# Environment Agency

# Generic design assessment of General Nuclear System Limited's UK HPR1000

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February 2021

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# Purpose of this meeting

- To help inform you about our work on Generic Design Assessment (GDA) of General Nuclear System Limited's UK HPR1000 nuclear reactor.
- To listen to your comments and answer your questions where we can.
- To invite you to respond to our consultation which is open until the 4th April 2021.

Note:-

A developer proposing to construct and operate a UK HPR1000 at a site in the UK will still need to obtain all necessary site specific regulatory permissions (permits, licences, consents, orders, etc).



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# Who is involved?

- Environment Agency
  - Environmental Regulator
- Office for Nuclear Regulation (ONR)
  - Nuclear Safety Regulator
- General Nuclear System Limited (GNSL)
  - The Requesting Party



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# Environment Agency - What we do

We protect and improve the environment.

We regulate industry, including nuclear sites.

We regulate the use of radioactive substances and disposal of radioactive waste as well as other matters such as operation of combustion plant and discharges into the water environment.

We do not regulate nuclear safety, security, or transportation of radioactive materials.

We are an advisor to planning authorities providing advice for them to consider in their decision making.



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# New nuclear power stations: role of regulators

Ensuring high standards of safety, security, environmental protection and waste management


**5 stages of regulation:** Design assessment (GDA) → Licensing and permitting → Construction → Operation → Decommissioning

- Protect nuclear information and IT systems
- Issue nuclear site licence to operators following robust assessment
- Advise government, local councils, Planning Inspectorate and the nuclear industry
- Set limits and monitor disposals and discharges of radioactive waste
- Ensure industry monitors and controls hazards effectively to protect the public
- GDA — Assess nuclear power station designs before construction begins
- Protect habitats and wildlife both on and off the site
- Issue environmental permits and consents during construction and for operation of the power station
- Approve site security arrangements through lifetime of power station
- Enforce regulations and take legal action if necessary
- Advise on flood and coastal erosion risk management for the site and associated developments
- Promote waste reduction, reuse and recycling
- Ensure compliance with agreed safety and security arrangements and law
- Monitor and assess compliance with government regulations
- Ensure fish and marine life are protected
- Manage the impacts of construction both on and off the site

Talking to communities and stakeholders

Talking to power station designers, operators and international bodies

**Geological Disposal Facility (GDF) for radioactive waste**
Supporting the search for a site

ONR Office for Nuclear Regulation · Environment Agency · Cyfoeth Naturiol Cymru Natural Resources Wales

**Planning Inspectorate**
Deal with planning applications for national infrastructure

**Government**
Make energy policy and identify sites

**Regulators**
Independent of government and industry

**Nuclear industry**
Design, build, operate and decommission a nuclear power station

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# New nuclear power stations: GDA

ONR Office for Nuclear Regulation | Environment Agency | Cyfoeth Naturiol Cymru Natural Resources Wales

Generic Design Assessment (GDA) helps ensure high standards of safety, security, environmental protection and waste management

GDA is where regulators work together to assess new nuclear power station designs **before** they are built

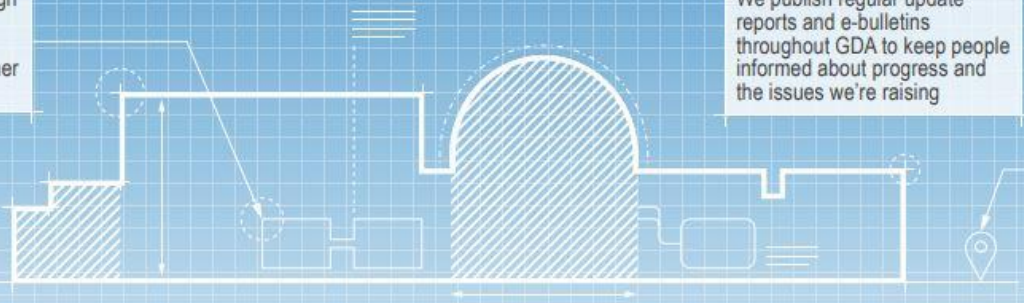
GDA helps ensure that new nuclear power stations meet **high standards** of safety, security, environmental protection and waste management


GDA is carried out in **4 steps** of increasingly detailed assessment

GDA will take around **4 years** to complete. At the end we say if the nuclear power station design is acceptable for the UK

We identify important design or technical issues early, before construction. This enables the reactor designer to address them

Identifying issues early is "enabling regulation" and helps to reduce potential cost and time risks from design changes during construction



We publish regular update reports and e-bulletins throughout GDA to keep people informed about progress and the issues we're raising

Developers and regulators use GDA to inform site specific work. Developers must obtain all relevant licences, permits and consents for each site before construction can begin

How can local communities get involved?

