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Development and Global Deployment of ABWR

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- Development Overview of ABWR
- New ABWR Construction in U.S.
- ABWR Deployment in Europe

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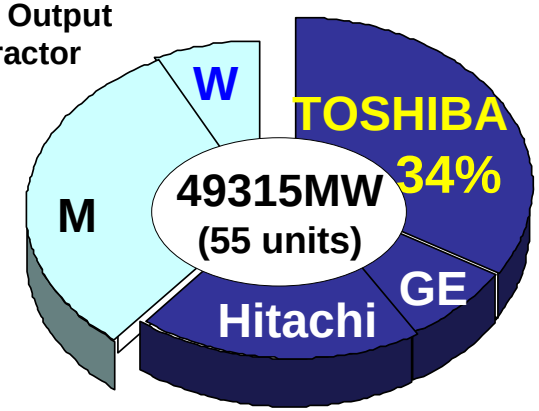
BWR Construction Experiences

Construction Experiences of Light Water Reactors in Japan

Ratio of Gross Output
As prime contractor



PWR
39%
(23 units)

BWR
61%
(32 units)

Reference : Nuclear Power Plants in the World 2009,JAIF

First Concrete — Fuel Lording

Constructed plants

Under construction

OHMA-1
LUNGMEN-2
LUNGMEN-1
HAMAOKA-5
Tohoku, HIGASHIDORI-1
ONAGAWA-3
KASHIWAZAKIKARIWA-7
KASHIWAZAKIKARIWA-6
ONAGAWA-2
HAMAOKA-4
KASHIWAZAKIKARIWA-3
KASHIWAZAKIKARIWA-2
HAMAOKA-3
FUKUSHIMAII-3
ONAGAWA-1
KASHIWAZAKIKARIWA-1
FUKUSHIMAII-1
HAMAOKA-2
FUKUSHIMAI-6
FUKUSHIMAI-5
HAMAOKA-1
FUKUSHIMAI-3
FUKUSHIMAI-2
FUKUSHIMAI-1
TSURUGA-1

