



Planning for Decommissioning – A UK Perspective

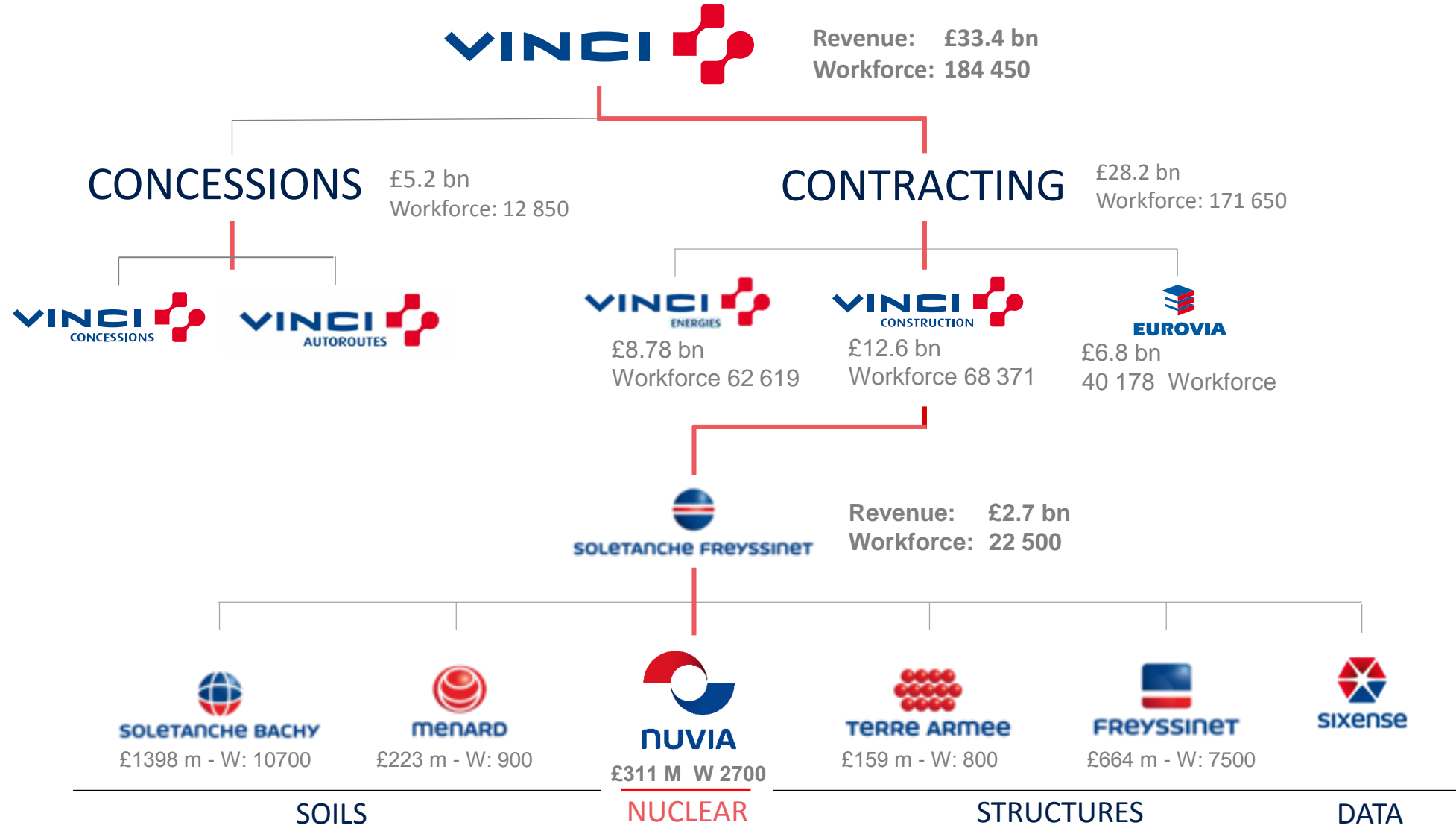
Ron Smith, International Business Manager

