HORIZON
NUCLEAR POWER

ENERGY WORKING FOR BRITAIN

Corporate overview

January 2018

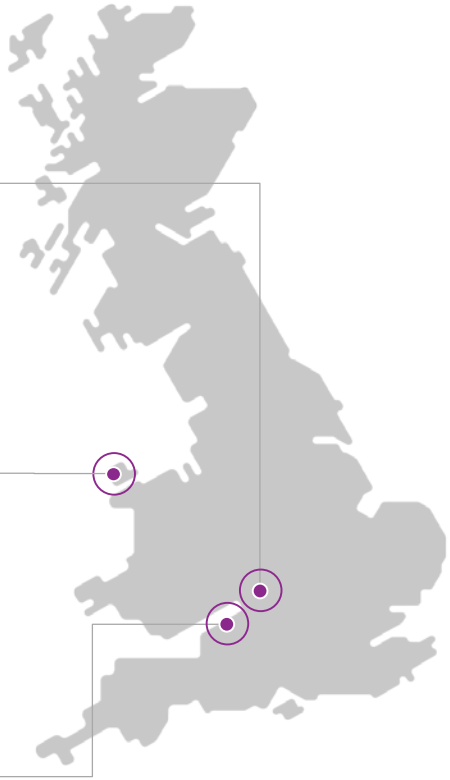
Corporate overview

- Established in 2009 (by German companies RWE and Eon), acquired by Hitachi in 2012
- Created to help meet the need for new, secure low carbon power
- Making steady progress past milestones for our lead project, Wylfa Newydd, with Oldbury to follow
- Will deploy tried and tested Hitachi-GE ABWRs which have already been built to time and budget in Japan
- c.£20billion investment in the UK - up to 60% of project value could be spent in UK, creating opportunities for British businesses
- Approx. 259 staff at HQ and Wylfa plus 27 temporary contractors and 30 graduates and apprentices

