How pre-licensing processes are helping deliver Nuclear New Build
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Pre-licensing is generally seen by the nuclear industry as an effective means of enhancing predictability” WNA

▶ US NRC “Design Certification and Early Site Permit” – most clear cut and well known and have certain legal and binding effect

▶ Canada – Regulator can be asked to perform a pre-design review of a new reactor design to establish compliance with national regulatory requirements and identify fundamental barriers to licensability (not very formal nor legally binding)

▶ UK – The Generic Design Assessment (GDA) was created by the regulator without national legislation. Aims to improve predictability by reviewing potential designs and assess their licensability once site-specific factors have been taken into account (less binding than US design certification)

▶ France – Regulator (ASN) undertakes a “review of safety options” which is not binding.

▶ Czech Republic – the site license is the first step of the legal licensing procedure of any particular nuclear plant
Nuclear Power Plant Construction (UK Perspective)

Pre-requisites

- Regulatory Justification
- Funded Decommissioning Programme
- Development Consent Order

Secretary of State

GDA

- Nuclear Site Licence
- Site Security Plan
- Environmental Permits

Nuclear Construction
“We want our GDA assessment to be more complete than these overseas assessments so that it can be wide ranging and as final as possible. This will minimise the design review work that will be needed if any of the designs are submitted for site licensing assessment. We will therefore deal with as many significant issues as possible within the scope of GDA” UK Nuclear Regulator
Generic Design Assessment (GDA) - Background

What is GDA?
Assessment of a Generic Reactor Design – single unit, independent of site
► 1st stage of a 2-step licensing process
► 2nd stage is Site Specific Licensing

Joint Regulatory Process through contract; Office of Nuclear Regulation (ONR) and The Environmental Agency (EA)

Purpose
Introduced to reduce the risk inherent in the licensing process - to give more certainty to utilities that designs are licensable in the UK

Process
Application by Requesting Party (ies) (RPs) – e.g. EDF and AREVA, HGNE, Westinghouse
Assessment:
► Safety (ONR → DAC*) ; Security (CNS) ; Environment (EA → SoDA**)
  Assessment – Steps 1 to 4 (increasing level of detail), and post-Step 4
  Assessment is ~< level appropriate to allow NI safety-related construction to proceed BUT does not provide the Approval for such.

* Design Acceptance Confirmation
** Statement of Design Acceptability
Why GDA and Pre-GDA?

Why GDA?
► Mitigates the risk of major investment and high cost momentum only to find fundamental flaws in reactor technology / application of technology

Why a De-Risking Process by UK Industry prior to GDA?
► UK context can be VERY different
► Recognised by ONR/EA that Pre-GDA is good LFE* from early GDAs
► More efficient use of regulatory resources
► Prepares for improved engagement on GDA
► GDA is fully open and transparent
► De-links commencement of (pseudo) Regulatory process from site acquisition
► Pre-GDA will reduce GDA costs, duration and risks (no surprises)
► Pre-GDA will reduce overall programme costs, duration and risks

*Learning From Experience
The Actors in a Typical GDA process

Requesting Party
- Vendor - Presents the design and provides evidence. Leads the project + GDA interface

UK Context Partners: Safety Case, UK Engineering & Regulatory Interface

ONR + EA
- Inspects and assesses and provides a Design Acceptance Confirmation (DAC)/ Statements of Design Acceptability (SoDA) for the generic design

Industry

Operator
Generic Design Assessment (GDA) - Process

4 steps with increasing level of scrutiny

- **Step 1**: Preparation
  - Overview of claims
- **Step 2**: Review of arguments
- **Step 3**: Detailed evidence of arguments
  - (EA) Public Consultation
  - iDAC
  - iSODA
- **Step 4**: DAC
  - SODA

Level of scrutiny

Time
ONR/EA Decision Making Processes

GDA outcomes

- Not content
- Not content enough
- Content
  - Vendors successfully implement resolution plans
    - iDAC and iSODA and assessment reports
    - GDA issues and vendors’ resolution reports
  - DAC and SODA

No DAC or SODA
General Principles of Pre-Licensing and GDA

Optimisation of GDA through early support activities from Amec Foster Wheeler

GDA EPR/AP1000 - Case History

Step 1 - Set Up
Step 2 - Claims
Step 3 - Arguments
Step 4 - Evidence

Back-end Loaded: Late Design changes

GDA Regulatory Guidance

Evidence made available earlier ... Licensing convergence

Phase 1: Pre-GDA
Phase 1.a - Project Initiation
Phase 1.b - De-Risking

Phase 1.a
- Design Familiarisation
- UK Context Training

Phase 1.b
- Responsible Designer
- Systematic & Robust Challenge
- Presentation of Design & Safety Case Documentation
- Independent Advice & Challenge Organisation (I.A.C.O.)
Provisional Approach to future GDA