Eastern and Central European Decommissioning Conference June 25-26 2019



The Safe Way is the Only Way

Nuvia is part of VINCI: The world's leading construction & concessions company



Nuvia UK

Nuvia is located across the UK

Our locations are close to nuclear sites to enable us to respond quickly

We have circa 900 Nuvia personnel based in the UK supporting nuclear projects

Nuvia Group

France

Czech Republic

Germany

Sweden

Canada







India

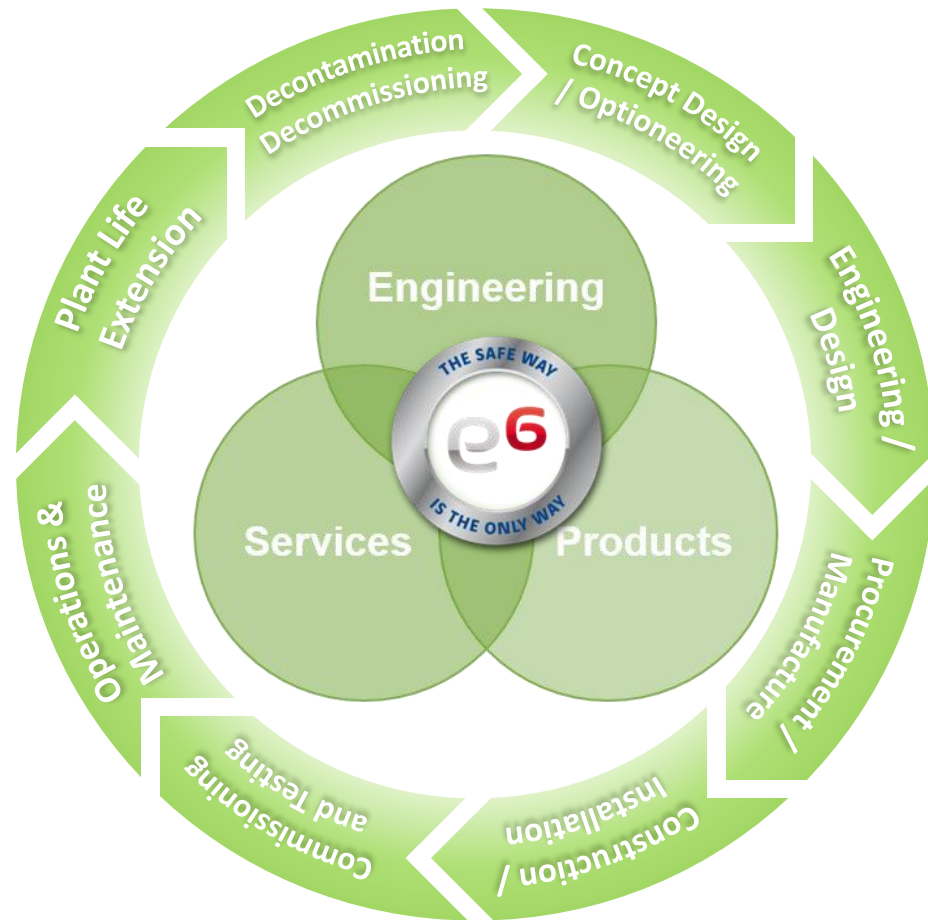


Nuvia Group

Supporting the full Lifecycle

Key Areas of Activity:

-  Consultancy
-  Design and Build
-  Plant Life Extension
-  Operations and Maintenance
-  Decommissioning
-  Radiation Protection
-  Waste Management
-  Products



Decommissioning Organisations in the UK

Government Owned Legacy Sites

Department Responsible

– Business, Energy & Industrial Strategy (BEIS)

Management

- Nuclear Decommissioning Agency (NDA)

Site License Companies / Businesses (owned by NDA)