GDA is **open and transparent**, so there are lots of ways to get involved

**Comments process**

You can view information on the designer's website and ask a question or make a comment during GDA and the designers will respond

We see all comments and the designer's responses and can use these to help inform our work

**Consultation**

The Environment Agency and Natural Resources Wales consult on findings from their detailed assessment

All comments made are carefully considered and can help inform decisions about the designs

**Meetings and events**

Talk to us at local stakeholder meetings, public events or conferences

Find out more and sign up for our e-bulletin:

www.gov.uk/government/collections/assessing-new-nuclear-power-station-designs



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# The Office for Nuclear Regulation (ONR)

- ONR is an independent statutory body
- Formed in April 2014 on the commencement of the Energy Act 2013
- Formerly agency of Health & Safety Executive HSE
  - Began as Nuclear Installations Inspectorate (NII) in 1960
- Regulate civil nuclear activity plus some aspects of defence activity across Great Britain
- Close liaison with other regulators in the sector (particularly the Environment Agencies)


Nuclear safety

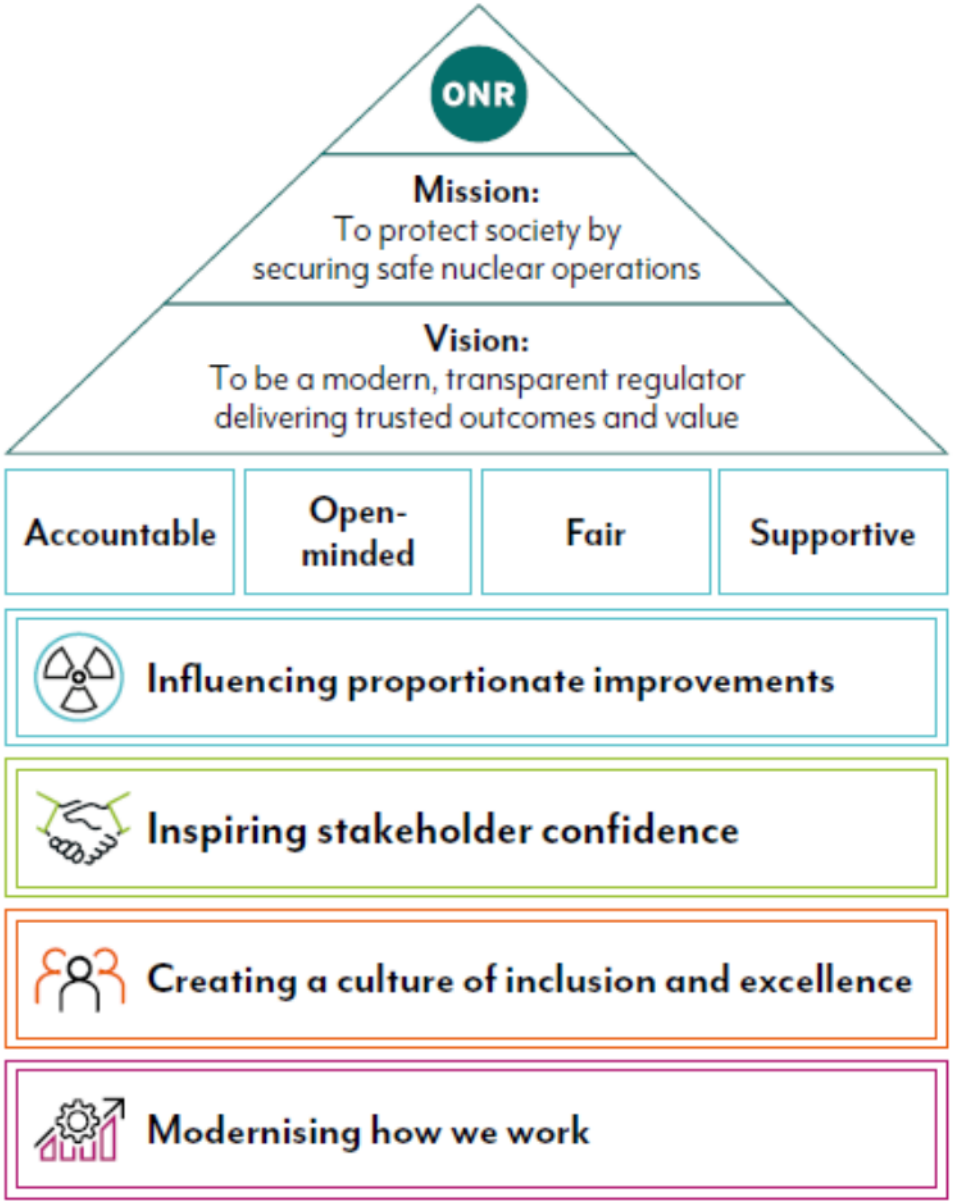
Nuclear site health and safety (conventional health and safety)

