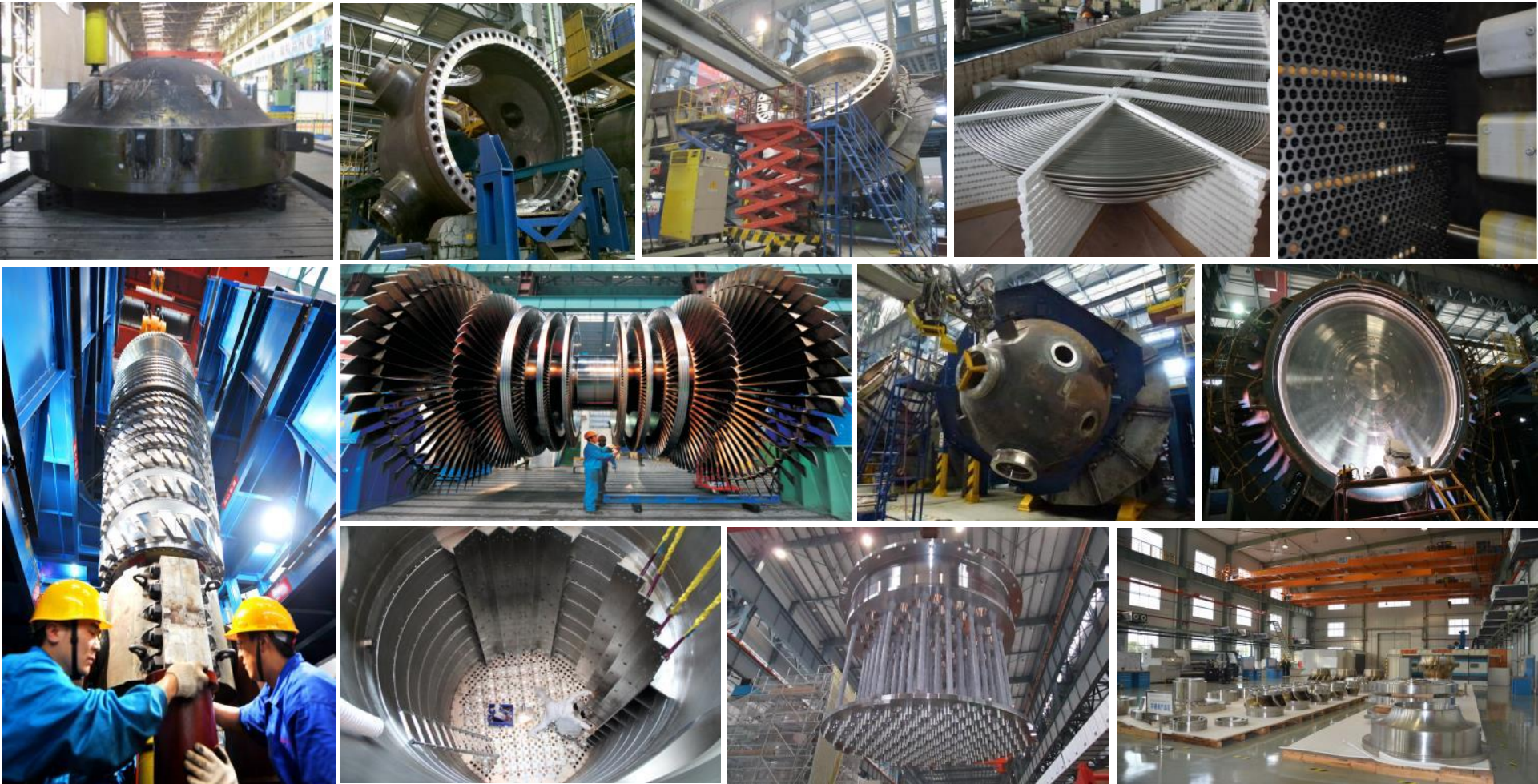
(I) Proven NP manufacturing capacity

Top-ranking hardware and facilities



(I) Proven NP manufacturing capacity

Advanced and Proven manufacturing technology and processing



(I) Proven NP manufacturing capacity

Sufficient manufacturing capacity

Production capacity per year	DEC (东电)	SEGC(上电)	HE (哈电)	CFHI (一重)
Reactor Pressure Vessel	4-6	4	-	5
Steam Generator	12-18	6	3.5	3
RC Pump	9-12	12	9	Pump case 6-8
Reactor Vessel Internals	6	10	-	1
Control Rod Drive Mechanism	4-6	10	-	-
Pressurizer	6-8	6	3.5	-
Turbine Generator Set Package	6-8	6	3	-