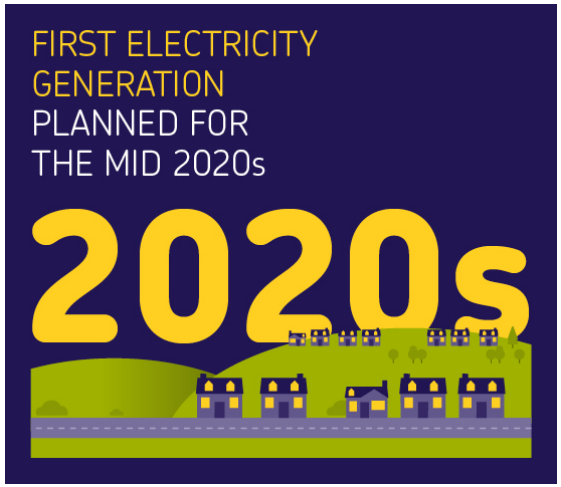
GLOUCESTER HQ

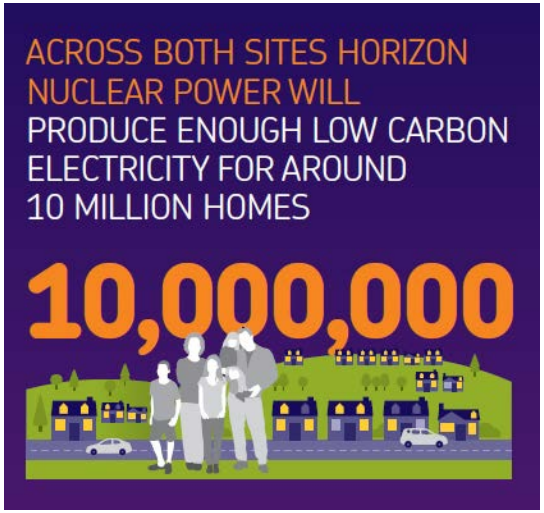
WYLFA NEWYDD

OLDBURY

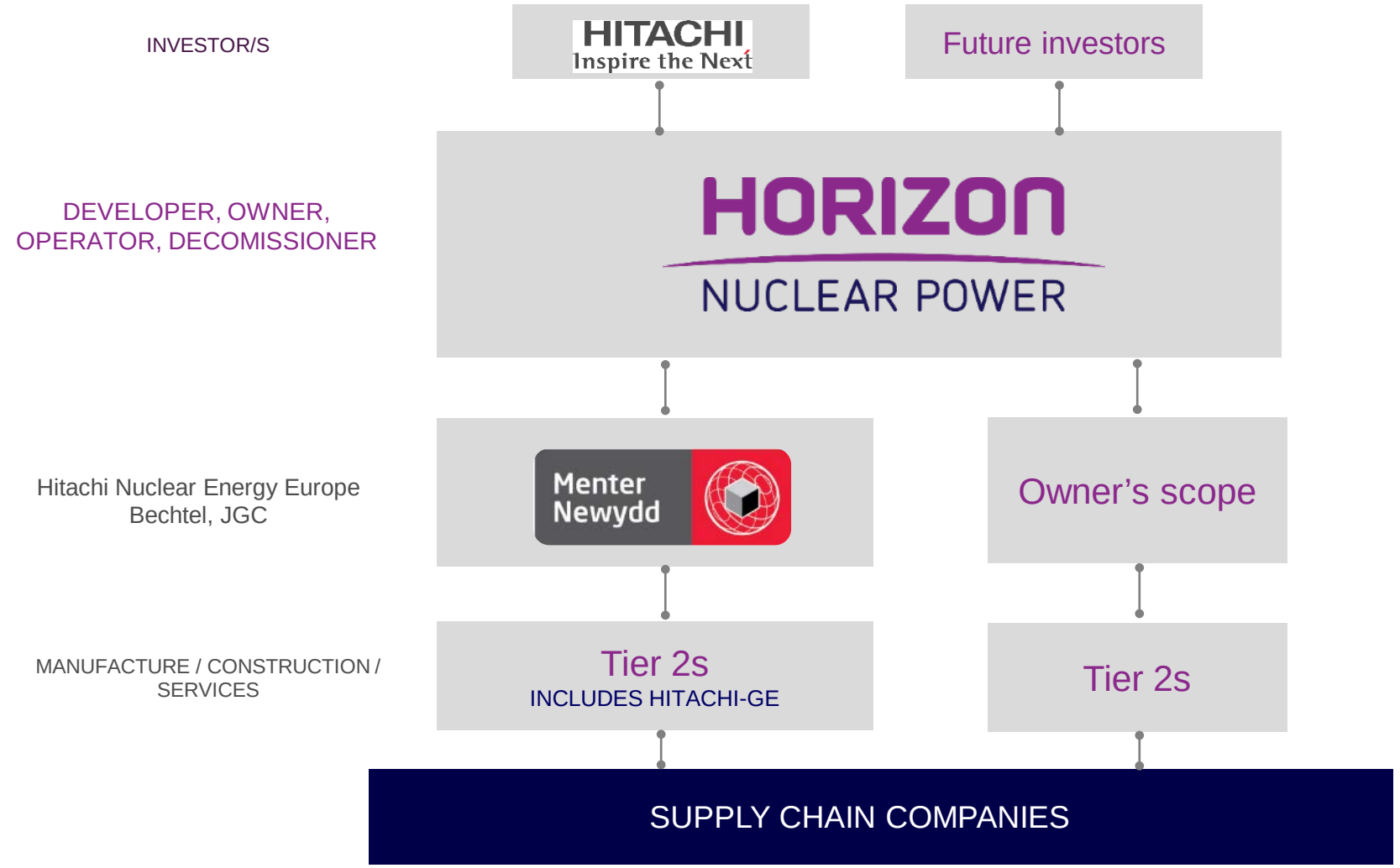


Project in numbers





Project structure



Principal Workstreams

Delivering Wylfa Newydd

- Nuclear Site Licence
- Planning permissions
- Site development
- Environmental permits
- Engineering design
- Supply Chain development
- Organisational development

Preparing for generation

- Safety
- Generating capability
- Operating partners
- Training service provider

Creating an investible project

- Contract for Difference
- Treasury Guarantee
- Future power sales
- Additional investors

Technical

- Generic Design Assessment
- Design Authority
- Technical assurance

Delivering Wylfa Newydd

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Wylfa Newydd Ground Investigation Film

Wylfa Newydd Archaeology Works Film

Wylfa Newydd Offshore Ground Investigations

Preparing for generation

Safety

- Developing the policies, processes, and procedures for governance of safety.