Nuclear security

Nuclear safeguards

Transport of radioactive materials

Office for Nuclear Regulation




# ONR's Mission Vision Values & Strategic Themes

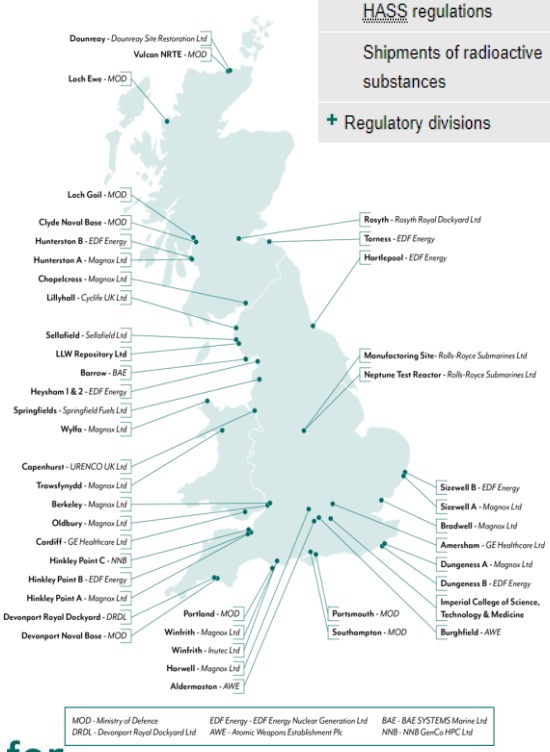
What we do
− How we regulate
Nuclear site licensing
Enforcement
Delicensing of nuclear sites
Sites that we regulate
+ Regulatory nuclear interface protocol
International Safety Standards (IAEA)
HASS regulations
Shipments of radioactive substances
+ Regulatory divisions

# Sites/Facilities that we regulate

Map of regulated sites/facilities

Public Register of Nuclear Site Licensees

- AWE - Aldermaston & Burghfield
- Barrow - BAE Systems
- Berkeley - Magnox Limited
- Bradwell - Magnox Limited
- Capenhurst Urenco UK Limited
- Chapelcross - Magnox Limited
- Clyde Naval Base - Ministry of Defence
- Cyclife UK Ltd - Lillyhall
- Devonport - Devonport Royal Dockyard Ltd
- Dounreay Site Restoration Ltd
- Dungeness A - Magnox Limited
- Dungeness B - EDF Energy Nuclear Generation Ltd
- GE Healthcare - Amersham
- GE Healthcare - Cardiff (De-licensed 10 December 2019)
- Hartlepool - EDF Energy Nuclear Generation Ltd
- Harwell - Magnox Limited
- Heysham 1 - EDF Energy Nuclear Generation Ltd
- Heysham 2 - EDF Energy Nuclear Generation Ltd
- Hinkley Point A - Magnox Limited
- Hinkley Point B - EDF Energy Nuclear Generation Ltd
- Hinkley Point C - NNB Generation Company
- Hunterston A - Magnox Limited
- Hunterston B - EDF Energy Nuclear Generation Ltd
- Imperial College of Science Technology and Medicine
- LLWR (Low Level Waste Repository) - Drigg
- Oldbury - Magnox Limited
- Rolls Royce Marine - Derby
- Rosyth Royal Dockyard Limited and Rosyth Royal Dockyard
- Sellafield - West Cumbria
- Sizewell A - Magnox Limited
- Sizewell B - EDF Energy Nuclear Generation Ltd
- Springfields Fuels Limited - Preston
- Torness - EDF Energy Nuclear Generation Ltd
- Trawsfynydd - Magnox Limited
- Winfrith - Magnox Limited / Inutec Limited
- Wylfa - Magnox Limited




ONR - Sites/Facilities that we regulate

Office for Nuclear Regulation

# ONR's Resources

ONR's cadre totals 600+ staff
with over 400 technical staff (c. 340 of whom are "fully" warranted inspectors)

