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Brief Overview of Chinese NPP Development

Shanghai Nuclear Engineering Research and Design Institute

IAEA Workshop on Construction Technologies for NPPs
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Status of Chinese NPP Development （1）

- Sept. 22, 2009, Chinese President Hu Jintao declared in UN Climate Summit on:

➢ Develop actively reproducible and nuclear power；

➢ By the year 2020, the rate of non-fossil energy will reach as high as 15%；

➢ ……

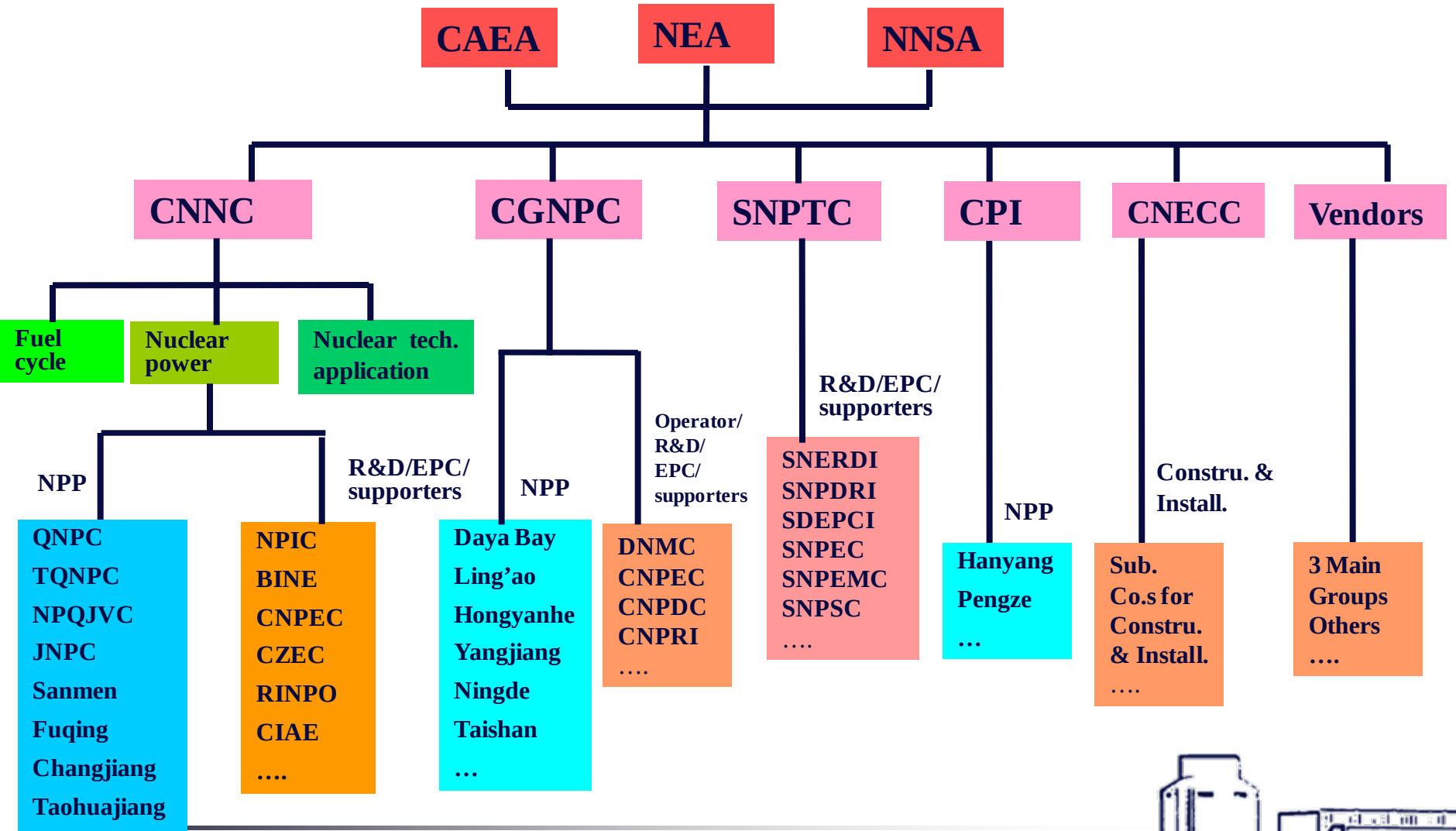
Status of Chinese NPP Development （2）

- China initiated nuclear power since 1970s
- The first NPP, Qinshan-I, a 300 MWe PWR unit independently designed by SNERDI, started operation in Dec. 1991.
- At present, China has totally 13 units in operation with total capacity about 10,740 MWe, 28 units under construction, many others under planning…
- By the year 2020, the total nuclear power capacity will reach to at least 75,000 MWe with another 45,000 MWe capacity under construction. It means more new units will be completed within this decade…
- Great potential need and challenge on ageing management and PLiM for Chinese NPPs in the future.