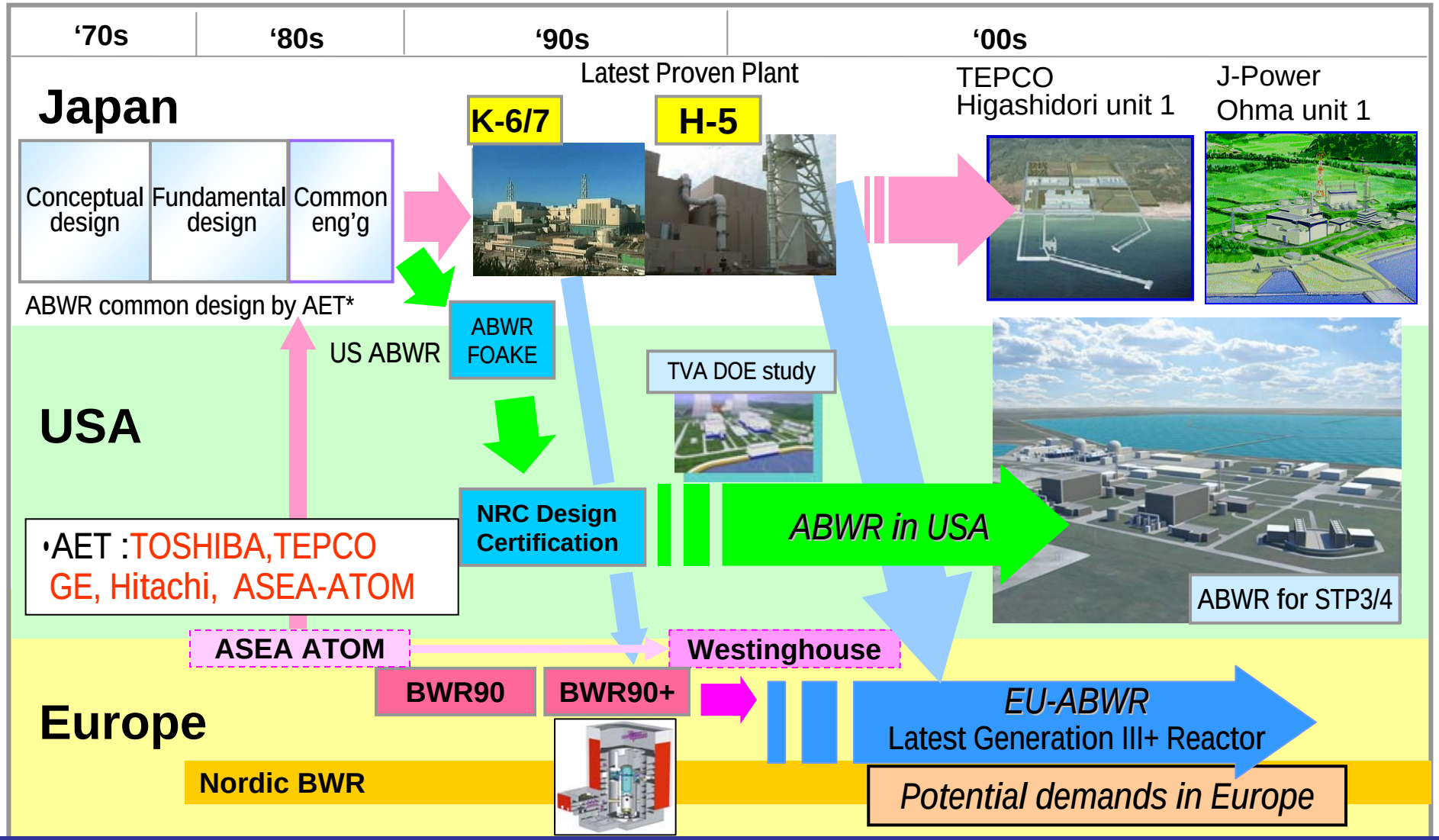
ABWR

1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015

- **Toshiba entered business in 1966, constructed 22 units, including 17 units as prime contractor**