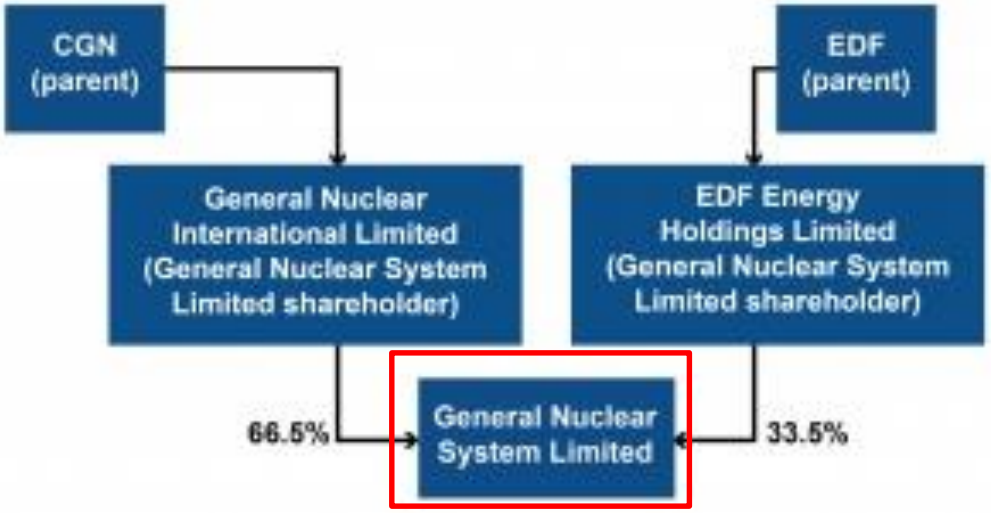
*ONR Inspectors Visit Fangchenggang Nuclear Power Plant construction site in May 2018*

*Picture Courtesy of CGN*

Office for Nuclear Regulation

# The Requesting Party

- CGN and EDF have created a joint venture company, called General Nuclear System Limited (GNSL), to undertake the Generic Design Assessment (GDA) process for the UK HPR1000 nuclear reactor technology.




- CGN and EDF have been working together for more than 30 years on a range of projects, including nuclear development and construction in China.
- We formed an industrial partnership in the UK to build the Hinkley Point C nuclear power station in Somerset and to develop Sizewell C (Suffolk) and Bradwell B (Essex).
- Together we bring a wealth of experience in developing nuclear power stations across the world, as well as proven safety and security records.

- General Nuclear System Limited is a UK registered company which acts on behalf of the three joint requesting parties: CGN, EDF and General Nuclear International (GNI).
  **For practical purposes General Nuclear System Limited is referred to as the 'UK HPR1000 GDA Requesting Party'.**

# CGN

- CGN is a major generator of low carbon energy in China and around the world and is the biggest builder of new nuclear power stations globally.
- CGN is the third largest nuclear enterprise in the world, with 24 nuclear units in operation in China and a total generating capacity of 27.1GW. It also has 5 units under construction with a capacity of 5.8GW.
- CGN has more than 30 years' experience of safely delivering nuclear power projects.
- CGN also has more than 30GW of renewables in 15 countries.