- Sellafield Ltd
- Magnox Ltd
- Dounreay Site Restoration Ltd
- LLWR Repository Ltd
- Springfields Fuels Ltd
- Capenhurst

Contractors

Operating Power Stations

Station owner and operator

- EDF Energy

Government Department Responsible

– Business, Energy & Industrial Strategy (BEIS)

Decommissioning Funding

- Nuclear Liabilities Fund (NLF)

The Main UK Decommissioning Sites



NDA Estate Key Programmes:

PROGRAMMES	SITE(S) SUBSIDI	Business Plan										
		13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22		
Transformation (Sellafield)	Sellafield	Delivering the Transformation										
Oxide Fuels - Reprocessing	Sellafield	THORP reprocessing						Repro Complete	POCO			
Metal Fuels (Magnarx Operating Programme (MOP))	Sellafield, Magnox and Dounreay	DEFUELING										
		Dungeness A										
		Chapelcross										
		Sizewell A										
		Oldbury										
		Wyfa										
High Level Waste Management (Inc HAL)	Sellafield	Evaporator D construction										
		Vitrification of Highly Active Liquor (HAL)										
		Reduction of HAL stocks										
Magnarx Decommissioning Programme	Magnarx	Berkeley Vaults project										
Pile Fuel Storage Pond	Sellafield	Retrievals in preparation for de-watering							Retrievals during de-watering			
		Preparations										
Pile Fuel Cladding Silo	Sellafield	Design and Construction of BEPPS/ D						First retrievals				
Dounreay Decommissioning Programme (incl Exotics)	Dounreay	Decommissioning under target cost contract										
First Generation Magnox Storage Pond	Sellafield	FGMSP export project - Generation of export capability										
		Bulk sludge and fuel retrievals - Generation of capability to retrieve sludge from pond and D-bay										
		Self shielded boxes and interim safe store - Generation of storage capability										
		Preparation										
Magnox Swarf Storage Silo	Sellafield	SEP 2										
		Box Encapsulation Plant - Construction						SEP 1	First retrievals			SEP 3
		Silo Maintenance Facility - Construction										
Oxide Fuels - Receipts	Sellafield	Preparation										
		AGR fuel receipts from EDFE										
Higher Activity Wastes (inc RWG)	All SLCs	Preparations										
Low Level Waste (LLW)	All SLCs	Launch of siting process										
		Community engagement, site evaluations										
		Deliver the Joint Low Level Waste Management Plan										