- PMO Support
- RIO Support
- Safety Case Support
- UK Context Engineering
- Training, Coaching and Mentoring

An integrated solution focusing on DAC and SoDA

Getting an optimised outcome
The Nuclear Site License (NSL) Phase
The operator is legally responsible for reducing the risk to employees and to others, so far as is reasonably practicable. (Thus reducing the risk As Low as is Reasonably Practicable [ALARP] or So Far As Is Reasonably Practicable [SFAIRP])

Vendors must supply equipment that is capable of being operated to achieve this.

It follows that the nuclear regulatory system is non-prescriptive. It is the Licensee who must fully understand the hazards, and define how this hazard is managed to reduce the risk.
Nuclear Site Licence (NSL)

The 36 Licence conditions are non-prescriptive – they set high-level goals that apply throughout the life of the installation.

The licensee can develop arrangements to comply with the licence conditions that best suit its business – but must demonstrate proper management of safety.

These Compliance arrangements form the basis for the Licensee’s Safety and Quality Management System – must demonstrate application of detailed safety standards and safe procedures.

ONR assesses whether the licence holder has demonstrated it understands the hazards associated with its activities and how to control them adequately – this is based largely on the Licensee’s safety case.

ONR assesses the licensee’s safety case against the Safety Assessment Principles for Nuclear Facilities - SAPs.
36 Nuclear Site Licence Conditions

The main basis for regulation of nuclear activities: each Licensee develops their own arrangements

1. Interpretation
2. Marking of the site boundary
3. Restriction on dealing with the site
4. Restrictions on nuclear matter on the site
5. Consignment of nuclear matter
6. Documents, records, authorities and certificates
7. Incidents on the site
8. Warning notices
9. Instructions to persons on the site
10. Training
11. Emergency arrangements
12. Duly authorized and other suitably qualified and experienced persons
13. Nuclear safety committee
14. Safety documentation
15. Periodic review
16. Site plans, designs and specifications
17. Management systems
18. Radiological protection
19. Construction or installation of new plant
20. Modification to design of plant under construction
21. Commissioning
22. Modification or experiment on existing plant
23. Operating rules
24. Operating instructions
25. Operational records
26. Control and supervision of operations
27. Safety mechanisms, devices and circuits
28. Examination, inspection, maintenance and testing
29. Duty to carry out tests, inspections and examinations
30. Periodic shutdown
31. Shutdown of specified operations
32. Accumulation of radioactive waste
33. Disposal of radioactive waste
34. Leakage and escape of radioactive material and radioactive waste
35. Decommissioning
36. Organisational capability
the three key themes ONR addresses in assessing a licence application are:
- the capability, organisation and resources of the applicant corporate body;
- the nature of the prescribed activities and the relevant safety case;
- the nature and location of the site.

Granting the NSL does not constitute permission to start construction of nuclear safety related plant, which also requires:

- Permission from ONR (LC19 says ‘the licence holder shall not commence construction of new safety related plant without the consent of the Executive’)
- Permits from the Environment Agency
- Planning consent from the Secretary of State (more later)
GDA and NSL Licensing
Taking the GDA output forward to the site-specific Stage

► A successful GDA outcome does not guarantee that ONR will permit the construction of the nuclear power station based on that design.

► Final GDA submission documentation need to be incorporated largely unchanged within site-specific Pre-construction Safety and Security Reports

► A programme to address the Assessment Findings (if applicable) from the GDA must be in place during the ongoing design, procurement, construction, testing and commissioning programme

► Aspects of the GDA submission may require re-assessment if they are affected by subsequent significant design changes

► GDA DAC will be used to underpin the regulatory permissions needed by operators to construct a fleet of reactors based on common design.
Points to take away

► International consensus to the advantages and benefits of pre-licensing

► A number of national models exist of how to undertake pre-licensing

► There is room for improvement and the pre-licensing process continues to evolve as a living organism

► Cross-fertilisation across national boundaries helps to improve the process

► Knowledge transfer and information exchange between countries (regulators, vendors, licensees and operators) are vital for streamlining the pre-licensing process
Any questions?