Programme Area: Nuclear

Project: SMR Deployment Enablers

Title: SMR deplyment enables work break down structure and first 5 year project plan

Context:

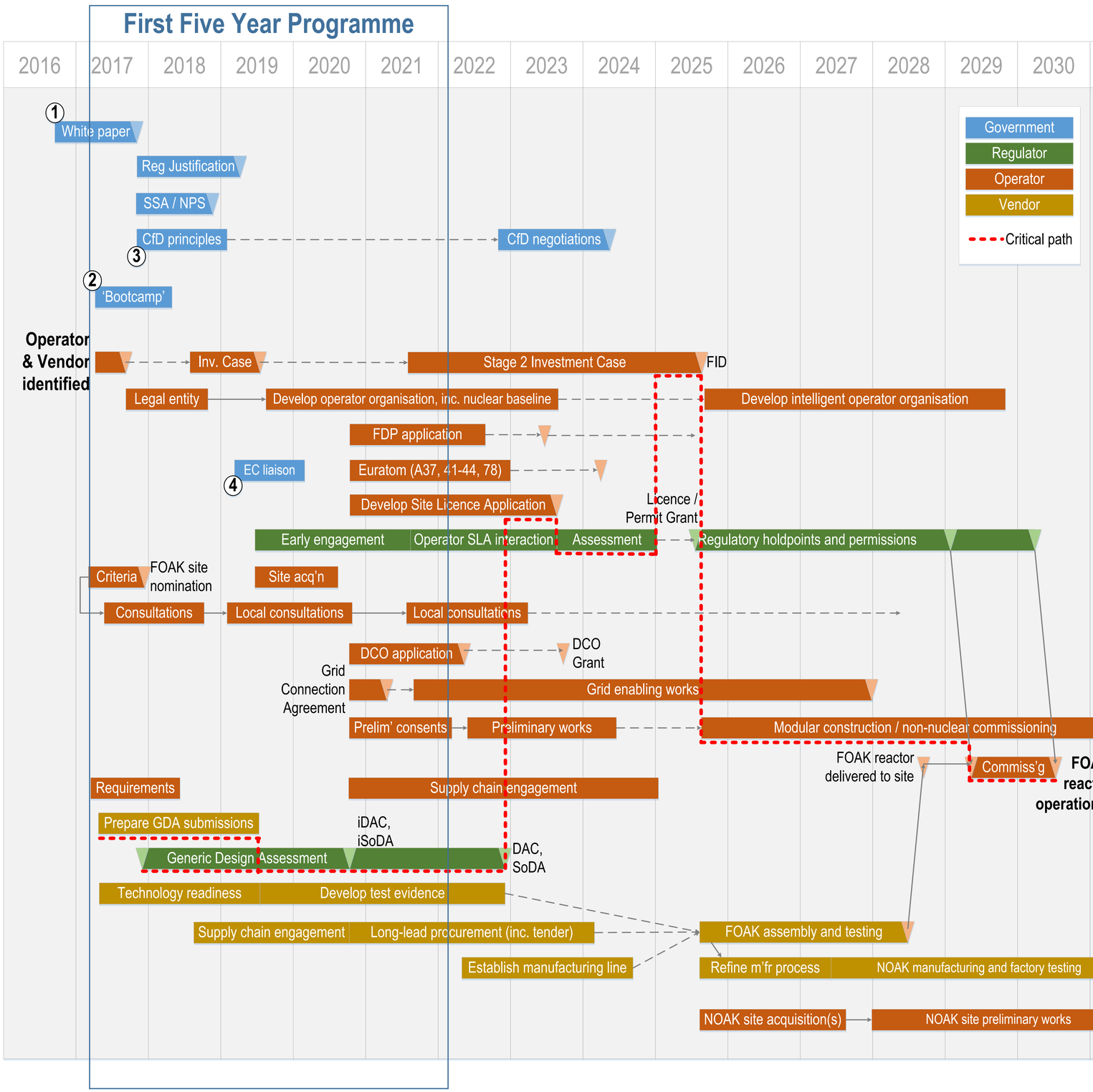
The purpose of the SMR Deplyment Enablers project was to identify the activities needed to take place in the first five years of a development plan for UK SMRs and the necessary capability of the SMR utility/developer organisation during this phase. Selection processes are out of scope so the starting assumption for the project is that both the SMR utility/developer and reactor vendor have already been identified.

