



Office for
Nuclear Regulation

The UK Generic Design Assessment

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Introduction to ONR

(www.onr.org.uk)

The Office for Nuclear Regulation (ONR)

- The UK nuclear regulatory body was created in 1960. It was then called Nuclear Installations Inspectorate (NII)
- NII was integrated into a new organisation called Office for Nuclear Regulation (ONR) in 2011. ONR was established as an Agency of the Health & Safety Executive (HSE) pending formal legislation
- ONR was created as an independent statutory body in April 2014, on the commencement of the Energy Act 2013:
 - ONR is as far removed from the Government as is possible
 - The Government has no role in regulatory decision making



ONR's Areas of Responsibility

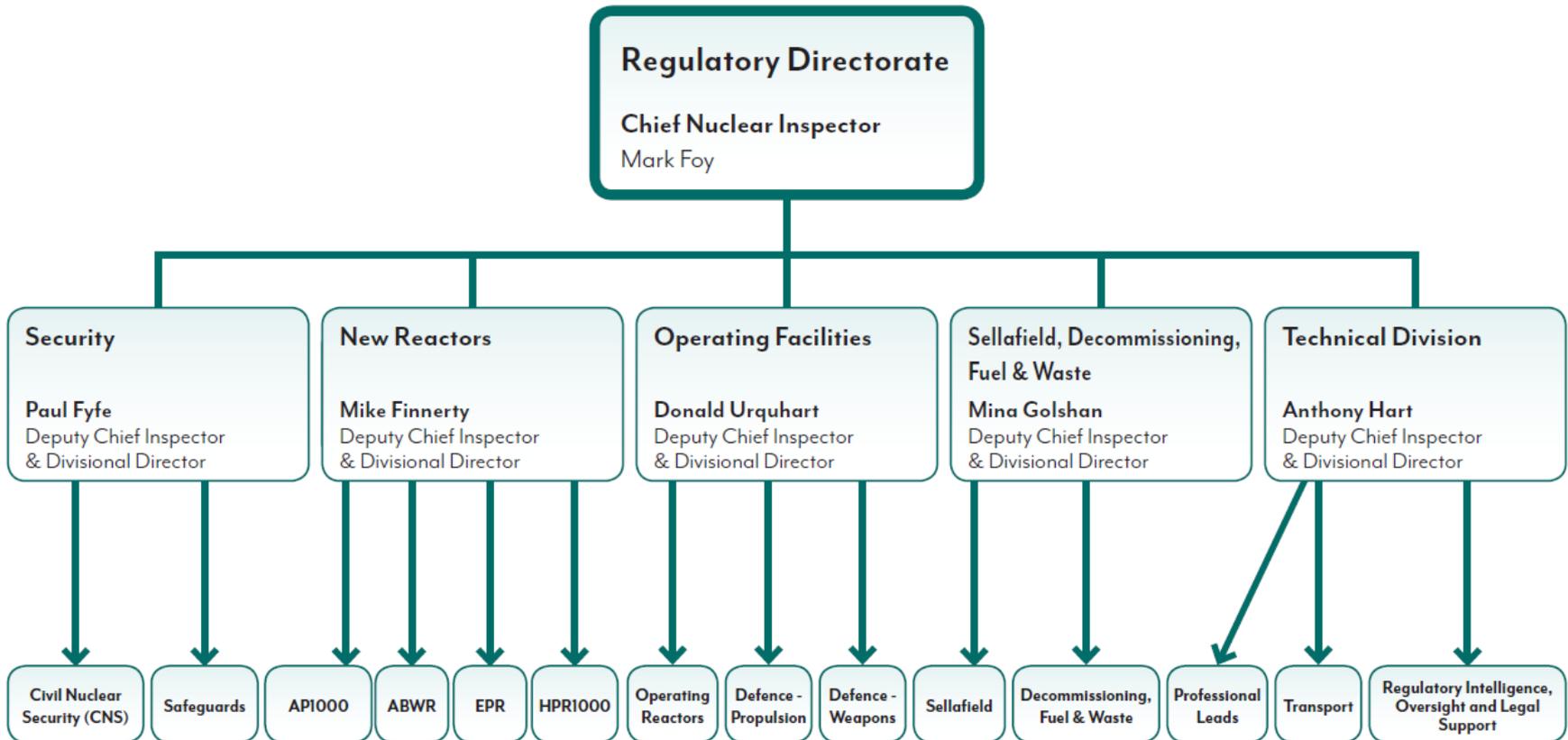
- Nuclear safety
- Nuclear site health and safety (*conventional* health and safety)
- Nuclear security
- Nuclear safeguards
- Transport of radioactive materials