Generating capability

- Developing the plans, budgets, schedules, and resources for developing Horizon's generating capability.

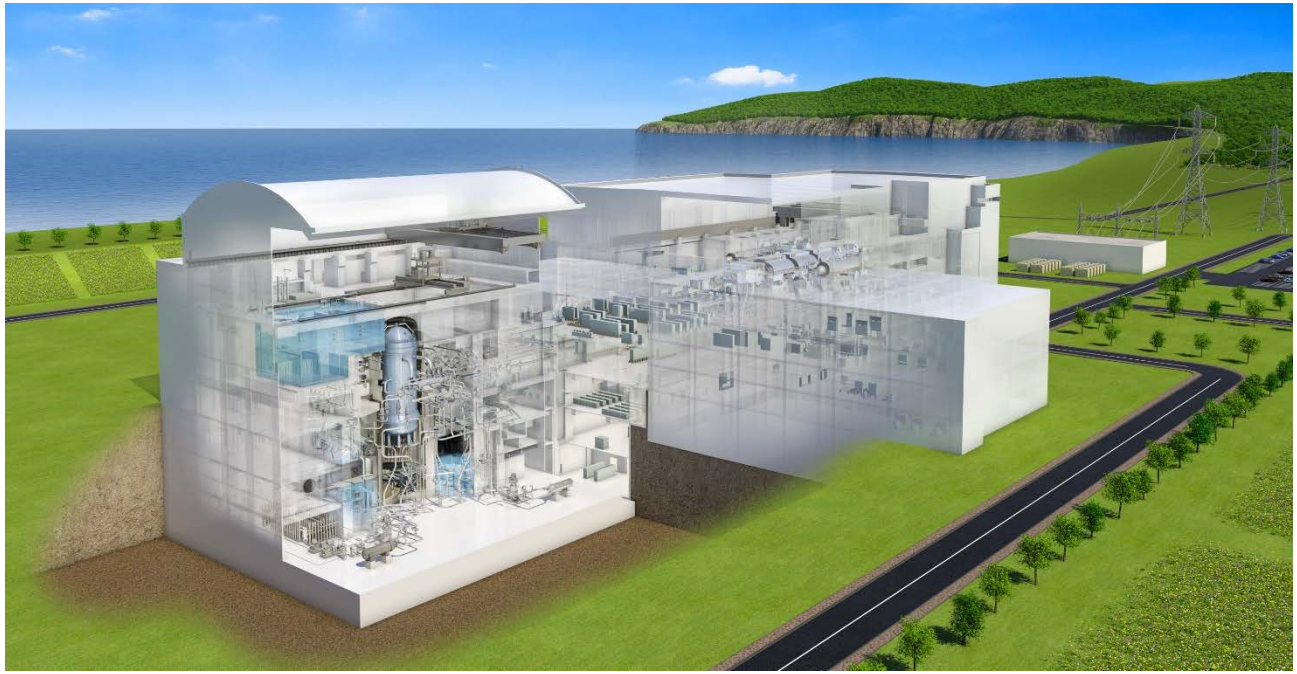
Operating partners

Our experienced nuclear leadership has partnered with JAPC and Exelon - JExel Nuclear – to provide us with advisory services, operations and maintenance management services.

Training service provider

Horizon's in-house training team is working alongside Tecnatom, a global nuclear training services provider, to provide training for the future station operations team many of whom will come from Anglesey.

Technical



GDA

Supported Hitachi-GE as the Requesting Party for the GDA of the UK ABWR.

Design authority

Support and ultimately accept the design of a UK ABWR at Wylfa Newydd.

Technical assurance

Provide Independent Technical Assurance and Nuclear Oversight for Horizon Nuclear Power.