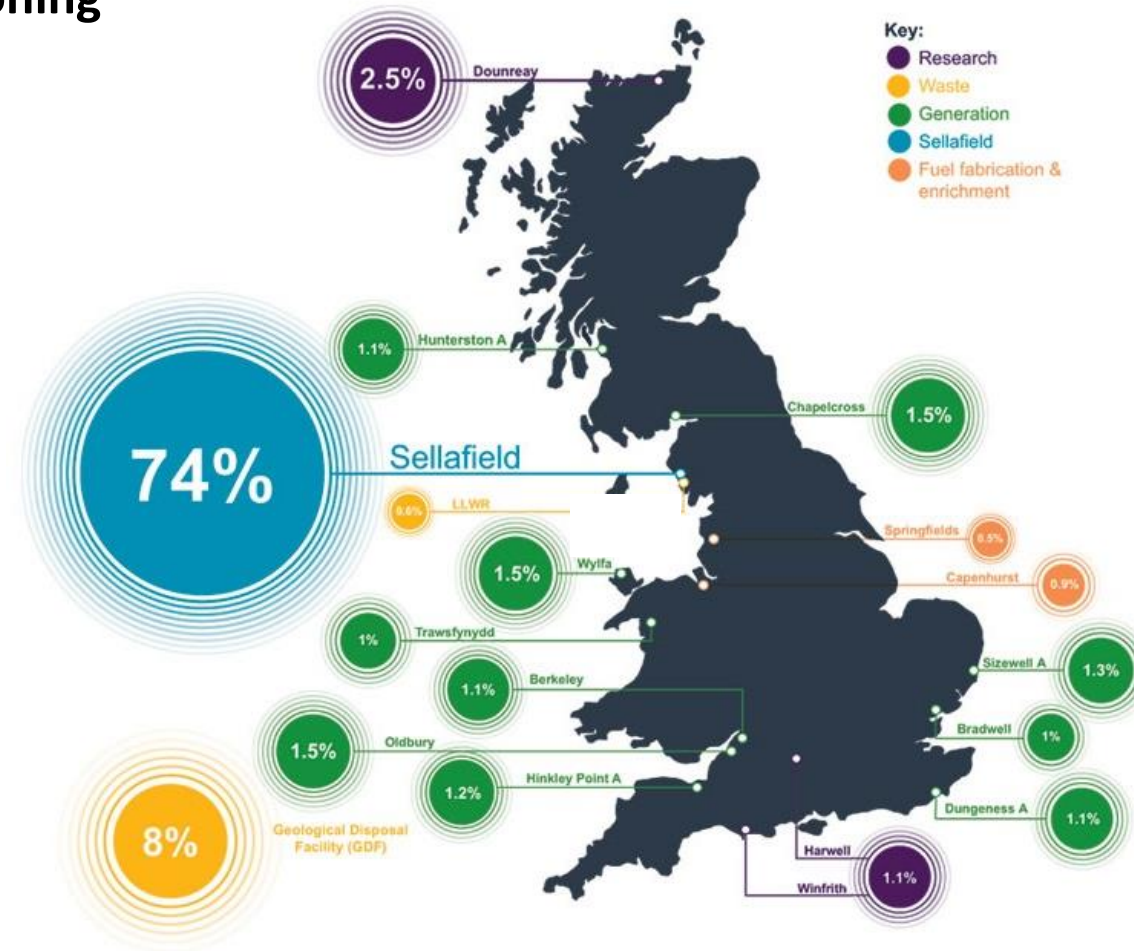
What have we learnt?

Ensure appropriate funds are available for decommissioning

As the reactors were never designed for decommissioning, appropriate costs were not properly considered or saved

At present the UK taxpayers are expected to pay **€ 250 billion** over the next 120 years based on NDA estimates (~2bn/year). Current spend is about €3.7 billion / year

Most of the money associated with this decommissioning is planned to be spent at Sellafield





Timescales

Framework commence June 2019

4 +2+1 Year framework

Implementation period extend past end date

Value £250M-£400M over lifetime

Scope : EPC, Decommissioning & Demolition

DSRL's major route to market

Nuvia 1 of 6 framework providers

All contractors are Tier 2

NEC contract options A, B C & E

Dounreay Decommissioning Services Framework

The EDF Energy Nuclear Fleet

Station	Type	Number of Units	Generation	Closure Date
Hunterston B	Advanced Gas Cooled Reactor	2	1976	2023
Hinkley Point B	Advanced Gas Cooled Reactor	2	1976	2023
Heysham 1	Advanced Gas Cooled Reactor	2	1983	2024
Hartlepool	Advanced Gas Cooled Reactor	2	1983	2024
Dungeness B	Advanced Gas Cooled Reactor	2	1983	2028
Heysham 2	Advanced Gas Cooled Reactor	2	1988	2030
Torness	Advanced Gas Cooled Reactor	2	1988	2030
Sizewell B	Pressurised Water Reactor	1	1995	2035

EDFE UK



7 AGR stations and 1 PWR all operating

D+D is funded by NLF backed by UK Government

EDF Energy responsible for D+D though the government has an option to take ownership of stations

Strategy in UK is safe store for graphite reactors (but prompt site clearance for SZB) followed by final deconstruction on ALARP grounds to GDF

AGR sites will start to close 2023 – all in decomm by 2030

Prompt / Deferred Dismantling

- Current strategy - Safe Store
- Work needed to achieve Safe Store
- If prompt – graphite issue

In house / contracting

- Employ EDF staff local and overseas
- Support from EDF decommissioning business
- Contractors

BEIS / NDA

- Option to take on decommissioning sites
- Management from NDA
- Value of Liabilities Fund

EDF Fleet Decommissioning Key Issues & Stakeholders

EDF Energy and its precursor organisations developed what became a decommissioning strategy with a common strand. This common strand involved some form of Safestore to allow a deferral of reactor dismantling, thus allowing for radioactive decay of the reactor structures and materials.