Nuclear power

Nuclear fuel

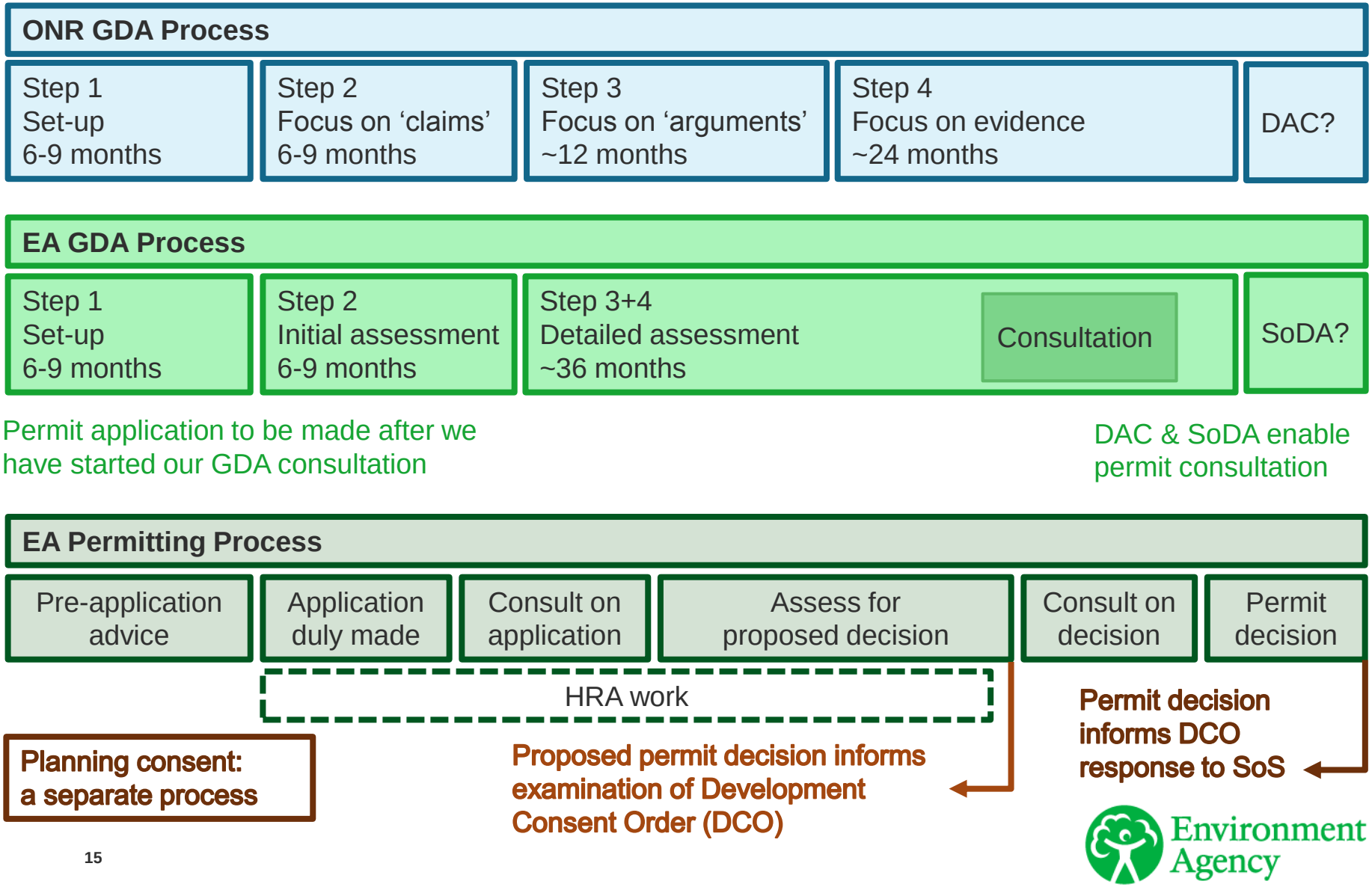
New energy

# EDF

- EDF Energy operates eight existing nuclear power stations across the UK, in addition to over 30 wind farms, one gas and two coal power stations.
- EDF Energy is the UK's largest producer of low-carbon electricity, meeting around one-fifth of the country's demand and supplying millions of customers and businesses with electricity and gas.
- Builds on the expertise of its people, its R&D and engineering skills, its experience as a leading industry operator and the attentive support of its customers to deliver competitive solutions that successfully reconcile economic growth with climate protection
- Extensive experience of building and operating nuclear power stations, as well as gas-powered stations, hydropower stations, renewable wind and solar projects.