BWR is the highest market share in Japan

Development history of ABWR



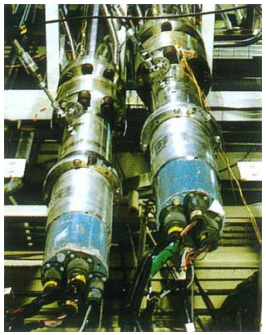
Latest evolutional ABWR in the world

Safety in ABWR

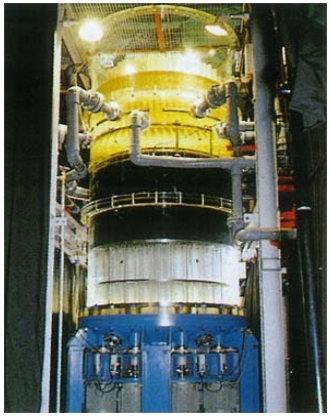
Testing for Verification & Optimization

In-house Test Facility

RIP Performance Test

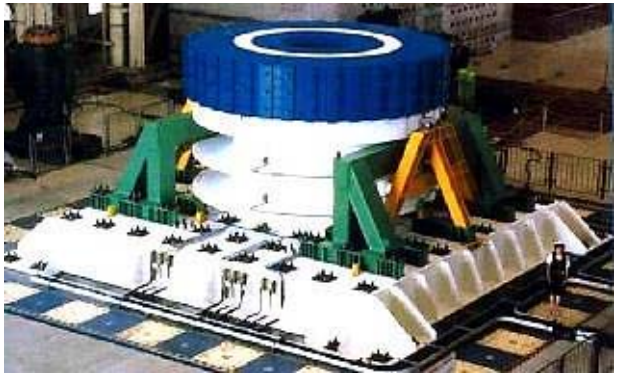


CRD Performance Test



Hydraulic Test
In Pressure Vessel

Seismic Test
of CRD



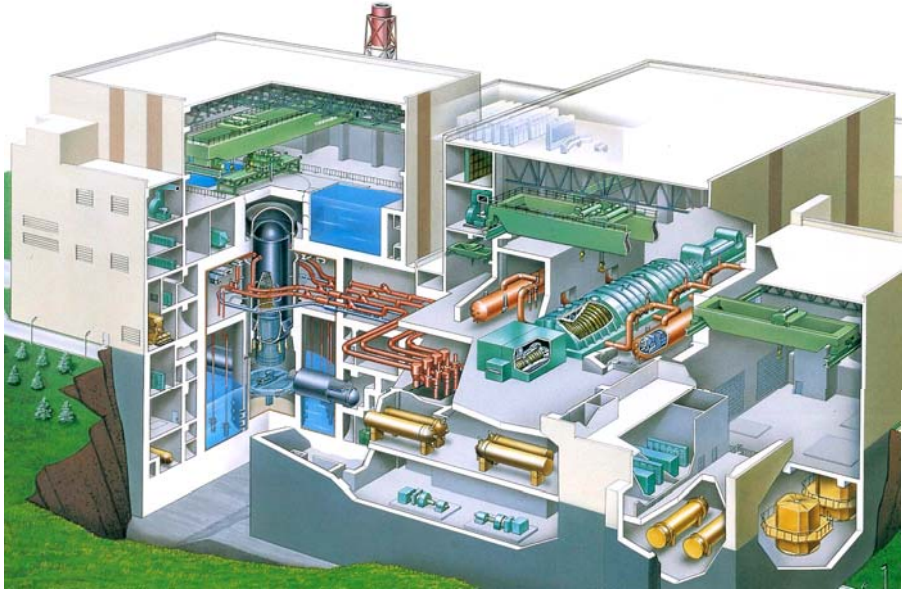
http://www.iae.or.jp/group/pdf/tadotsu.pdf

Demonstration Test of
RCCV (Seismic Test)
(by Government)

High reliability by building test facilities

Safety Nuclear Power Plant ABWR

- The latest and Proven BWR
  to receive Design Certification from the US-NRC
- The first unit started operation in 1996
- Four ABWR in operation in Japan



ABWR (Japan)

Thermal Power	3926MWt
Elec. Power	1350MWe
Life time	60 years
Availability	90%

Tested and Proven Light Water Reactor

ABWR in Japan

Kashiwazaki-Kariwa Unit 6/7

- The first Generation III Reactor in the world
  (C/O: November 1996)
- Short construction period
  37months (1st concrete – FL)
- Built on schedule and budget

Hamaoka Unit 5

- World's 3rd ABWR
  (C/O: January 2005)
- Latest technologies applied
- Combined type reactor building for the high seismic condition

On time, On budget and High Seismic Safety

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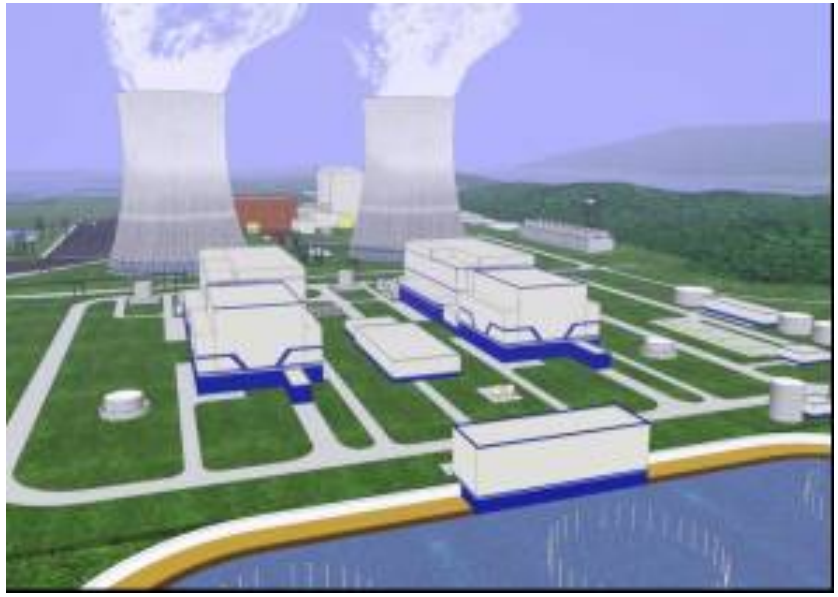
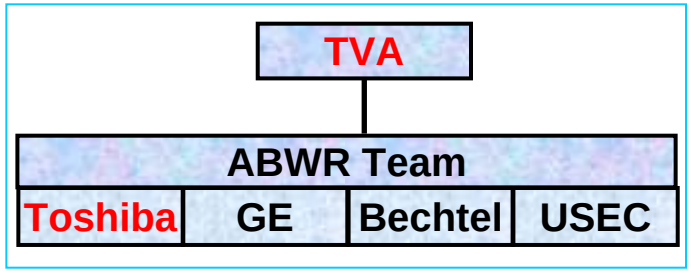
TVA DOE funding study in 2004,2005