➢ 2020 second largest nuclear power capacity in the world (more than 80 units)

➢ 2030 largest nuclear power capacity in the world (more than 200 units)

Status of Chinese NPP development (3)



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List of Operational NPPs in China

NPP Name		Owner	Type	Nominal Power (MWe)	Construction Start Date	Date of First Connection to the Grid
Qinshan NPP (single unit)		CNNC	PWR	310	1985-03-21	1991-12-15
Daya Bay NPP	Unit1	CGNPC	PWR	984	1987-08-07	1993-08-31
	Unit2	CGNPC		984	1988-04-07	1994-02-07
Qinshan Phase II NPP	Unit1	CNNC	PWR	650	1996-06-02	2002-02-06
	Unit2	CNNC		650	1997-04-01	2004-03-11
	Unit3	CNNC		650	2006-03-28	2010-08-01
LingAo NPP	Unit1	CGNPC	PWR	990	1997-05-15	2002-02-26
	Unit2	CGNPC		990	1997-11-28	2002-09-14
	Unit3	CGNPC		990	2005-12-15	2010-07-15
Qinshan Phase III NPP	Unit1	CNNC	CANDU	720	1998-06-08	2002-11-19
	Unit2	CNNC		720	1998-09-25	2003-06-12
Tianwan NPP	Unit1	CNNC	WWER	1060	1999-09-20	2006-05-12
	Unit2	CNNC		1060	2000-09-20	2007-05-14

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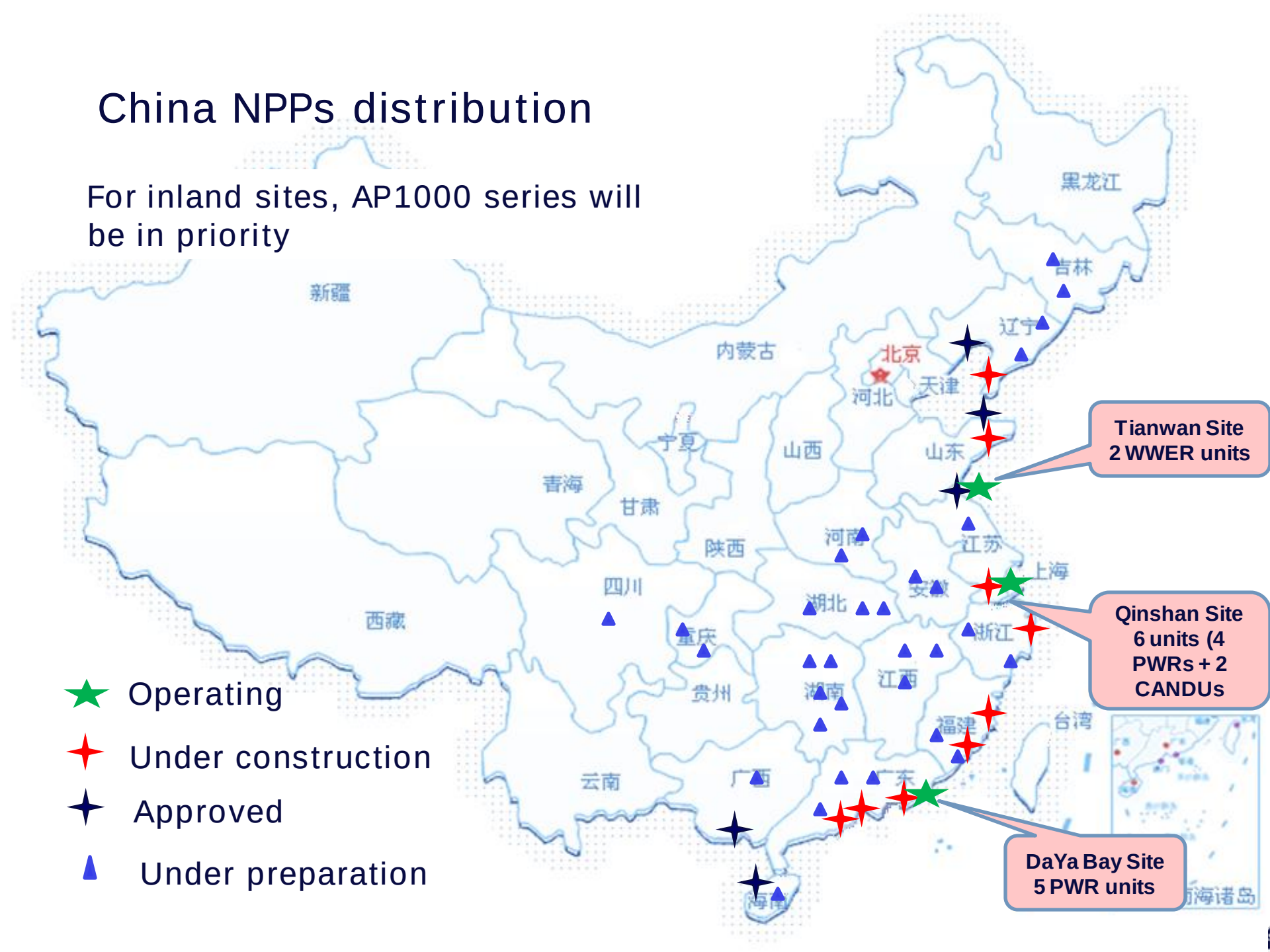
List of NPPs under construction