SMR Deployment Enablers Project

Work Breakdown Structure (WBS)
UK SMR FOAK Development Programme

- **WBS 1 Facilitative Action by UK Government**
  - WBS 1.1 Implement Framework of Facilitative actions
    - WBS 1.1.1 Update HMG Policy on Nuclear Energy
    - WBS 1.1.2 Undertake Further SSA Process to Extend Range of Potential Sites
    - WBS 1.1.3 Establish Updated National Policy Statements
    - WBS 1.1.4 Secure Regulatory Justification of SMR designs
    - WBS 1.1.5 Initiate Generic Design Assessment of SMR designs
  - WBS 1.2 Facilitate Investor Confidence
    - WBS 1.2.1 Facilitate Investment Promotion
    - WBS 1.2.2 Influence Grid Investment Policy
    - WBS 1.2.3. Influence Business, Innovation and Skills Strategy
    - WBS 1.2.4 Set Foreign Policy / Strategy and assess Impacts
    - WBS 1.2.5 Set Climate Change Energy Policy
  - WBS 1.3 Facilitate Bootcamp to Provide Education in Processes, Particularly UK Regulatory Process
- **WBS 2 Understand and Negotiate Business Case**
  - WBS 2.1 Agree Developer / Operator Financing Arrangements (inc "start-up" financing)
  - WBS 2.2 Assess Market Support (inc. Feed-in tariff / CfD)
  - WBS 2.3 Build Revenue Model (inc. Operating regime, single/ multiple revenue streams, power purchase agreements)
  - WBS 2.4 Build Whole Life Cost Model (capital, fixed/variable operating, decommissioning, fuel, carbon)
  - WBS 2.5 Assess External factors (inc Government policy)
  - WBS 2.6 Establish Economies of Multiples
  - WBS 2.7 Establish the Financial Viability Using Scenario-Based Investment Analysis
  - WBS 2.8 Plan for Intellectual Property and Technology Licensing (inc. Government Policy)
- **WBS 3 Establish Credible Nuclear Operator**
  - WBS 3.1 Establish legal entity (Developer / Operator)
  - WBS 3.2 Establish Nuclear Baseline
    - WBS 3.2.1 Define Organisational Structure and design criteria
    - WBS 3.2.2 Identify All Nuclear and Radiological Business Activities
    - WBS 3.2.3 Establish Employment Model
    - WBS 3.2.4 Define / Record Nuclear Baseline Posts / Roles
    - WBS 3.2.5 Evaluate Nuclear Capability Resilience
    - WBS 3.2.6 Define Management of Change Process
    - WBS 3.2.7 Establish Management System Arrangements
    - WBS 3.2.8 Secure Suitable Operator Resourcing / Recruitment
  - WBS 3.3 Establish Safety and Environment Management Prospectus
    - WBS 3.3.1 Define and publish Strategy and Route-map
  - WBS 3.4 Produce a Company Manual
- **WBS 4 Select and Acquire site(s), Seek Consent for Preliminary Works**
  - WBS 4.1 Define Key Aspects of Project Relevant to Site Selection
  - WBS 4.2 Characterise Potential Site Against Key Project, Consenting and Stakeholder Requirements
  - WBS 4.3 Nominate Site into New Strategic Siting Assessment
  - WBS 4.4 Establish Key Commercial Terms for Site Development