ABWR Cost/Schedule/COL Project at TVA's Bellefonte Site

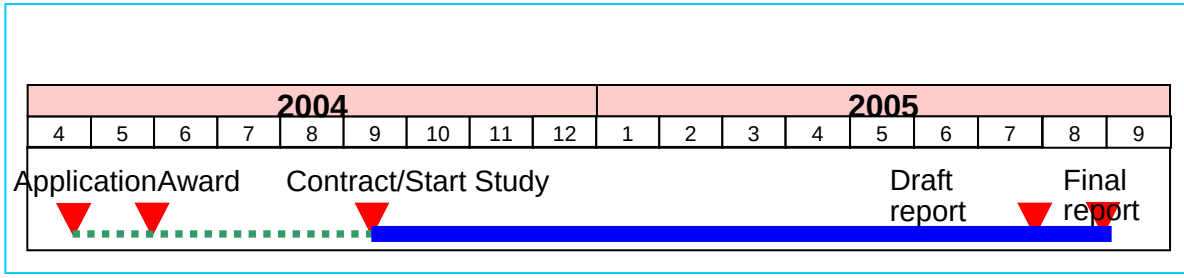
- Cost and Schedule
  - ABWR 2 units
  - 1350 – 1500 MWe class
- PJ Deployment model
- ABWR Enhancements
- Fuel Supply Plan



ABWR Team



DOE study schedule(2004 ~ 2005)



Starting point of Global ABWR Deployment

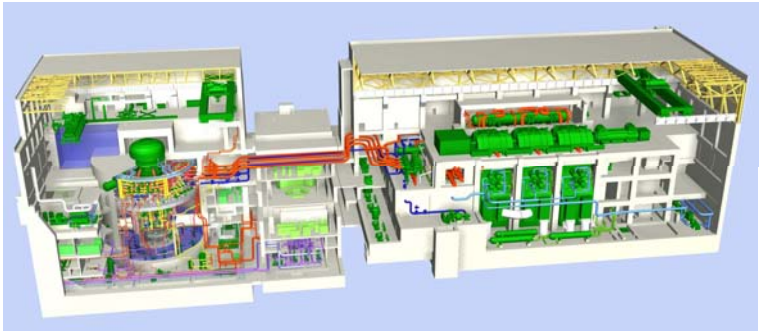
New LWR Construction in U.S.