Decommissioning Timescales are long – circa 100yrs for AGR

The Decommissioning process for an AGR site can be considered in three main phases of work

Key Phase 1—Pre Closure Transition & Defuelling

- Planning
- Characterisation
- Defuelling

Key Phase 2—Site Surveillance, Care & Maintenance

- Removal of non essential infrastructure
- Waste management
- C&M programme

Key Phase 3—Reactor Building Decommissioning & Final Site Clearance

- Reactor core – graphite
- Site remediation

AGR Decommissioning Strategy - Key Phases

Decommissioning Stages

- Planning
 - Strategy – prompt / deferred / hybrid
 - Waste management strategy
 - Characterisation
 - Methodology and Technology
 - Safety case
 - Plant closure
 - Defuelling
 - Utility optimisation
 - Infrastructure for Decommissioning
 - Civil modifications
 - New facilities
 - Staff
 - Implementation
 - BoP
 - Turbine
 - Reactor Island
 - Civil Structures
 - Clearance
 - Characterisation
 - Safety case
 - Site release
- * Nuvia Capabilities



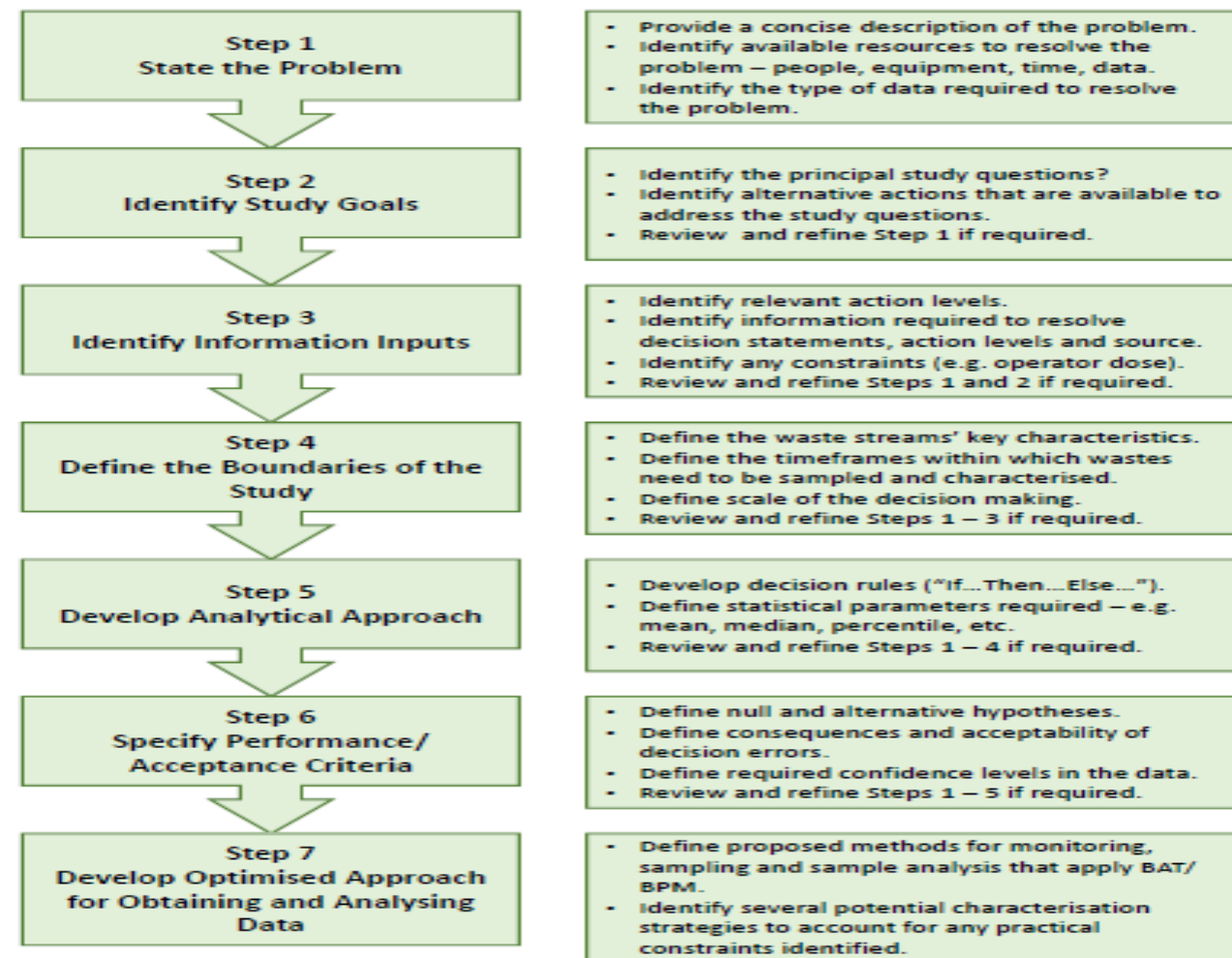
Kozloduy NPP, Bulgaria
Units 1 to 4 undergoing decommissioning