- In addition ONR works closely with other agencies (such as the Environment Agency (EA)) to take strategic action in the public interest





Regulatory Directorate Structure





The UK Generic Design Assessment



The three elements of new build

General Design Assessment (GDA)	Nuclear Site Licensing	Construction
<p>EDF/Ariva's UK EPR™</p>  <p>Westinghouse's AP1000®</p>  <p>Hitachi-GE's UK ABWR</p>  <p>General Nuclear System's UK HPR1000</p> 	   	<p>Hinkley Point C</p>  <p>Sizewell C</p>  <p>Moorside</p>  <p>Wylfa Newydd</p>  <p>Oldbury</p>  <p>Bradwell B</p> 

What is GDA?

- GDA is an upfront, step-wise assessment of a generic reactor design undertaken by joint Regulators (ONR / Environment Agency (EA) / Natural Resources Wales)
- Usually, GDA does not consider a specific build location or a specific operating organisation
- Prior to investment decisions
- Aim and advantage is ***identifying and resolving key issues and design changes long before build – reducing construction cost and time risks***
- Openness, transparency and public input are very important in GDA – building public confidence
- GDA is not a formal regulatory / legislative requirement, but remains a Government expectation

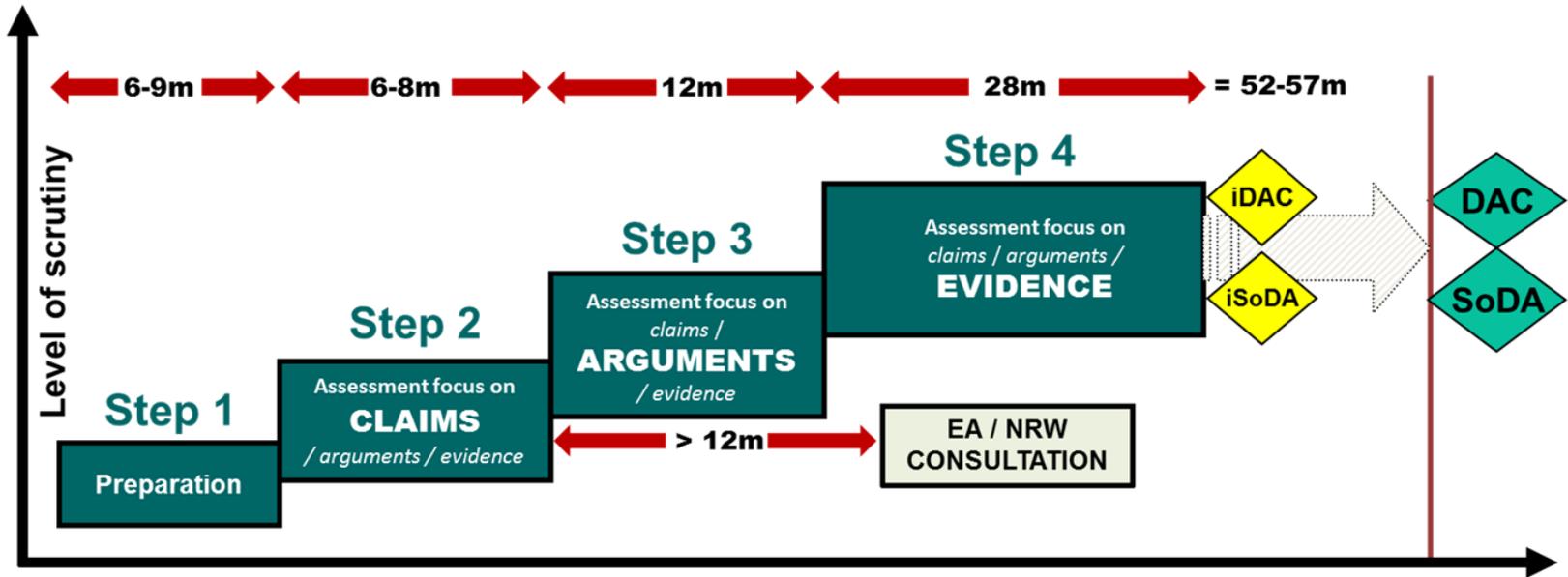


Role of ONR & EA in GDA Entry

- Entry to GDA is a matter for the Government via the Department for Business, Energy and Industrial Strategy (BEIS)
 - BEIS determines the reactor technologies proposed for GDA against their own criteria, and therefore the regulators are technology neutral
 - Based on preliminary technical discussions with a potential GDA Requesting Party (RP), the regulators will form a view on:
 - The RP's readiness to begin GDA, and
 - whether there is a credible prospect of completing the process in a reasonable timeframe
- The regulators provide their views to BEIS**
- Once the GDA process has started, BEIS does not have vires over ONR's and EA's technical regulatory decisions