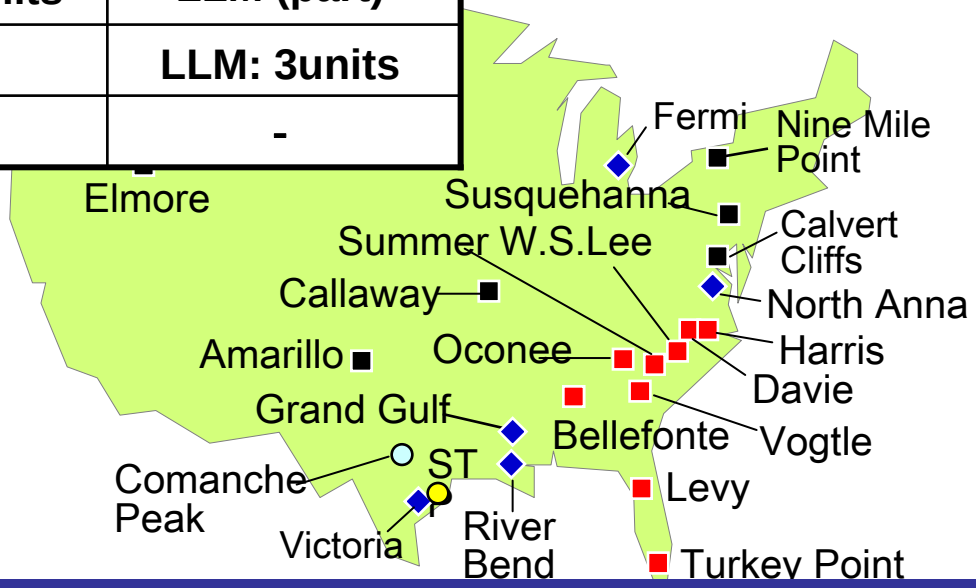
Ready for Construction

【COL Status】COL: Combined Construction and Operating Licensing

	COL applied	COL in preparation	EPC contract
ABWR	1site, 2units	-	1site, 2units
AP1000	7sites, 14units	2sites, 2units	3sites, 6units
EPR	4sites, 4units	2sites, 2units	LLM (part)
ESBWR	5sites, 6units	-	LLM: 3units
APWR	1site, 2units	-	-

Source: NEI HP (09/05)
With TOSHIBA's assumptions

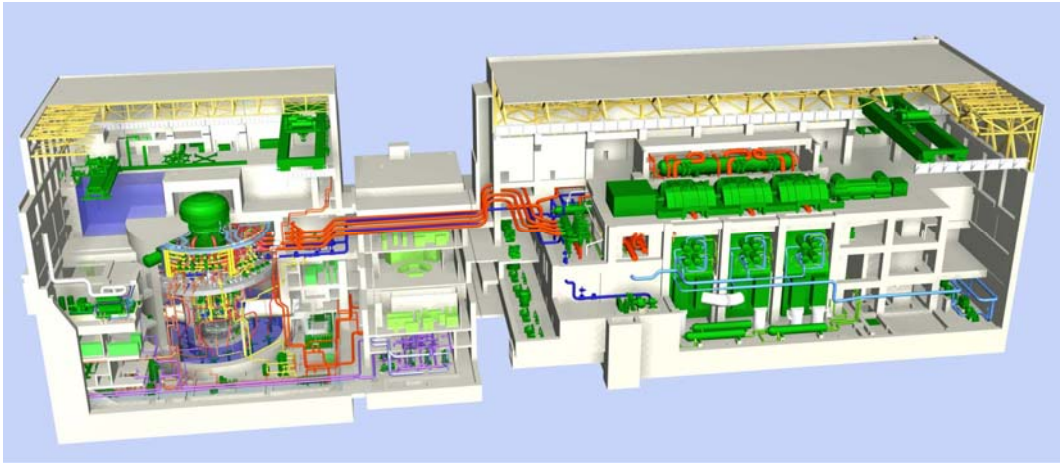




Construction of ABWR begins the Nuclear Renaissance in USA.

STP3/4 project in U.S.

ABWR in USA



EPC contract Feb 9,2009 as TOSHIBA prime contractor

Current Status of STP3/4 project

STP3/4 Project Outlines

- Customer: STPNOC
- ABWR 2 units (1380MWe/Gross)

Features

- Actual 1st BWR project as a revival of nuclear industry in U.S.
- Leading success with maximum application of excellent experiences for design, construction and operation of ABWRs in Japan.

Current Project Status

- COLA rev.2 provided by STPNOC to NRC with Toshiba technology
- EPC contract was established in 2009 as Toshiba prime contractor
- The date of Commercial Operation expected in 2016 for Unit No.3.

STP3/4 project is on going in U.S.