About GDA

- A regulatory assessment by Office for Nuclear Regulation (ONR) and the Environment Agency (EA) of whether a proposed reactor design is safe for deployment at a generic site in the UK.
- Early identification of challenges allow these to be addressed in the planning phase – de-risking the overall project.
- Submissions must be suitably tailored to the UK regulators' need – not just showing that the technology is credible, but working to the 'non-prescriptive' style of UK regulators.
- *ONR/EA reports are published on their website, along with quarterly progress updates. Hitachi-GE submissions are published on our website*

The regulators

- **The Office for Nuclear Regulation**

"The Office for Nuclear Regulation's mission is to provide efficient and effective regulation of the nuclear industry, holding it to account on behalf of the public"

- **The Environment Agency**

"We are involved throughout the entire lifecycle of a nuclear power station … Assessment of designs … planning and construction … Operation … Decommissioning"

http://www.onr.org.uk/new-reactors/ (Joint regulators)

- **Natural Resources Wales**

"Natural Resources Wales has taken over the functions of the Countryside Council for Wales, Environment Agency Wales and Forestry Commission Wales, as well as some functions of Welsh Government"
http://naturalresourceswales.gov.uk

GDA Process in the UK – Areas of Assessment

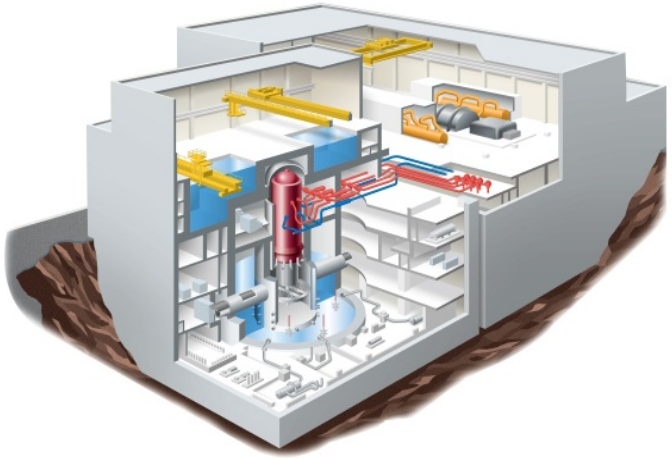
- *External Hazards*
- *Internal Hazards*
- *Structural Integrity*
- *Civil Works and Structures*
- *Reactor Core*
- *Reactor Coolant Systems, Reactivity Control Systems and Associated Systems*
- *Engineered Safety Features*
- *Control and Instrumentation*
- *Electrical Power Supplies*
- *Auxiliary Systems*
- *Steam and Power Conversion Systems*
- ***Radioactive Waste Management***
- ***Fuel Storage and Handling***
- ***Radiation Protection***
- *Human-Machine Interface*
- *Emergency Preparedness*
- ***Reactor Chemistry***
- *Design Basis Analysis*
- *Probabilistic Safety Assessment – **PSA Level 3 Radcons***
- *Beyond Design Basis and Severe Accident Analysis*
- *Human Factors*
- *ALARP Evaluation*
- *Commissioning*
- *Operation*
- *Decommissioning*
- ***Spent Fuel Interim Storage***

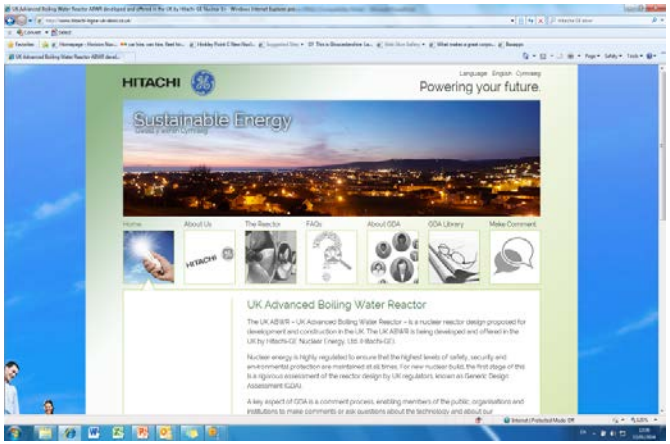
An increasing amount of cross-cutting issues are identified compared to previous GDAs!