# A quick reminder – the GDA process



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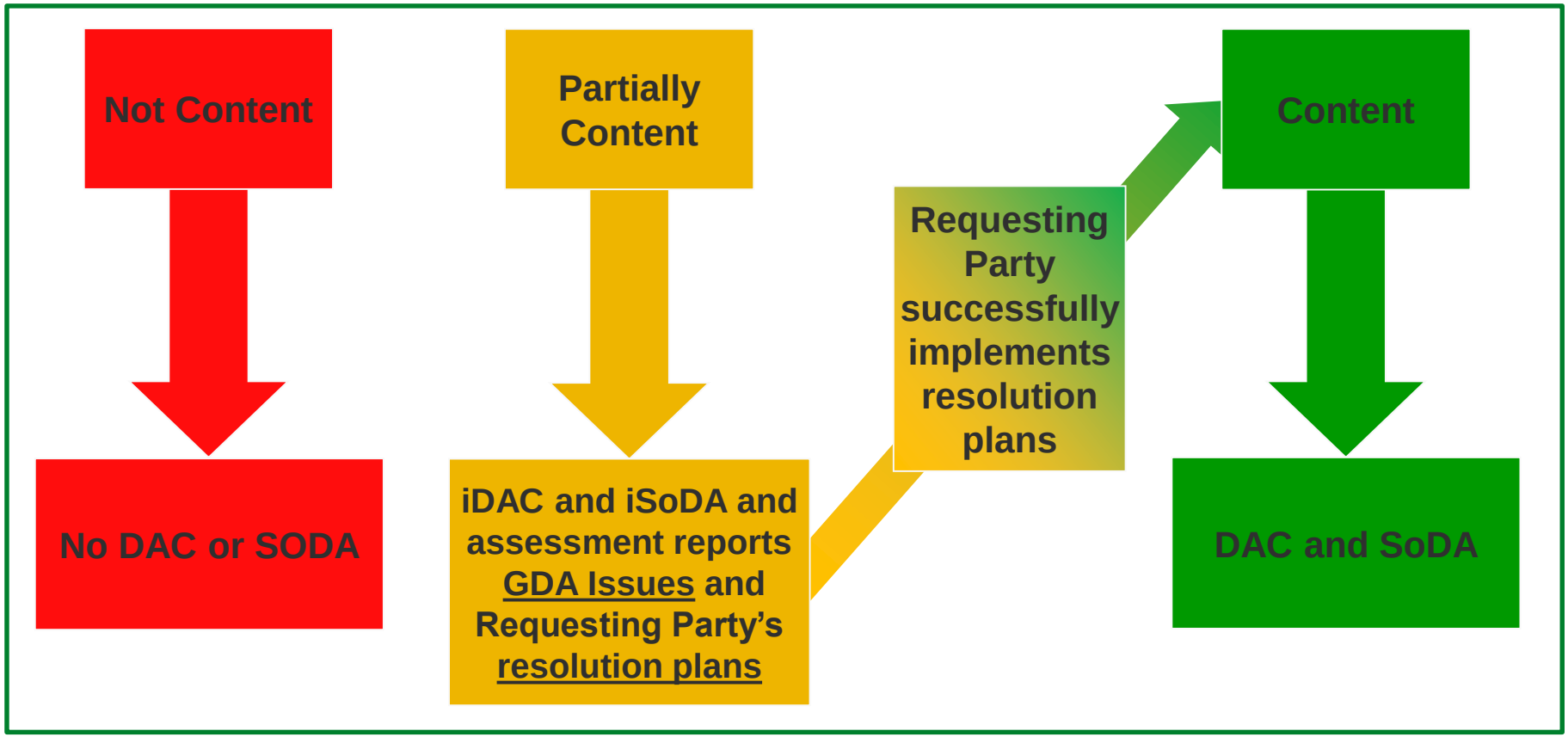
# A quick reminder – GDA outcomes




**DAC:** ONR's Design Acceptance Confirmation (iDAC: interim DAC)

**SODA:** EA's Statement of Design Acceptability (iSoDA: interim SoDA)



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# Our Consultation

We are

- working to engage people, recognising the current difficult position due to coronavirus restrictions
- holding events for both national and local stakeholders
- increasing the number of events
- advertising in local newspapers – both print and digital formats
- including non-digital options (telephone appointments and making hard copy documents available)
- raising awareness via our regular communication channels

Our engagement plan is available online:

https://www.gov.uk/government/publications/generic-design-assessment-of-the-uk-hpr1000-consultation-plan/environment-agencys-consultation-plan-on-the-generic-design-assessment-of-the-uk-hpr1000



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# Our consultation documents

- We have produced a suite of documents to help inform you.
  - **Summary document:** non technical information and how to respond
  - **Consultation document:** about the consultation, the GDA process, the design and summarises our assessment
  - **Assessment reports:** 8 detailed technical reports and an independent dose assessment

  - All our documents are found here: https://www.gov.uk/government/consultations/generic-design-assessment-of-general-nuclear-system-limiteds-uk-hpr1000-reactor

  - For additional information, the Requesting Party have also published their – Pre-construction Environmental Report (PCER) (http://www.ukhpr1000.co.uk/documents-library/step-4/)



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# Scope of the GDA consultation

- In GDA we assess environmental protection aspects of a new design of nuclear power station, including its potential environmental impacts.
- These impacts are not related to a specific site, but to a generic site, as specified by the Requesting Party.