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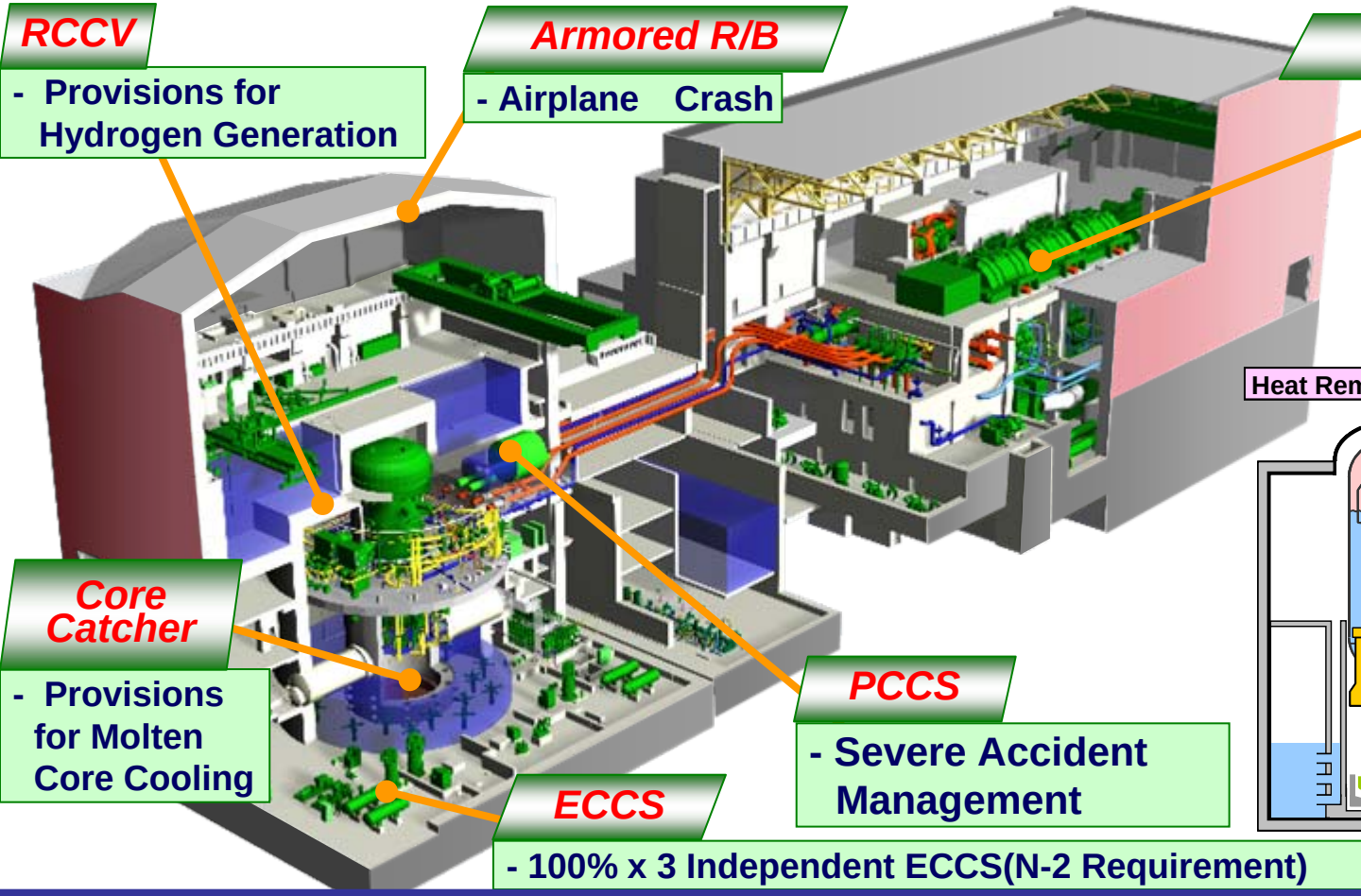
- **ABWR Deployment in Europe**

Deployment of ABWR in Europe

- European BWR Technologies are applied in European ABWR
- ABWR is changed to meet European safety requirements