ABWR assessment and justification

- Generic Design Assessment (GDA)
- Step 1 - Assessment agreements signed March 2013
- Step 2 – overview of basic acceptability of the proposed reactor design construction in the UK
- Step 3 – launched August 2014, increasingly detailed analysis covering Overall Design, Safety Case and Security Arguments
- Step 4 – launched October 2015
- **Successfully completed - December 2017 –**
- **Straight to a full DAC and SoDA**

- **All done ?**





GDA Process successfully finished – but …

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- Internal Hazards
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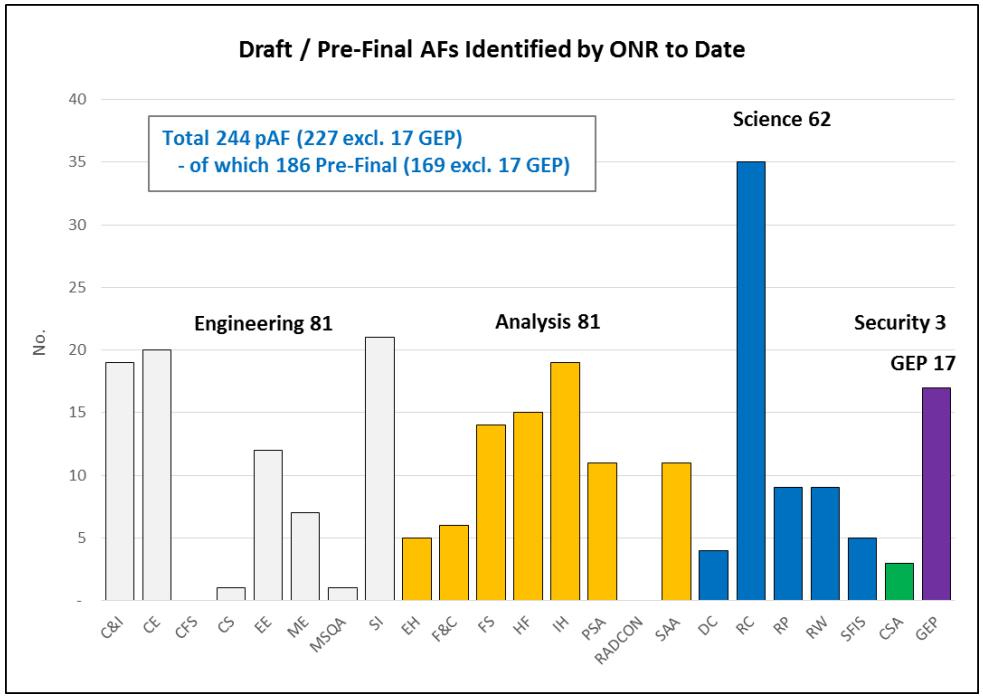
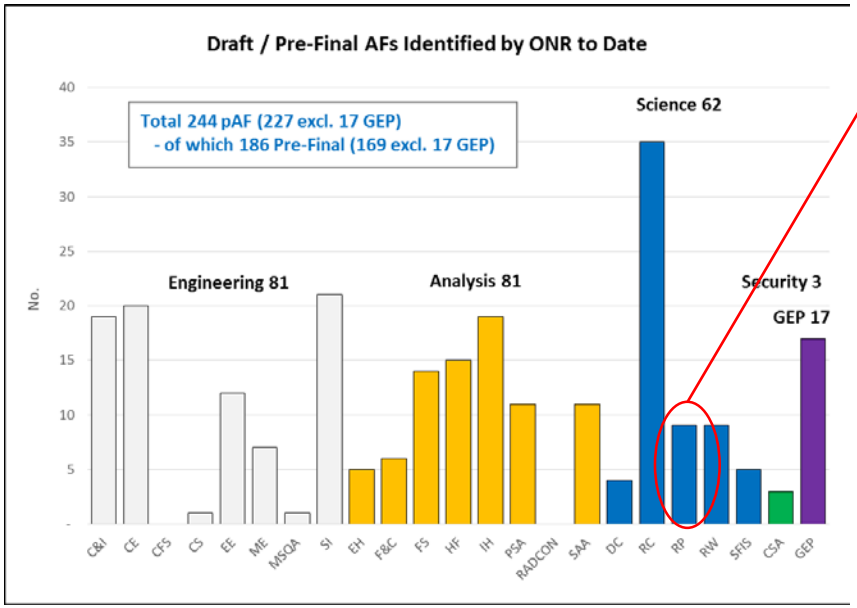
Assessment findings in nearly each area – now to be resolved by Horizon in accordance to resolution plans