GDA Process & Typical Timescales



E N A B L I N G

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

SODA: EA/NRW's Statement of Design Acceptability (iSODA: interim SODA)



GDA Step 1: preparatory phase of the GDA process

- The key objective of Step 1 is for the Requesting Party (RP) to develop adequate project management arrangements and deploy sufficient technical resource to complete GDA
- There is no technical assessment during Step 1 but the regulators can engage with the RP to ensure that regulatory expectations are well understood
- The output from Step 1 is a statement of readiness (from the regulators) for the RP to proceed to Step 2

GDA Step 2: high-level assessment of the fundamental aspects of the design (“claims / assertions”)

- **Claims (or assertions)** → comprehensive set of statements that describe the design and explain why the facility is safe, secure and environmentally acceptable
- The claims are normally presented in the form of Preliminary Safety, Security and Environmental Reports
- The key objective of Step 2 is to identify any fundamental safety, security or environmental issues that might prevent the issue of a DAC or SoDA
- ONR publishes its Step 2 Assessment Reports and a Summary Report in <http://www.onr.org.uk/new-reactors/index.htm>
- EA publishes its GDA reports in <https://www.gov.uk/topic/environmental-management/nuclear-regulation>

GDA Step 3: a more detailed assessment of the design (“arguments / reasoning”)

- **Arguments (or reasoning)** explain the approaches to satisfying the claims
→ for example methodologies used and assumptions made
- These are normally described within the (generic) Pre-construction Safety Report (PCSR), Pre-construction Environmental Report (PCER) and Generic Security Report (GSR) and relevant references
- There is increased regulatory scrutiny during Step 3
- A key objective of Step 3 is to identify whether any significant design changes are required to meet UK legislative requirements
- At the end of Step 3 ONR publishes a Summary Assessment Report in <http://www.onr.org.uk/new-reactors/index.htm>

GDA Step 4: in-depth assessment of “evidence”

- **Evidence** → facts presented to support and form the basis of the arguments and claims → for example code analysis results, verification and validation reports, experimental results, etc.
- The objective of Step 4 is for the regulators to complete a detailed assessment to be able to come to a judgment of whether a DAC and SoDA should be issued for the design
- During Step 4 the Environment Agency conducts a public consultation on the findings so far
- ONR publishes its Step 4 Assessment Reports and a Summary Report in <http://www.onr.org.uk/new-reactors/index.htm>
- EA publishes its GDA reports in <https://www.gov.uk/topic/environmental-management/nuclear-regulation>