Nmae	Onwer	Type	Power（MWe）	Date of FCD	Date of to grid (1st unit)
LinAo-II	CGNPC	CPR1000	1080×2	2005-12	2010-07
Qinshan-II (ext)	CNNC	CNP600	650×2	2006-04	2010-08
Hongyanhe	CGNPC/CPI	CPR1000	1080×4	2007-04	2012-03
Ningde	CGNPC	CPR 1000	1080×4	2008-02	2012-12
Fuqing	CNNC	CNP1000	1080×（2+ 4）	2008-11	2013-07
Fangjiashan	CNNC	CNP1000	1080×2	2008-12	2013-10
Yangjiang	CGNPC	CPR1000	1080×6	2008-12	2013-10
Sanmen	CNNC	AP1000	1250×2	2009-04	2013-10
Haiyang	CPI	AP1000	1250×2	2009-09	2014-04
Taishan	CGNPC	EPR	1750×2	2009-10	2013-12
Total			2980 / 28 + 4		

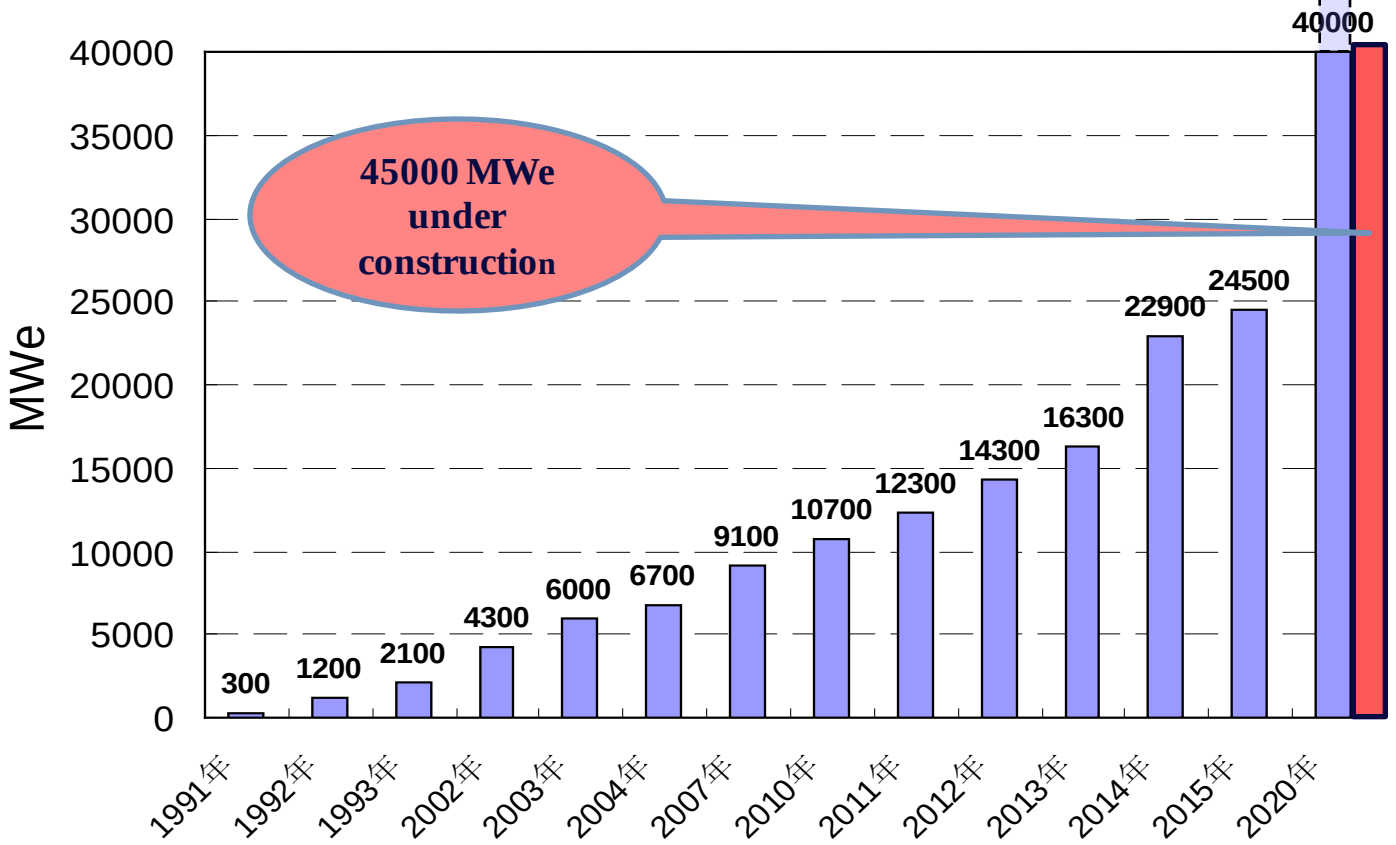
China NPPs distribution

For inland sites, AP1000 series will be in priority



75,000 ?

Nuclear Power Capacity up to 2020 in Mainland of China (estimated)



What should we do after Fukushima accident?

- After Fukushima accident, more strict requirements are implemented by related parties. March 16, 2011, State Council put forward 4 measures based on lessons learned from Fukushima:
  - To carry out immediately comprehensive special safety inspection to all nuclear power facilities
  - To enhance safety management to all operational NPPs
  - To comprehensively review all NPPs under construction in reference with the latest and most advanced C&S
  - To strictly control the approval for new NPP projects and the approval procedure for new NPPs will be suspended until the approval of Nuclear Safety Planning which is now under compilation
- **Conclusion :** In spite of Fukushima accident, China will not stop to develop nuclear power, but in a more cautious way and under more strict supervision.

Brief introduction on SNERDI

1. **About SNERDI**
   - **Shanghai Nuclear Engineering Research and Design Institute (SNERDI), located in Shanghai, east China, was established in 1970, and currently more than 1200 staffs.**
   - **SNERDI is a pioneering organization representing Chinese independent capabilities of R&D for NPPs. Qinshan-I, a 300 MWe PWR unit, which started operation in 1991, was designed by SNERDI.**

Brief introduction on SNERDI

Three Roles of SNERDI

Engineering

- Qinshan-I (CNP300)
- Chashma-I~IV (CNP300)
- Qinshan-III (CANDU)
- Hongyanhe-I~IV (M310)
- Sanmen-I, II (AP1000)
- Haiyang-I, II (AP1000)
- Taohuajiang (AP1000)
- Pengze (AP1000)
- Xianning (AP1000)