  - WBS 4.5 Develop and Submit DCO Application
  - WBS 4.6 Secure Consents for Any Works Needed in Advance of DCO Grants
  - WBS 4.7 Submit Early Application for Grid Connection
- **WBS 5 Accelerate Technology Development**
  - WBS 5.1 DefineTechnology Requirements
    - WBS 5.1.1 Define Nuclear Island Requirements (baseload / Variable Electricity / Heat Recovery)
    - WBS 5.1.2 Define Conventional Plant Requirements
    - WBS 5.1.3 Define ILW and Spent Fuel Handling (strategy and Requirements)
    - WBS 5.1.4 Define New Fuel Supply (Strategy and Requirements)
  - WBS 5.2 Assess Technology Readiness
    - WBS 5.2.1 Validate and verify Technology claims (inc. OPEX international SMR programmes)
    - WBS 5.2.2 Evaluate Design for Manufacture requirements (economies of multiples)
    - WBS 5.2.3 Develop Standardisation (economies of multiples)
- **WBS 6 Establish Approved Funded Decommissioning Programme**
  - WBS 6.1 Develop DWMP
  - WBS 6.2 Agree Waste Transfer Contracts
  - WBS 6.3 Develop Funding Arrangements Plan
- **WBS 7 Obtain Assessment, Permitting and Consents**
  - WBS 7.1 Provide Vendor Input to Pre-Construction Safety Report
  - WBS 7.2 Obtain DAC and SoDA from Regulators for Generic Design Assessment (Phase 1)
    - WBS 7.2.1 Submit Generic PCSR and Obtain DAC from ONR
    - WBS 7.2.2 Submit Generic Data on Environmental Attributes of Design and Obtain SoDA from EA
  - WBS 7.3 Demonstrate Compliance with Euratom Treaty Provisions
    - WBS 7.3.1 Secure Favourable Article 37 Opinion
    - WBS 7.3.2 Secure Favourable Article 43 Point of View
    - WBS 7.3.3 Complete Communication Required Under Article 78
  - WBS 7.4 Provide Operator Input to Pre-Construction Safety Report
  - WBS 7.5 Obtain a Nuclear Site Licence from ONR, Planning Permission from Government, and site-specific Environmental Permits from EA/NRW
- **WBS 8 Identify and Engage with FOAK Stakeholders**
  - WBS 8.1 Scope FOAK Stakeholders
    - WBS 8.1.1 Engage Systematically With Stakeholders in Planning System
    - WBS 8.1.2 Engage Systematically With Nuclear Regulators
  - WBS 8.2 Identify key Issues for Stakeholders
  - WBS 8.3 Engage Systematically With Local / Regional Public Stakeholders
  - WBS 8.4 Establish Framework for Local and Regional Stakeholder Engagement
    - WBS 8.4.1 Initiate Local / Regional Stakeholder Group
    - WBS 8.4.2 Extend Local / Regional Stakeholder Group into Permanent Forum
- **WBS 9 Initiate Supply Chain Development**
  - WBS 9.1 Develop Manufacturing Resource and Infrastructure Strategy
  - WBS 9.2 Develop Construction Methodology and Infrastructure Strategy
  - WBS 9.3 Develop Skills, Employment and Training
  - WBS 9.4 Develop Preparedness for Supplier Qualification
  - WBS 9.5 Develop Long Lead Item Procurement Strategy