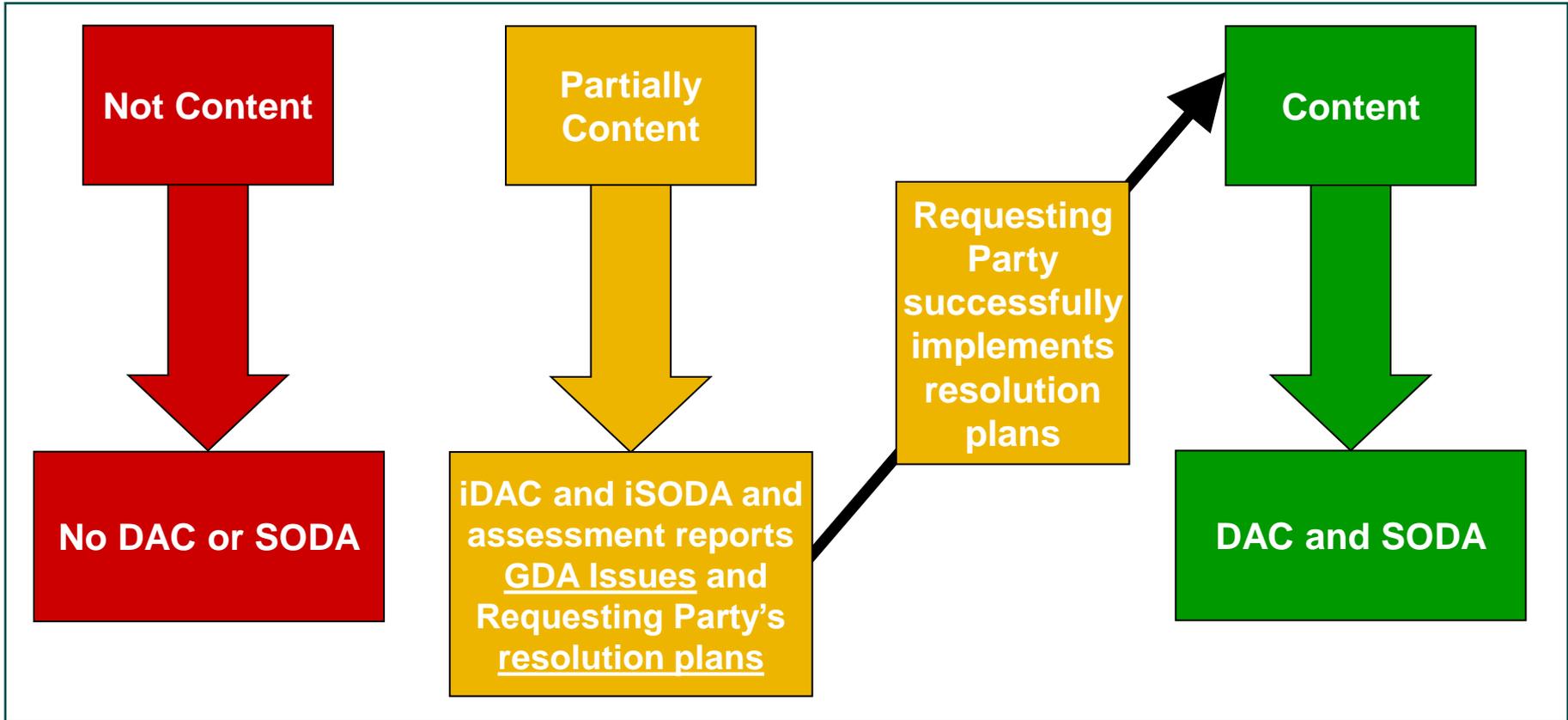
Resolution of technical issues

- **Regulatory Queries (RQ)** – Low level queries. Closure does not require a dedicated work plan
- **Regulatory Observations (RO)** – Potential for a significant regulatory shortfall where action by the RP is required. ROs can have one or multiple actions, and usually have multidiscipline ramifications
- **Regulatory Issues (RIs)** – Raised when ONR identified a significant and serious shortfall in the design in relation to UK regulatory expectations.

RIs are reserved to sufficiently significant concerns that would prevent the issue of a DAC unless resolved



GDA: Potential Outcomes



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

SODA: EA/NRW's Statement of Design Acceptability (iSODA: interim SODA)

Scope of GDA

Safety → Assessment by ONR

- 20 technical disciplines
- The bases of assessment are: ALARP (risks As Low as Reasonably Practicable) and ONR's Safety Assessment Principles (SAPs)

Security → Assessment by ONR

- The bases of assessment are: the Nuclear Industry Security Regulations (NISR) and ONR's Security Assessment Principles (SyAPs)

Environment → Assessment by the Environment Agency

- The bases of assessment are: BAT (Best Available Techniques) and EA's Radioactive Substances Regulation Environmental Principles (REPs)
- Through life assessment, plus future disposability of wastes



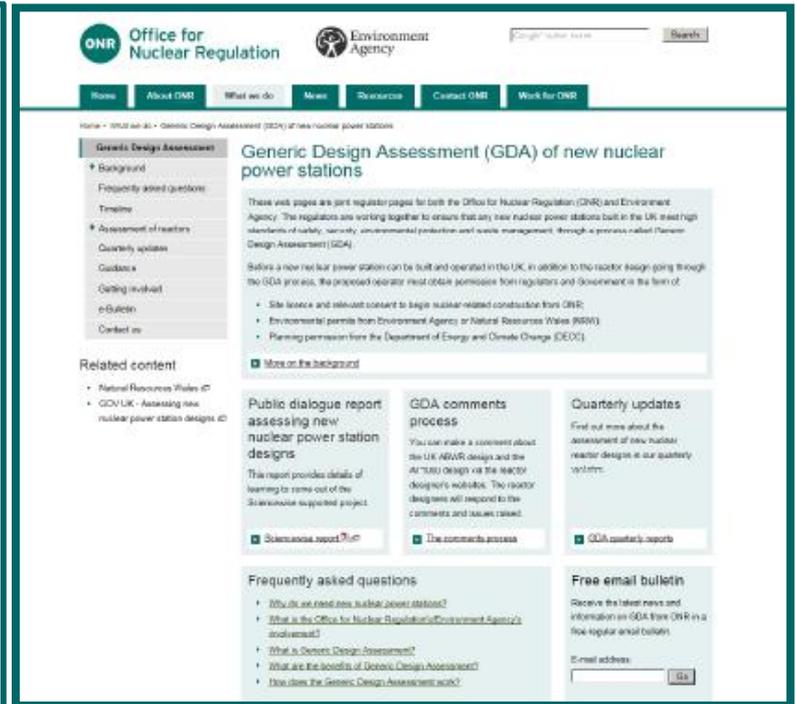
Engagement in GDA: openness and transparency