- Shidaowan (AP1000)

……

R&D

- 300 PWR prototype with more than 300 R&D topics
- Localization of AP1000
- Larger scale PWR based on AP1000
- R&D on services methodology ……

TS & Services

- Qinshan-I
- Qinshan-III
- Chashma-I, II
- Tianwan

……

Brief introduction on SNERDI

1. The 1st NPP in mainland of China
2. A 2-loop, 300MWe PWR plant designed by SNERDI (overall, NI) and ECEPDI(CI).
3. 1st power to grid in Dec. 15, 1991, 8th cycle under operation.
4. Excellent operation records achieved in recent years.
5. SNERDI provides full scope and lifetime support for Qinshan NPP-1.

The First Self-design and Self-construct NPP in Mainland China

Brief introduction on SNERDI

1. **A turn-key project.**
2. **A 2-loop, 300MWe PWR plant designed by SNERDI and ECEPDI.**
3. **International codes and standards followed in plant design and construction.**
4. **While taking Qinshan-1 as reference plant, many improvements were made:**
   - Foundation, EFWS, layout, etc.
5. **C-1 1st power to grid in June 2000, well operated by PAEC .**
6. **C-2 has been turned over to PAEC in 2011**
7. **C-3/C-4 is under design and construction**

The First NPP Ever Exported from China

Brief introduction on SNERDI

1. **SNERDI is the supporting institution of the Qinshan phase-3, the CANDU project, in the following area:**

   - **Preparing feasibility study report.**
   - **Preparing basic design document.**
   - **Participating Qinshan CANDU project construction management, i.e, BOP construction management.**
   - **Technical support for PSAR and FSAR.**
   - **Participating Qinshan CANDU NPP commissioning.**
   - **Technical support for operation, maintenance, licensing and safety analysis.**

The only CANDU NPP in China

Brief introduction on SNERDI

CAP1400
major research and development project

AP1000 standard design- inland and coastal areas

AP1000 "Self-rely on" projects.

- Step 1: WEC consortium gives priority to , we fully participate in – self reliance projects
- Step 2: Domestic companies give priority to, WEC consortium provides technical support
- Step 3: fully independent innovation

Cooperation with IAEA

Cooperation with IAEA

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Welcome to Shanghai

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Thanks !