GDA Process successfully finished – but …

Assessment findings in nearly each area – now to be resolved by Horizon in accordance to resolution plans which need to be developed until Autumn next year



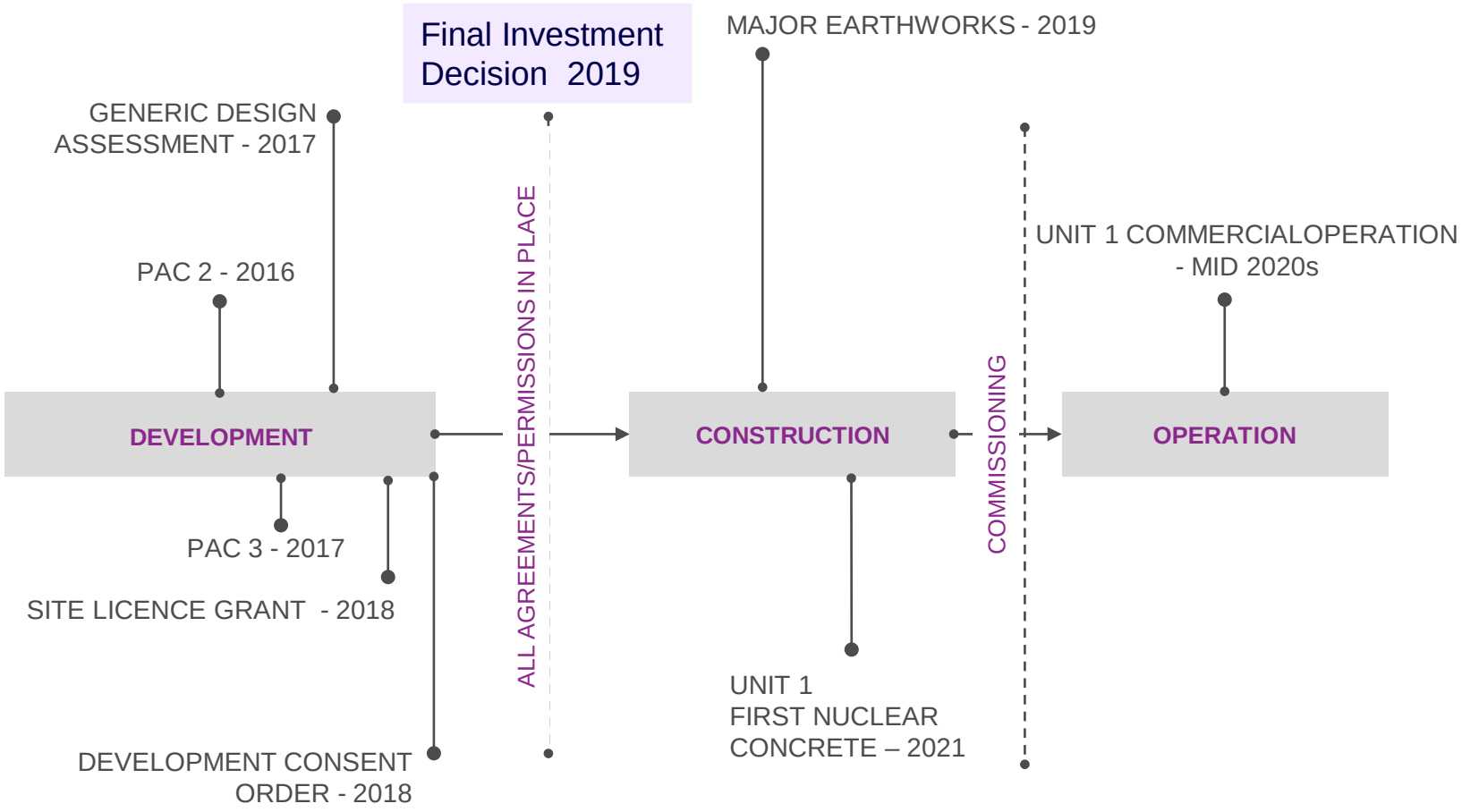
RP assessment findings are related to:

- ALARP application to solid and liquid waste management, HVAC and Off-gas systems
- Optimisation of RPV opening/closing (multi-stud tensioner)
- Review the requirements for direct radiation and activity in air monitoring, interfaces to interlocks to prevent access to high radiation areas
- Local exhaust ventilation (LEV), fixed installed preferably to temporary installations
- Penetration design (preferably inherent safe designs), minimisation of use of lead wool
- Review of fuel handling and transfer processes

Other Topics we currently dealing with in RP

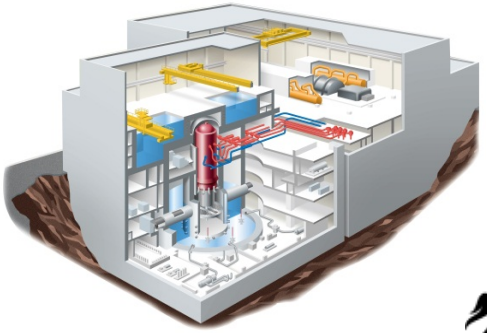
- Adapt existing documentation to the newly issued IRR17
- Interact with the regulators to support the site licence process
- Investigate and assess impacts of intended outage and maintenance strategies regarding individual and collective doses
  - Collective approach with Operations, PSA, use of EPRI research
  - Includes approaches to data gathering for condition based maintenance (introduction of digital technology)
- We are looking for benchmark opportunities to judge applicability and implementation of best technologies and practices
  - For RP e.g. outcome of EPRI's RMT Technology program, Peach Bottom's RMT approach and experience, Exelon's Digital Plant Viewer
  - Visit operating plants during outages, in outage planning phases
- Habitability assessment of the main control room, back-up building control room and other plant locations which need to be accessed under severe accident conditions

Baseline schedule



Recent progress

- Governments of UK and Japan support the project
- UK ABWR successfully completed Generic Design Assessment
- Clearance to buy reactor components
- Menter Newydd delivery team in place
- Operational Partners – JAPC and Exelon
- Optimisation of plant
- Site Licence Company Board established
- Submitted Site Licence Application (March 2017)
- Second year of apprenticeship programme
- £1 million funding for Coleg Menai
- Completed a third and final public consultation on 22 June 2017
- Announced Training Services Partnership with Tecnatom – July 2017
- Submitted application for EPRSR to NRW - 10 Oct 2017



Ready to deliver

Proven technology

- Hitachi-GE's ABWR – tried and tested technology
- Regulatory approvals in three countries, and now the UK as well
- Built and operated four times over to budget and schedule
- Successful completion of GDA for UK ABWR at end of 2017

Proven delivery capability

- Joint venture between Bechtel, Hitachi Nuclear Energy Europe and JGC.
- Helped deliver over 180 Nuclear Power Stations
- Delivered a huge array of complex infrastructure mega-projects
- Hitachi Nuclear Energy Europe – delivered 23 BWRs and ABWRs
- Bechtel constructed first USA nuclear power station this century
- JGC expertise in Japanese and global supply chains

Proven leadership

- Duncan Hawthorne appointed Horizon CEO in 2016
- Previously CEO of Bruce Power, one of the largest nuclear power plants in the world
- Negotiated Government deals to refurbish and restart 6 reactors.
- Former Chairman of the World Association of Nuclear Operators
- Wider senior Horizon Leadership Team experience includes nuclear, power, infrastructure delivery and finance sectors
- Hitachi has global leadership and proven capability