Nuvia Scope in Decommissioning Planning and Implementation

Example of Decommissioning Plan element – Generic Characterisation Plan

The seven steps of the Data Quality Objectives (DQO) process

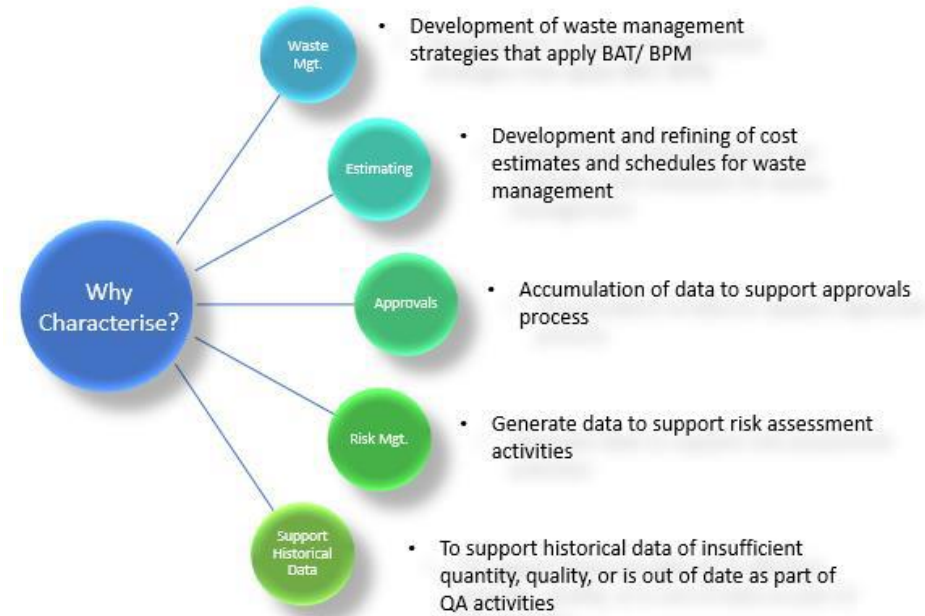
- Ensure a high level of protection for people and the wider environment;
- Reflect recognised best practice;
- Make the best use of available waste routes, and in particular low-activity low level waste (LA-LLW)
- and very low level waste (VLLW) disposal routes, where these reflect the BAT (England and Wales) or
- Best Practicable Means (BPM) (Scotland).
- Ensure final waste packages meet the waste acceptance criteria of the recipient storage/
- decommissioning facilities.
- Support disposability and safety cases for wastes processed during decommissioning phases of each
- station:
- Make fully auditable and defensible decisions regarding waste management.