China has the capacity for supplying of complete sets of nuclear power equipment, above 8 sets per year.

(II) Complete nuclear product industry chain

Large casting and forging pipes and sheets	Equipment such as valve for NI pump	Heavy equipment in NI	Equipment in CI	Auxiliary equipment
CFHI 一重 SINOMACH 国机集团 SEGC 上海电气 BAOSTEEL 中国宝钢 JIULI 久立特材 THM 台海玛努尔 YINGLIU 安徽应流 TISCO 太钢 ANSTEEL 鞍钢	SHENGU 沈鼓 HE 哈尔滨电气 DEC 东方电气 CCNC SUFA 中核苏阀 SHENTONG 江苏神通 KAIQUAN 上海凯泉 Shanghai APOLLO -上海阿波罗	DEC 东方电气 SEC 上海电气 HE 哈尔滨电气 CFHI 一重 SINOMACH 国机集团 BSHI 渤船重工 HLHI 海陆重工 Shanghai Morimatsu -上海森松	DEC 东方电气 SEC 上海电气 HE 哈尔滨电气	TYHI 太原重工 DBNE 大连宝原 SHANGSHANG 上上电缆 SANY 三一重工

China has the complete industry chains for nuclear power equipment.

The Large casting and forging, U-tube for SG, welding material, sealing elements, as well as the all the heavy equipment, TGP can be supplied in China.

(III) NP Supply experience

Project	Units	Reactor Type	Notes
Daya Base NPP	2	M310	<ul style="list-style-type: none"> ● Till the end of August 2015, 27 units in China mainland were put into operation and 24 units under construction.
Ling Ao NPP	2	M310	
	2	CPR1000	
Hong Yanhe NPP	3	CPR1000	
Ning De NPP	3	CPR1000	<ul style="list-style-type: none"> ● Among 27 units in operation, the crucial main equipment for 20 units were supplied in China.
Yangjiang NPP	2	CPR1000	
Qinshan NPP	1	CNP300	
	2	M310	
Qinshan 2 nd NPP	4	CNP600	<ul style="list-style-type: none"> ● Since 1994, the nuclear equipment manufactured in China run stable and safe
Qinshan 3 rd NPP	2	CANDU-6	
Tianwan NPP	2	AES-91	
Fuqing NPP	2	M310	



Nuclear equipment manufacturing capacity and achievement

- (I) Proven nuclear equipment manufacturing capacity
- (II) Complete nuclear product industry chain
- (III) Supply experience for nuclear products under multiple technologies



DEC- Leading nuclear equipment supplier in China

- (I) DEC and it's Nuclear Power Business
- (II) Localization and Innovation

(I) DEC and it's NP Business



Dongfang Electric Corporation (DEC), is a state owned enterprise group.



Main business:

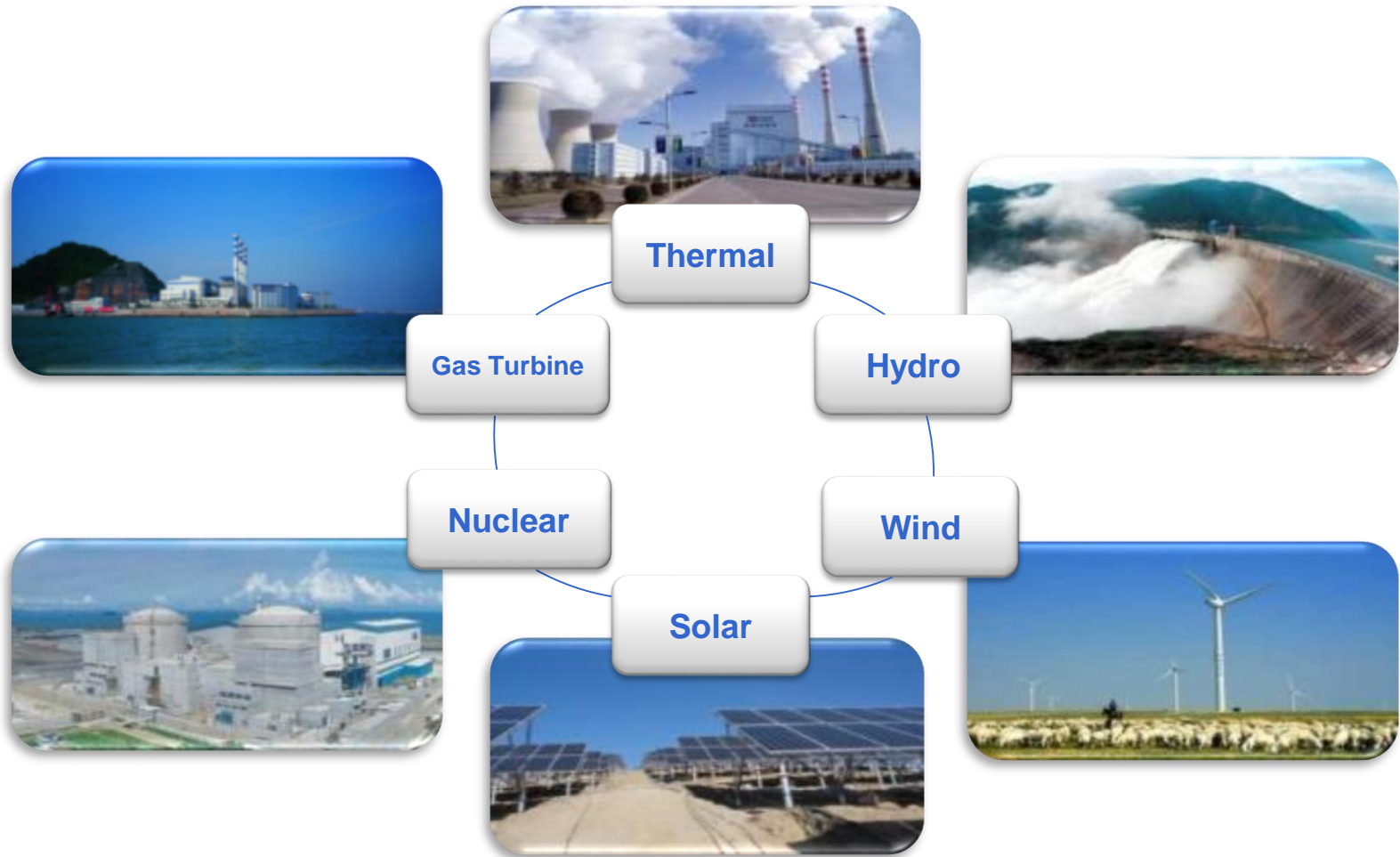
power equipment manufacturing and power projects contracting



Annual turnover: 6.5 billion US dollar in 2014, total employees over 28,000 , with the headquarter located in Chengdu

(I) DEC and it's NP Business

Product Structure: Multi-Power



(I) DEC and it's NP Business

A special investment of over 1.3 Billion US dollar for nuclear business



(I) DEC and it's NP Business

List of DEC NP equipment manufacturing capacity and delivery

	Equipment	Capacity per year	Delivery
Nuclear Island	Reactor Pressure Vessel	4-6	6
	Steam Generator	12-18	39
	Reactor Vessel Internals	4	1
	Control Rod Drive Mechanism	4-6	1
	Reactor Coolant Pump	12-18	32
	Pressurizer	6-8	10
	Residual Heat Removal Heat Exchanger	6-8	2

