ABWR Technology and Construction Experiences

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Hitachi-GE Nuclear Energy, Ltd.

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President & Representative Director
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1. Introduction

Promote our Core Technology BWR
2. ABWR Features
3. Realizing **Reliable NPP in Shorter Period** - our Back-bone
3. Realizing **Reliable NPP in Shorter Period**

- **High quality equipments**

Advanced technology & skilled technician produce High quality equipments

- **RPV** [Reactor Pressure Vessel]
- **RIP** [Reactor Internal Pump]
- **Steam Dryer**
- **Steam Separator**
- **Shroud**
4. Construction & Module Experience
- NPP construction by HGNE

> 40 years of continuous experience
> Continuous workforce development
> Additional ABWR orders in the future

Overview of Hitachi-GE Nuclear Energy (HGNE)

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4. Construction & Module Experience

- We concern **ALL ABWR NPPs**

Hitachi: 19 plants in operation [4 ABWR]
2 plants under construction [2 ABWR]
1 plants under licensing [1 ABWR]

Japan: 53 plants in operation (30 BWRs, 23 PWRs)
3 plants under const. (2 BWRs, 1 PWR)

7 ABWRs

- Hokuriku Electric Power Company
  Shika 2

- The Chugoku Electric Power Company
  Shimane 3

- EPDC Ohma

- Tokyo Electric Power Company
  Higashidori 1

- Tokyo Electric Power Company
  Kashiwazaki-Kariwa 6,7

- Chubu Electric Power Company
  Hamaoka 5

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4. Construction & Module Experience - Development of construction method

1985
- **1st Generation**
  - Open-Top Construction with Tower Crane

1990
- **2nd Generation**
  - Large Crawler Crane for Block/Modular Construction

2000
- **3rd Generation (ABWR)**
  - Expanded Open-Top & Parallel Construction
  - Expanded Block/Modular Construction

- **4th Generation (ABWR)**
  - Dedicated Module Factory
  - Hybrid Module and Block/Module’s Enlargement
  - Ubiquitous Technology for Logistics and Progress Control
4. Construction & Module Experience - Modularization Method

- Upper Drywell Module (650 ton)
- RPV (900 ton)
- RCCV Top Slab (550 ton)
- Stator (420 ton)
- RCCV Lower Liner Module (630 ton)
- Upper Condenser Module (270 ton)
- RPV Pedestal Module (410 ton)
- Base Mat Module (460 ton)
- HPU Module (270 ton)
- Lower Condensor Unit (260 ton)
4. Construction & Module Experience

- Manpower Peak Reduction Effort

Based on previous ABWR (Conventional Method)

Level-off Manpower Peak

Manpower Distribution

Based on Latest ABWR
4. Construction & Module Experience

Module Process
5. Continuous Construction of NPP

Under Construction

2005
- Tomari-3

2010
- Shimane-3
- Ohma

2015
- Kaminoseki-1
- Tsuruga-3
- Tsuruga-4
- Higashidori-1 (TEPCO)
- Fukushima I-7
- Fukushima I-8
- Sendai-3
- Higashidori-2 (TEPCO)
- Kaminoseki-2
- Hamaoka-6
- Namie-Odaka
- Higashidori-2 (TOHOKU)

Based on Power Supply Plan 2009 Japan FY by METI

BWR 11 Units

PWR 4 Units

: BWR

: PWR

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6. Our Business for the world

**China**
- Growing rapidly
  - 9GW (11 NPPs) ⇒ 70GW by 2020
- The governmental policy on PWR ⇒ variable types of NPP

**Canada**
- New CANDU: 10 NPPs~

**EU**
- Re-establishing policy
- Finland & Switzerland

**India**
- GEH contracted with Indian company of one of the biggest in the country

**UAE**
- 4 NPPs (op. by May 2017), ⇒ upto 8~10 NPPs
- Proposal of the short construction period

**USA**
- New 30NPPs (BWR: 11NPPs by 6utilities)
- ABWR/ESBWR by HGNE & GEH

**Vietnam**
- Team JAPAN

**Thailand**
- Seminars
- Cooperation for F/S of EGAT/B&R

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7. For the future
- Development of BWR NPP

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<th>Safety System</th>
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<td>Forced circulation</td>
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For the future - Development of BWR NPP

- ABWR (1,350 MW): Development (FY '00) to Construction (FY '10)
- ESBWR (1,550 MW): Development (FY '20) to Construction (FY '30)
- Next-generation BWR (1,700-1,800 MW): Development (FY '30) to Construction (FY '40)
Conclusion

- ABWR is the only “Advanced “ LWR design which has operating experiences.
- Ready to market with proven design, licensed both in Japan and US, and detail design package is available.
- Advanced construction technology has been developed and demonstrated through continuous construction experiences.
- The most advanced construction technology is applied to the plant now under construction, and more plants in the near future.
- Hope that ABWR will be introduced into world wide market.
Thank you for your attention

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Oct. 27, 2009

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