Planning Methodology

Formulation of Generic Characterisation Plans

Residual Operational Wastes		Early Decommissioning Wastes	
Low Level Waste	Higher Activity Waste	Low Level Waste	Higher Activity Waste
Sludges and Resins Metallic Items Miscellaneous Materials	Sludges and Resins Desiccants and Catalysts Carbonaceous Material Miscellaneous Contaminated Materials	Stainless/ Mild Steel Contaminated Items	N/A



It is understood that the requirement can be broadly defined as: the need to collect sufficient data on the radiological, chemical, physical and biological characteristics of each waste group to be able to make robust and defensible disposability cases. These will contain optimised waste management strategies that will meet, if not exceed, national and international standards for radioactive waste management.



THE ENERGY ACT 2008

Funded Decommissioning Programme
Guidance for New Nuclear Power
Stations

December 2011



Wylfa & Moorside

Nuclear New
Build Programme

Scope

Technical authorship of the decommissioning activities and associated costs for Moorsides AP1000s.
Acted as the independent verifier of the decommissioning activities and costs for the Wylfa ABWRs.

Challenges

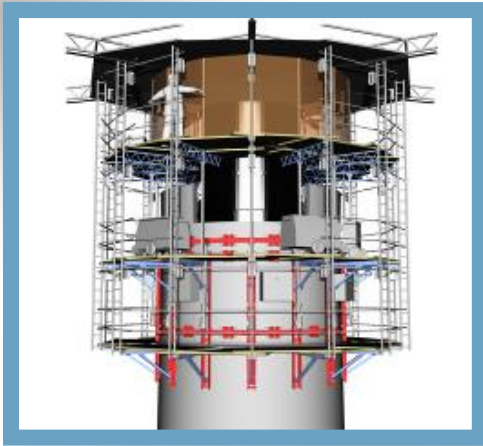
- Avoiding preferential engineering and excessive detail
- Stakeholder management of several interested parties
- Understanding how to cost for waste disposal decades into the future, including waste repositories that are not yet built

Outcome

- Wylfa Project – Successfully delivered an independent verification report to support the FDP. The report has been passed to UK Government as part of the FDP
- Moorside Project – Successful chapter authorship, cost estimations and risk reviews delivered.

Funded Decommissioning Planning (FDP)

Applying experience and knowledge of Decommissioning



Scope

- Full Engineer Procure Construct (EPC) and 'operate' project
- Design of the method of decommissioning and demolition – full install and erection of the SCP and decommissioning of the stack
- Full scale off site trials of the SCP system

Challenges

- Contaminated stack from fuel reprocessing
- Safe access and egress to platform
- Working at height and adverse weather
- Plant and equipment hazards

Outcome

- Nuvia brought together a group of specialists to offer best guarantee of safety through all project phases
- Platform erected at off site test facility; installation and initial commissioning at Sellafield site completed.
- Decommissioning is progressing ahead of schedule
- First project in a generation to retire a Category A risk on the Sellafield site by reaching the 47m mark in July 18

Planning and undertaking the decommissioning of the highest stack at Sellafield, in the centre of this congested nuclear site

Conclusion – UK Decommissioning

Government Owned Legacy Sites

The UK has a wide variety of nuclear facilities including closed power stations, reprocessing facilities and research sites undergoing decommissioning.

The UK Government funds the liabilities currently estimated at € billion to complete the decommissioning work.

The NDA is responsible for determining the overall decommissioning strategy to be implemented by the subsidiary businesses and the UK supply chain.

Operating & New Power Stations

There is a legal requirement for decommissioning plans to be developed and approved along with a funding mechanism.

The operator is responsible for the meeting these requirements however the UK Government is committed to provide a final repository for Fuel and ILW.