Openness:

- Requesting Parties' websites with safety and environmental reports, and the means for the public to make comments
- Regulators' GDA website
- Regulators' guidance published

Transparency

- Regulatory Observations (RO) and Regulatory Issues (RI) published
- Regulators' assessment reports published



<http://www.onr.org.uk/new-reactors/index.htm>



GDA discipline-specific expectations

- ONR proactively shares learning (and expectations for GDA) at international conferences and events. Two recent examples are:



NUCLEAR POWER PLANT DESIGN RESILIENCE AGAINST HAZARD COMBINATIONS - A MULTI-DISCIPLINE VIEW

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24th International Conference on Structural Mechanics in Reactor Technology (SMiRT 24) - 15th International Post-Conference Seminar on "FIRE SAFETY IN NUCLEAR POWER PLANTS AND INSTALLATIONS"

UK REGULATORY EXPECTATIONS IN THE ASSESSMENT OF INTERNAL FIRE AND EXPLOSION HAZARDS THROUGH THE GENERIC DESIGN ASSESSMENT PROCESS

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Office for Nuclear Regulation (ONR), Bootle, United Kingdom





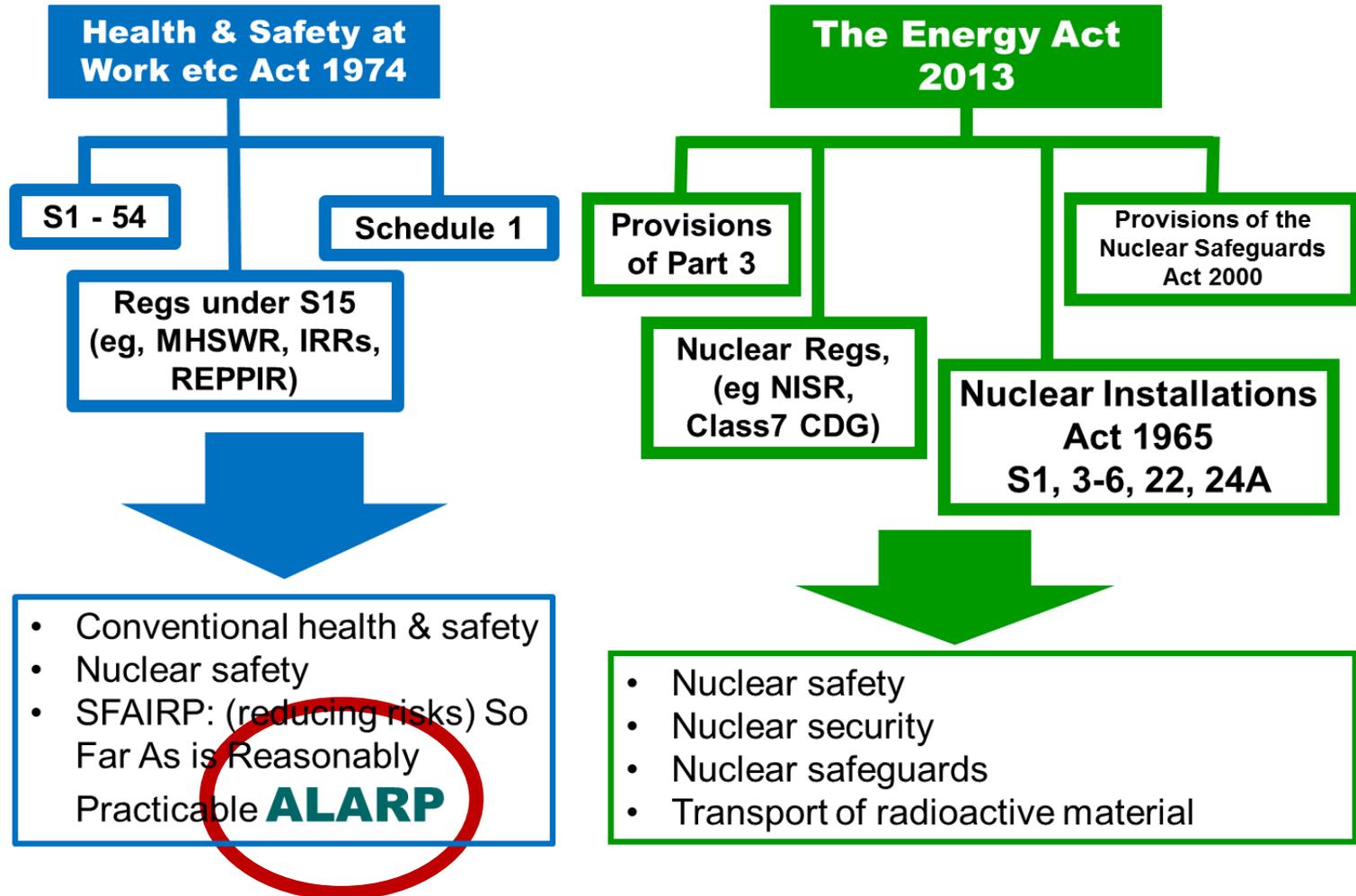
The way ONR regulates

ONR's Regulatory Philosophy

- **Goal setting – (mostly) non-prescriptive**
- Underpinned by a **risk-informed framework** (Tolerability of Risk, **TOR**)
- Aimed at developing and sustaining an open and effective dialogue with dutyholders → positive and **enabling** approach to the permissioning of activity
- The key pillar of our regulatory work is ensuring that risks are reduced **As Low As Reasonably Practicable (ALARP)**



ONR Legal Framework



ALARP: As Low As Reasonably Practicable

The “Reasonably Practicable” Principle

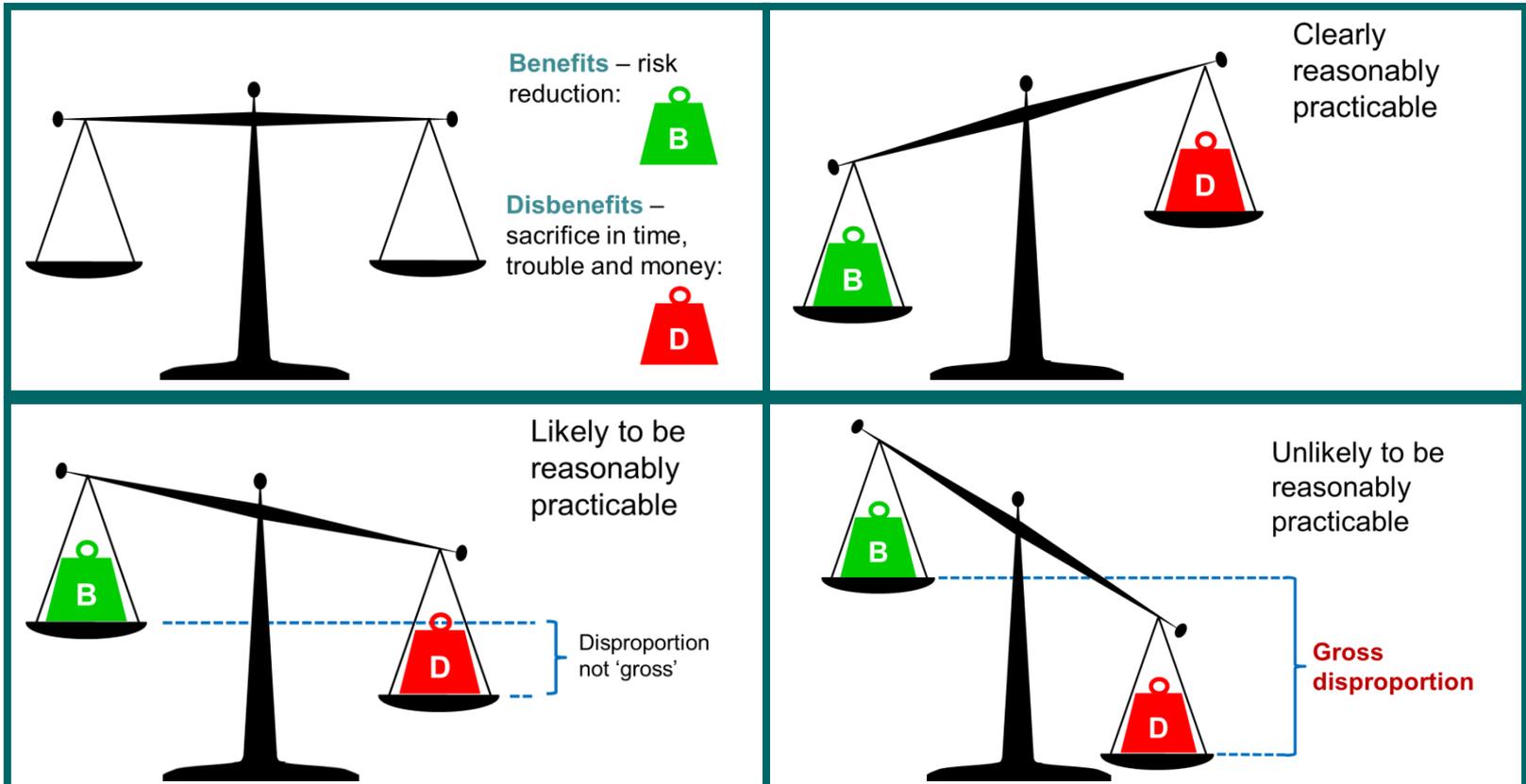
- Based on the 1949 Court Case: Edwards vs. National Coal Board
- The Court of Appeal considered whether it was reasonably practicable to make the roof and sides of a road in a mine secure. The Court of Appeal held that:

'Reasonably practicable' is a narrower term than 'physically possible' and seems to me to imply that a computation must be made by the owner in which the quantum of **risk** is placed on one scale and the **sacrifice** involved in the measures necessary for averting the risk (**whether in money, time or trouble**) is placed in the other, and that, if it be shown that there is a **gross disproportion** between them - the risk being insignificant in relation to the sacrifice - the defendants discharge the onus on them."





Understanding what 'Reasonably Practicable' means



The use of Relevant Good Practice (RGP)

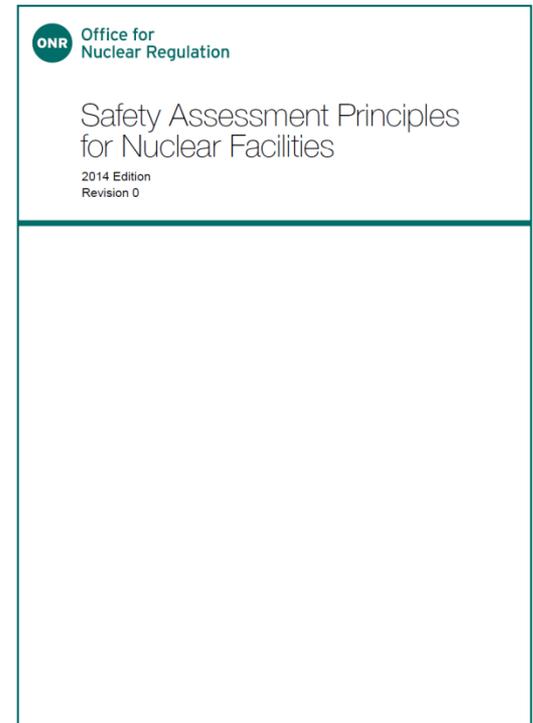
- In most cases demonstrating ALARP is not done through explicit comparison of costs and benefits, but by applying established **relevant good practice (RGP)**
- **RGP** is those standards for controlling the risk **judged and recognized by ONR** as satisfying the law, when applied appropriately
- **RGP** is the starting point in any ALARP demonstration:
 - Focus on appropriate engineering, operations and management of safety
 - Defence-in-depth / hierarchy of control measures: 1 Prevent the hazard → 2 Protect → 3 Mitigate
- Sources of **RGP** are, for example ONR's Safety Assessment Principles (SAPs) & Technical Assessment Guides (TAGs), IAEA Standards, WENRA Reference Levels, what is done in similar facilities

ONR's Safety Assessment Principles (SAPs)

- The SAPs are principles to be followed by ONR Inspectors when assessing Safety Cases
- They provide a framework for consistent regulatory judgements on the acceptability of Safety Cases
- They also include numerical targets (BSLs and BSOs) to be used by inspectors as an aid to judgement when considering whether risks are reduced to ALARP
- The SAPs are neither intended, nor sufficient to be used as a design standard
- The SAPs are in line with IAEA standards and guidance
- The SAPs are supported by more detailed Technical Assessment Guides (TAGs)