- This consultation is not about:
  - government energy policy,
  - site specific environmental impacts
  - planning aspects, such as visual impacts or transport (Planning Inspectorate & Secretary of State)
  - Safety, security or transportation of radioactive materials (ONR)



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# Key assumptions used in this GDA

- Consistent with government policy:
  - Fuel will not be reprocessed
  - Spent fuel will go to a geological disposal facility (GDF)
  - Higher activity wastes will go to a GDF
- The generic site uses once through seawater cooling



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# The UK HPR1000 – How it works

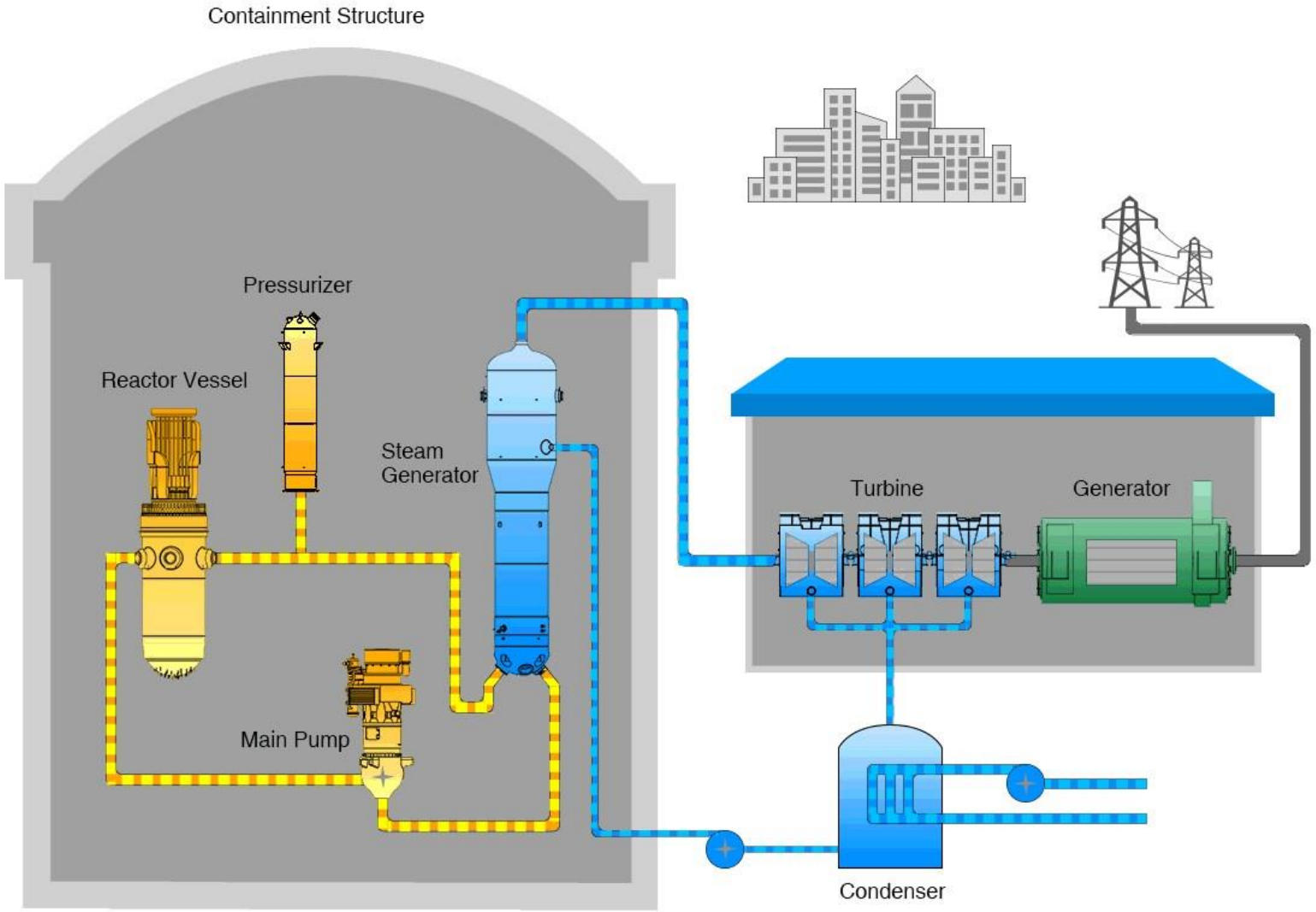


*Image courtesy of CGN*



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# Assessment outcomes – A summary

- We have 8 topics of assessment in GDA:
  1. MSQA (Management systems)
  2. Strategic waste management
  3. Best available techniques (BAT)
  4. Discharge to air and water
  5. Solid waste, spent fuel and disposability
  6. Sampling and monitoring
  7. Generic site and radiological impact
  8. Other Environmental Regulations
- We can discuss specific topics in more detail in the Q&A if required.