SMR Deployment Enablers Project



Enabling Actions

Aim	Method	Role of Government
Commence GDA and Regulatory Justification early and complete within a 5 year timeframe	To enhance the confidence of private sector investors that future revenue from SMR generation is likely Enhance the quality of engagement between Vendor(s) and Regulators by raising awareness of the GDA process, in particular the UK regulatory standards and expectations	1 Facilitation / Statement of intent: To set out a clear statement of intent in relation to SMR development in the UK, the required timescales and facilitative actions that will be taken by Government. 2 Facilitation / UK awareness: To promote early engagement with Vendors, through a UK regulatory 'bootcamp' (facilitated by an industry body, such as the NIA) 1 Facilitation / Commit resource: To request the Regulators to support GDA and Regulatory Justification (facilitated by the NIA) and support the headcount implications
Minimise the duration between completion of GDA and FID	Establish the licensability of the Operator as a legal person distinct from the Vendor, with demonstrable capacity to assess the acceptability of the SMR designs and the assumptions on how these will be operated which underpin Vendors' GDA and Regulatory Justification submissions, together with the suitability of the proposed sites for SMRs and associated waste stores Identify opportunities for the Operator to commence wider site licence, permitting and consenting work, together with supporting site characterisation, pre-application engagement and public consultation, in parallel with vendor GDA (noting that this will represent a commercial risk to the private sector) Limit uncertainty within the investment case that underpins FID (in order to release interim investment ahead of FID and increase investor confidence concerning FID itself). This includes terms for grid connection, electricity offtake and transfer of waste and decommissioning liabilities	1 Risk management / facilitation: To review the adequacy of current legislation and national policy statements in light of the proposed SMR development programme and lessons learnt since the publication of the 2008 White Paper; and pass new legislation where required, in order to minimise the risk of challenge by Judicial Review 3 Risk management / facilitation: To engage early and constructively with operators (and their investors) to confirm agreements that underpin cost and revenue models (including, CfD negotiations, district heating assumptions, export market facilitation, waste storage and geological disposal strategies under the FDP).
Minimise the duration between FID and FOAK operation	Minimise the timescale associated with site construction by undertaking as much preliminary site work as is permissible ahead of grant of Site Licence, environmental permits and Development Consent (i.e. all reversible non-nuclear construction) Ensure the manufacture and assembly of the FOAK reactor is not on the critical path, by commencing the procurement of long-lead items ahead of FID	3 Risk management / facilitation: To engage early and constructively with operators (and their investors) to confirm agreements that underpin cost and revenue models (including, CfD negotiations, district heating assumptions, export market facilitation, waste strategies / geological disposal).
Minimise the schedule risk associated with critical-path and near-critical-path activities	Establish a clear and robust understanding of the regulatory and legislative framework for decisions throughout the timeline from project initiation up to FOAK operation; ensure this is aligned with the views of regulators, local authorities, the Planning Inspectorate and Government; and maintain effective interfaces with these stakeholders to identify and manage schedule risks	1 Risk management / facilitation: To review the adequacy of current legislation in light of the proposed SMR development programme and lessons learnt since the publication of the 2008 White Paper; and pass new legislation where required, in order to minimise the risk of challenge by Judicial Review 4 Risk management / facilitation: To engage early with European member states and the European Commission to identify and address potential challenges to Euratom Treaty submissions.

First Five Year Programme

2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023

Government
Regulator
Operator
Vendor

- NPS updated (to support DCO preparation)
- Site confirmed (route to acquisition understood)
- CfD principles outlined (inc. district heating assumptions)
- Regulatory Justification

Develop interim (Phase 1b) investment case

Assumed investment trigger: Issue of iDAC, iSoDA

Management Prospectus
Euratom
Site Licence / Permit compliance
Funded Decommissioning Programme
Preliminary site works
Long Lead Procurement

Operator / Vendor Bootcamp

Issue ISoDA
Issue SoDA

EA
- Discussions with Requesting Party
- Initial assessment of application
- Detailed Assessment
- Consultation
- Review and Decision

Issue IDAC
Issue DAC

ONR
- Step 1: Discussions with Requesting Party
- Step 2: Fundamental design, safety and security — *'Review of claims'*
- Step 3: Overall design, safety and security review — *'Review of arguments'*
- Step 4: Detailed design, safety and security assessment — *'Review of evidence'*

Requesting Party
Vendor Preliminary Safety Report (PSR)
Vendor Pre Construction Safety Report (PCSR)
Finalise Vendor Pre Construction Safety Report (PCSR)

Prepare GDA required documents
Update GDA required documents
Development of test evidence (inc. physical / virtual rig work)
Bound claims and arguments (Operator PSR / PCSR)