Structure of ONR's SAPs

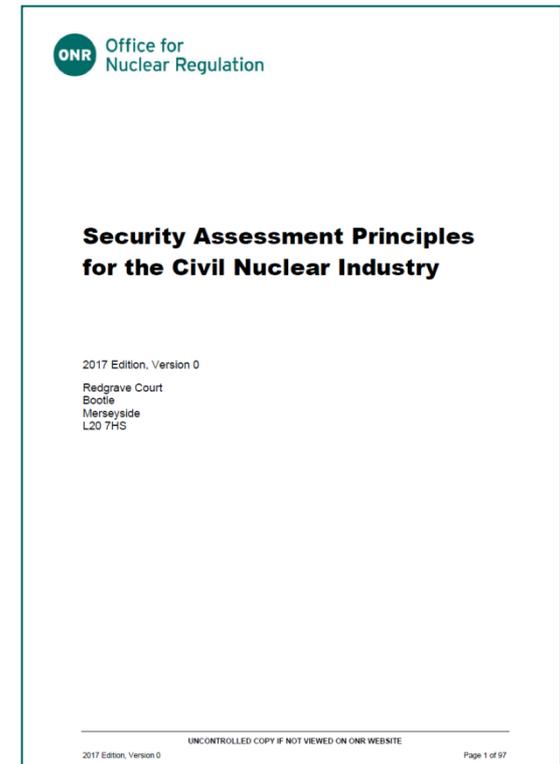
- Fundamental principles
- Leadership and management for safety
- The regulatory assessment of safety cases
- Siting aspects
- Engineering principles
- Radiation protection
- Fault analysis
- Numerical targets
- Accident management and emergency preparedness
- Radioactive waste management
- Decommissioning
- Land quality management



<http://www.onr.org.uk/saps/saps2014.pdf>

ONR's Security Assessment Principles (SyAPs)

- UK legislation on nuclear security is covered by the Nuclear Industries Security Regulations 2003 (as amended)
- Supported by the ONR Security Assessment Principles (31 March 2017):
 - 1 Unifying Statement
 - 10 Fundamental Principles
 - 38 Security Delivery Principles
 - 38 Technical Assessment Guides
- The majority of SyAPS and TAGs are published on ONR's website



<http://www.onr.org.uk/syaps/security-assessment-principles-2017.pdf>



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UK ABWR GDA

UK ABWR GDA

HITACHI



- Formally concluded in December 2018 (started 2013) – c. 5 years
- UK ABWR awarded the Design Acceptance Confirmation (DAC)
- No GDA issues – DAC issued at the end of Step 4
- 201 Assessment findings to be addressed during the Licensing and Construction phases in line with ONR regulatory processes



UK HPR1000 GDA

UK HPR1000 GDA

- On 10 January 2017 the UK Government requested the Regulators (ONR and EA) to commence the GDA of the UK HPR1000 reactor technology
- **The UK HPR1000 GDA formally started on 19 January 2017**
- General Nuclear System Ltd (GNS) is a UK-registered company created to implement the UK HPR1000 GDA
- GNS acts on behalf of the *three joint requesting parties*: China General Nuclear Group (CGN), EDF S.A. and General Nuclear International Limited (GNI)
- For practical purposes GNS is referred to as the “UK HPR1000 GDA Requesting Party (RP)”

UK HPR1000 GDA Step 1

- Started in January 2017
- During Step 1 the GDA Requesting Party:
 - Set up its project management and technical teams and arrangements for GDA, and
 - Wrote and prepared submissions for Step 2, including the Preliminary Safety, Security, and Environmental Report
- Also during Step 1 the Requesting Party and the Regulators held extensive discussions (including technical discussions) to enable the Requesting Party's understanding of the requirements and processes that would be applied



UK HPR1000 GDA Step 2

- Step 2 officially commenced on 16 November 2017 – it is scheduled to last one year
- GNS established a [UK HPR1000 GDA website](#) containing:
 - The Preliminary Safety, Security and Environmental Report (PSR) for the UK HPR1000
 - A means for the public to raise comments
- During Step 2 the regulators are assessing the UK HPR1000 PSR and its references

Cooperation with Overseas Regulators

ONR considers international cooperation essential for successful delivery of regulation of new reactors, and thus, we seek and welcome opportunities for international collaboration



MDEP AP1000 design Specific Working Group – Visit to Sanmen NPP in September 2014

Cooperation between National Nuclear Safety Administration (NNSA) and ONR/EA

- A bilateral NNSA / ONR&EA Working Group was launched in September 2017. Its key objectives are:
 - To share information and experience
 - To identify opportunities for joint visits and inspections
- In addition, a HPR1000 Design Specific Working Group within the OECD-NEA Multinational Design Evaluation Programme (MDEP) has been created and has commenced its activities in 2018



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THANK YOU

WWW.ONR.ORG.UK/NEW-REACTORS/INDEX.HTM