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# GDA outcomes: Potential GDA Issues and Assessment Findings

- *Potential GDA Issues* are matters identified during GDA that, if not resolved **by the end of GDA** would become GDA Issues. This means we could only issue an iSoDA

- *Assessment Findings* relate to matters identified during GDA that require addressing at the site specific stage. These are **addressed after GDA** as they require inputs relating to operator decisions or site specific information before they can be assessed



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# Assessment – Generic Site

- In GDA, we require a representative (generic) site to be defined in order to assess the environmental impacts of the reactor design

- The parameters that are part of the generic site description may include:
  - the position of the reactor and the environment around it
  - environmental parameters such as meteorological conditions, dispersion of liquid and gaseous discharges
  - the distance to the nearest occupied buildings, farmland and centres of population
  - “habits” of the local population
  - potential designated or protected wildlife sites



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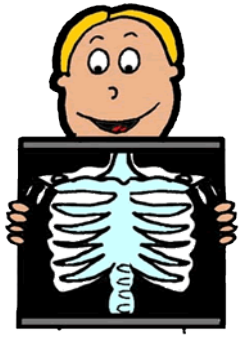
# Radiological impact in Context

- GNSL's submission indicates that, potentially, the highest total dose to members of the public will be between **10 and 23 micro-Sieverts** a year (μSv/y) depending on age group
- The highest dose would be to an adult member of a 'fishing family' who are most affected by discharges of liquids

- Dose received from:
  - eating 100g brazil nuts = **10 micro-Sv**
  - having a chest x-ray = **14 micro-Sv**
  - taking a transatlantic flight = **80 micro-Sv**
- Average annual radiation dose in the UK = **2700 micro-Sv/y**
- Average annual radon dose in Cornwall = **6900 micro-Sv/y**



https://www.gov.uk/government/publications/ionising-radiation-dose-comparisons/ionising-radiation-dose-comparisons



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# Assessment outcomes – A summary

- MSQA - We identified 1 potential GDA Issue:
  - Potential GDA Issue 1: This relates to ensuring consistency across the project in selection and use of Operational Experience (OPEX)

- Best Available Techniques - We have identified 2 potential GDA Issues:
  - Potential GDA Issue 2: We have received an appropriate BAT case for GDA, but the ONR have yet to agree the ALARP case. Where this leads to re-evaluation of design options we require a demonstration that environmental protection was given appropriate consideration (alongside safety).
  - Potential GDA Issue 3: We require further justification of how best available techniques is applied to the choice made in selection of HEPA filter type.

*ALARP = As low as reasonably practicable, an ONR term related to risk*



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# Assessment outcomes – A summary

- Solid Waste, Spent Fuel and Disposability - We have identified 3 potential GDA Issues
  - Potential GDA Issue 4: GNSL need to demonstrate the proposed concept design for the SFIS is applicable to the actual requirements stipulated by the fuel manufacture
  - Potential GDA Issue 5: GNSL need to provide further substantiation of the proposed strategy for the management of in-core instrument assemblies (ICIAs) to ONR. If there are any changes to the proposed waste strategy the impact on the disposal of ICIA wastes needs to be considered.
  - Potential GDA Issue 6: GNSL still need to provide evidence that the RWM have agreed that the higher activity waste (HAW) is suitable for acceptance into a future GDF.

RWM = Radioactive Waste Management Ltd ('gatekeepers' for waste entering our GDF)



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# Our overall preliminary conclusion

- As we have identified 6 potential GDA Issues, which if not resolved before the end of GDA would become GDA Issues (details later), therefore:
- **Consultation document considers issuing an interim Statement of Design Acceptability (iSoDA)**
- As stated in the consultation document:
  - Work is already ongoing to resolve these issues.
  - If these issues are resolved by the end of GDA and no other potential issues are found, we could consider issuing a SoDA
- We have also identified 40 Assessment Findings which will require work by a future operator to address



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# Responding to the consultation

## Online

Visit our e-consultation website.

https://consult.environment-agency.gov.uk/nuclear/assessing-new-nuclear-power-station-ukhpr1000/

## By email or letter

You can also submit a response by email or letter.

Email to: nuclear@environment-agency.gov.uk

## By post:

For the attention of Paula Atkin

Environment Agency
Ghyll Mount
Gillan Way
Penrith
CA11 9BP



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# Next Steps

We will:

- record, carefully consider and respond to all relevant comments in our decision document
- use these comments to help inform our assessments, where relevant
- publish a summary of the responses on GOV.UK in May 2021
- publish our final decision document on GOV.UK in early 2022



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# Thank you for your time

# Any questions?



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