Licensing of UK ABWR in an international environment

12th September 2017

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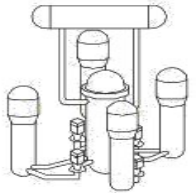
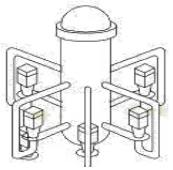
Introduction

- Hitachi introduced Boiling Water Reactor (BWR) technology to Japan, building on US experience, in the 1950s.
- BWR technology has since been developed through successive generations of design – with construction more-or-less continual from 1970s to now.
- Design evolution during this time has culminated in the Advanced Boiling Water Reactor (ABWR).
- The UK Advanced Boiling Water Reactor (UK ABWR) is proposed for deployment in the UK, and Hitachi-GE is seeking regulatory design approval – a Design Acceptance Confirmation (DAC) and Statement of Design Acceptability (SoDA) for the design.

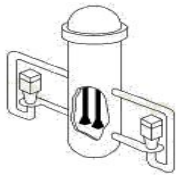


BWR1

BWR2



BWR3



BWR4

BWR5

BWR6

ABWR

ABWR Overview

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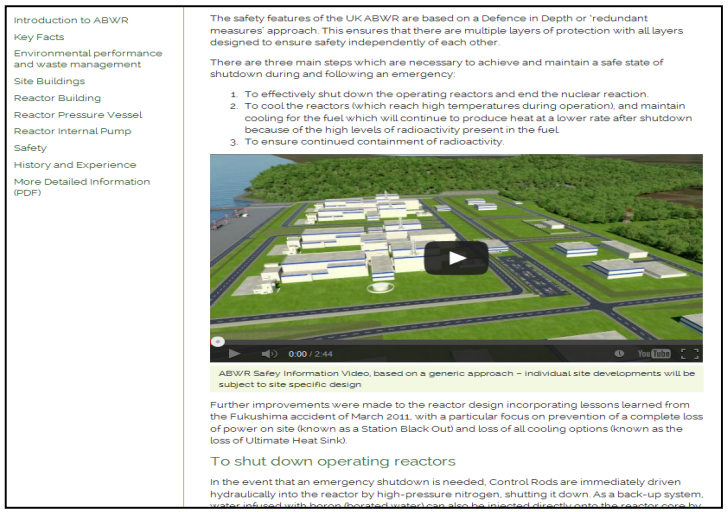
- Benefits from proven construction and operating experience – safe, reliable and cost competitive
- Proven design: 4 operational, 4 under construction
- 4 units constructed on time and on budget in Japan
- Simplified systems with high operability

- UK ABWR design includes latest international developments, as well as refinements to meet specific UK conditions – but remains an ABWR.
- World-class safety features

Safety features of the UK ABWR

- Defence in depth design– multiple safety trains and back-ups
  - o Core cooling: diverse methods of cooling water supply
  - o Containment: multiple layers – fuel cladding, RPV and RCCV
  - o Control: control rods fast acting to shut down the reactor plus back-up liquid control system
- Enhanced C&I system & HWBS
- Aircraft impact protection
- Extreme hazard protection from independent Back-up Building



Visit our website and view the UK ABWR safety video:
http://www.hitachi-hgne-uk-abwr.co.uk/reactor-safety.html

Fukushima Countermeasures

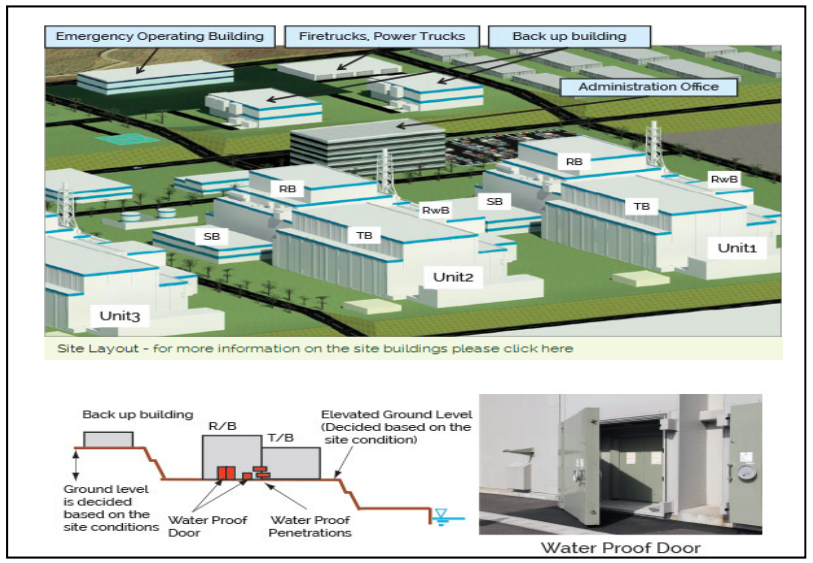
Lessons learnt from Fukushima include:

Earthquake Protection: Seismically qualified buildings

Site layout: Elevated site plus option to site backup buildings on raised ground

Protection of core facilities: watertight buildings and doors around backup features

Loss of cooling and loss of off-site power: additional diverse and independent methods of power supply and core cooling



Visit website for further information on Fukushima learnings:
http://www.hitachi-hgne-uk-abwr.co.uk/reactor-safety.html

UK ABWR Update - GDA

- Generic Design Assessment (GDA) is a challenging review by UK nuclear regulators
- Examines safety, environmental protection, security
- Takes significant effort

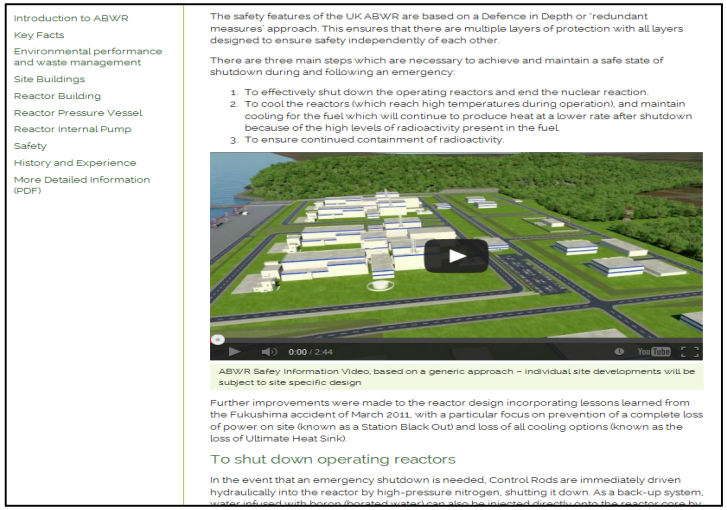
- Transparent process – reports published plus a public comments process
- Aim is to complete assessment while design is still ‘on paper’
- A number of design changes have been made to meet UK regulatory expectations

UK ABWR Update – site deployment

- GDA target completion is end of 2017
- Horizon Nuclear Power (a 100% Hitachi subsidiary) has plans to deploy the UK ABWR at Wylfa Newydd and Oldbury-on-Severn.
- Will be twin units at each site
- Nuclear Site Licence application made
- Working to build UK domestic expertise – University seminars and support for BWR research hub

Influences of International Licensing

- BWRs are deployed in many countries world-wide.
- Licensing by different regulatory regimes has undoubtedly contributed to design development and safety improvement.
- ABWR has undergone regulatory assessment in 4 countries.



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Influences of MDEP

- MDEP has existed for around 10 years
- There is a design specific ABWR working group – this helps the regulators share information and learn from each other
- We believe MDEP does influence the UK regulator – and in turn that has an influence on their assessment as we progress through GDA
- No doubt that MDEP is positive for getting international regulators to work more closely together
- This is helping encourage common approaches (eg MDEP Common Positions) which will ultimately encourage international harmonisation of approaches for new reactor assessment.
- Hitachi-GE support further work to harmonise international regulation of new reactors.

Summary – UK ABWR licensing in an international environment

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- BWR technology has been developed through successive generations of design – with construction more-or-less continual from 1970s to now
- Design evolution during this time has resulted in the proven Advanced Boiling Water Reactor (ABWR)
- Generic Design Assessment for UK ABWR target is to complete end 2017
- ABWR design has been influenced by international developments e.g. introduction of Fukushima learning and aircraft impact protection
- Hitachi-GE believes international cooperation via MDEP benefits regulation of new nuclear power plants
- Hitachi-GE supports the MDEP initiative and encourages continued progress on international harmonisation of approaches to regulation


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