For more information

Horizon Nuclear Power channel

@HorizonNuclear

horizon-nuclear-power

@horizonnuclear

www.horizonnuclearpower.com

Other new build projects in UK

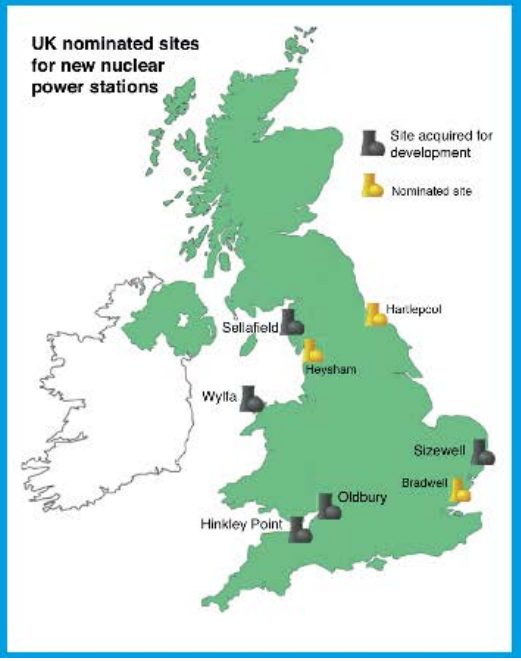
Development sites

The UK Government's energy national policy statement in June 2011 confirmed that eight sites are suitable for new nuclear power stations by 2025, as shown on the map below. All are the sites of existing nuclear plant. Five of the sites have been acquired by new build developers.

EDF Energy is proposing to build two Areva EPRs at **Hinkley Point**, Somerset, and two at **Sizewell**, Suffolk. EDF also proposes to work with investment partner China General Nuclear Power Corporation (CGN) to deploy the Chinese Hualong HPR-1000 reactor at **Bradwell**, Essex.

Horizon Nuclear Power, owned by Hitachi, is planning to build two 1.3GWe ABWRs at **Wylfa**, Anglesey, and at least two at **Oldbury**, Gloucestershire.

NuGeneration is intending to build three Westinghouse AP1000s at the **Moorside** site at Sellafield, Cumbria.



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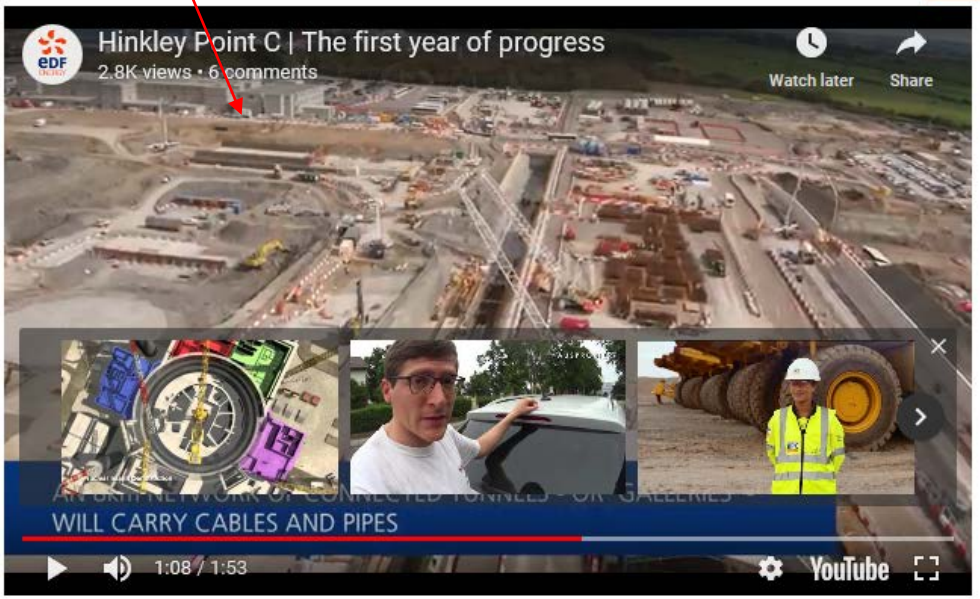

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Thank you