RCCV
- Provisions for Hydrogen Generation

Armored R/B
- Airplane Crash

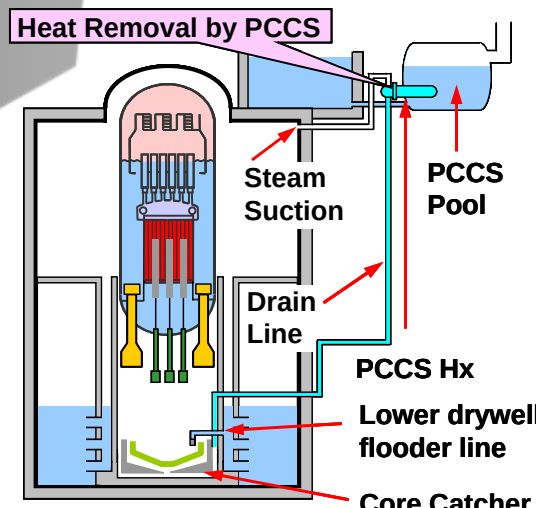
1600 MWe out put
- 72 inch Turbine

Core Catcher
- Provisions for Molten Core Cooling

PCCS
- Severe Accident Management

ECCS
- 100% x 3 Independent ECCS(N-2 Requirement)

➢ **Severe Accident Management**



Design changes are minimum to satisfy safety requirements

Plant Main Data of European ABWR

- **Plant Specification**
  - Reactor Thermal Power: 4300MW
  - Electrical Output: >1600MW
  - Plant efficiency: >37%
- **Plant availability**
  - Design life: 60 years
  - Plant availability: >90% over lifetime

Thermal Power increases from 3926 MW to 4300MW.

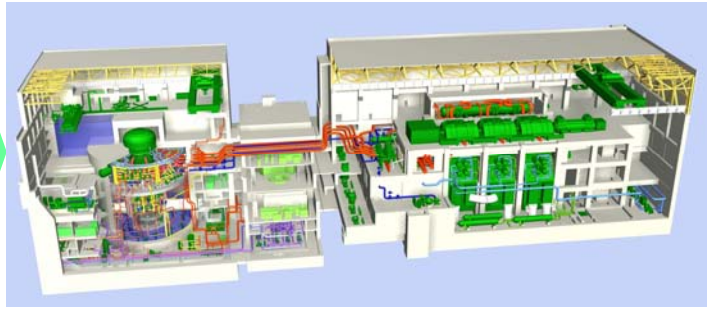
Global Deployment of ABWR

Japan

USA

US-ABWR

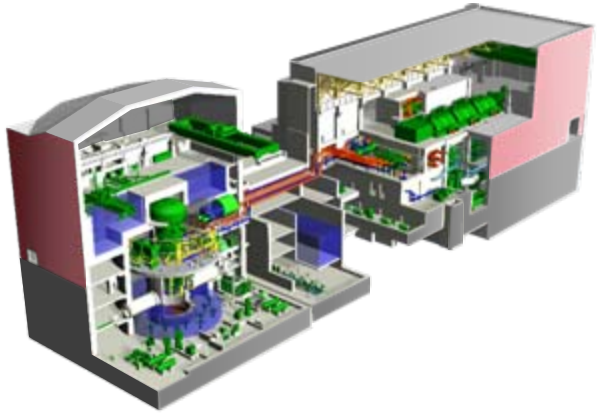
http://www.stpnoc.com/New%20Units.htm



Europe

*EU-ABWR (ABWR*III+ *)*

Latest Generation III+ Reactor



To be the World Standard LWR

Global Deployment of ABWR

- Only Generation III Reactor under Operation with excellent operating experience in Japan.
- High certainty for schedule based on the actual construction experiences in Japan.
- Implementation for the development of the STP3/4 project is under going in U.S. based on the results of TVA DOE funding study.
- Specific regulation will be considered for ABWR promotion in Europe as well.

Expanding ABWR construction worldwide

Summary

We provide the BWR technologies and contribute to "The Nuclear Renaissance".

TOSHIBA

Nuclear Renaissance