(I) DEC and it's NP Business

List of DEC NP equipment manufacturing capacity and delivery

	Equipment	Capacity per year	Delivery
Conventional Island	Turbine	6-8	18
	Generator	6-8	18
	Moisture Separator Reheater	6-8	18

The Contracts in hand

□ NI main equipment

- ❖ SG 80 sets
- ❖ RPV 11 sets
- ❖ CRDM 3 sets
- ❖ RVI 3 sets
- ❖ RCP 69 sets
- ❖ PRZ 22 sets

Equipment	Generation II plus	AP1000	CAP1400	EPR	HRP1000
SG	54	10	2	2	12
RPV	7	3		1	
RVI	2	1			
CRDM	2	1			
PRZ	15	3	1	1	2
RCP	63				6

(I) DEC and it's NP Business

The Contracts in hand

□ TG packages in CI

No.	Reactor Type	Output Class	Projects	CI Equipment (set)
1	Generation II plus	1000MW	LingAo Phase 2	2
			Fuqing Phase 1	4
			Hongyanhe Phase 1	4
			Hongyanhe Phase 2	2
			Ningde Phase1	4
			Tianwan Unit 5&6	2
			Fangjiashan	2
2	HPR1000	1150MW	Fuqing Unit 5&6	2
3	AP1000	1250MW	Pengze Phase 1	2
			Xudapu Phase 1	2
4	CAP1400	1400MW	CAP1400	2
5	EPR	1750MW	Taishan Phase1	2
Total				30

(I) DEC and it's NP Business

Reference of TG in operation




Units in operation		Scope of supply of DEC
岭澳二期2台	2 units for LingAo Phase 2	汽轮发电机组 TG
红沿河一期3台	3 units for Hongyanhe Phase 1	汽轮发电机组 TG
宁德一期3台	3 units for Ningde Phase 1	汽轮发电机组 TG
阳江一期2台	2 units for Yangjiang Phase 1	/
福清一期2台	2 unit for Fuqing Phase 1	汽轮发电机组 TG
方家山2台	2 units for Fangjiashan	汽轮发电机组 TG

■ **There are 14 units in total, and 12 sets of TG among them were supplied by DEC.**

■ **The actual output of these units are all above the contract guarantee value.**

(I) DEC and it's NP Business

HPR1000 & CAP1400 Project

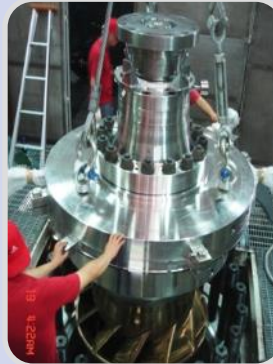
	Reactor Type	CI Equipment	NI Equipment
Fuqing 5,6#	HPR1000 	TGP(5#6#)	SG(6 sets) PRZ(2 sets) PRS-HE(2 sets)
Fangchenggang 3,4#	HPR1000 	-	SG(6 sets) RCP(6 sets) ACC(6 sets)
SNTPC PWR Demonstration Nuclear Power Station	CAP1400  国家电投	TGP(1#2#)	SG (2 sets) PRZ(1 set) PRHR-HX (1 set)

1) Starting from LingAo Phase I



- In 1996, DEC undertook parts of the manufacturing for some of the main equipment for LingAo Phase I.
 - SG, PRZ, ACC, BIT
 - TG Package

2) As contractor for NI and CI heavy equipment in LingAo Phase II



- In 2005, DEC led to form a consortium to undertake the supply contract for the primary loop package heavy equipment for LingAo Phase II.
- In 2005, DEC, as the main contractor, undertook the supply contract for TG package for LingAo Phase II.

3) EPR main equipment supplier



(II) Localization and Innovation in DEC

- 4) As contractor for NI and CI heavy equipment in batch projects, such as HYH1#-4#, ND1#-4#, FQ1#-4#, FJS1#-2#, TW 5#-6#



5) HPR1000 and CAP1400 main equipment supplier



Thank you !