HINKLEY POINT C
PRE-APPLICATION CONSULTATION

3 HINKLEY POINT C NUCLEAR POWER STATION

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3.1 Outline Description of the Nuclear Power Station

3.1.1 This section briefly explains the principles of a nuclear power station. The proposed Hinkley Point C nuclear power station design will comprise two UK EPR reactor units and shared facilities.

a) UK EPR Technology

3.1.2 The UK EPR reactor unit is a development of existing nuclear technology. It has been developed by Areva in partnership with EDF and also embodies experience from German designs. It combines the latest technologies to provide enhanced safety, environmental protection, technical and economic performance above those of existing reactors. The use of an 'international standard design' provides significant benefits including taking advantage of overseas experience involving many years of design input and regulatory review. In addition, the UK's nuclear regulators, as part of the GDA process, are subjecting the design to further comprehensive reviews against UK requirements.

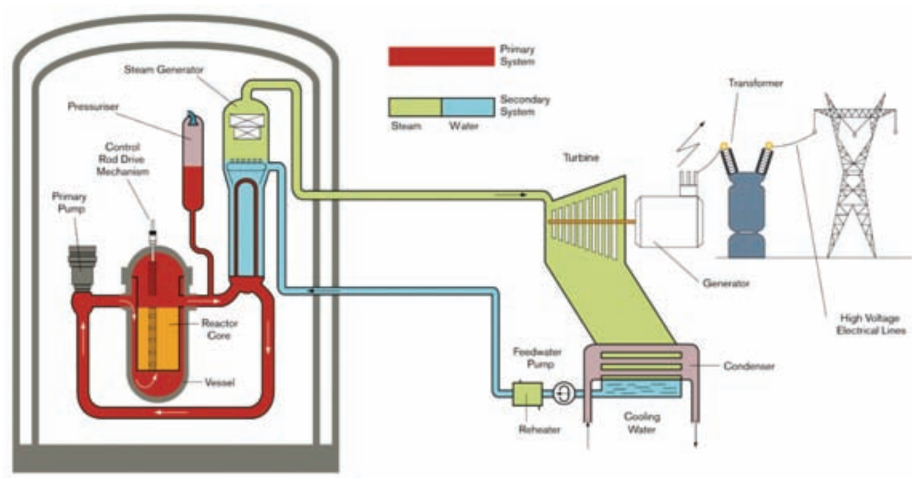
3.1.3 At the heart of the UK EPR is a reactor core which consists of 241 fuel assemblies each containing a 17x17 array of fuel rods comprising of uranium dioxide pellets in a sealed cladding tube and cooled by water. The uranium is enriched in the fissile isotope U235 by up to 5%. The water also serves to slow down (or moderate) the neutrons produced during nuclear fission so that the nuclear chain reaction can be sustained. The core is capable of producing 4,500MW of heat and is contained within a thick-walled steel pressure vessel which is around 10m high and 5.5m in diameter. Diverse systems are installed for the safe shutdown of the reactor in the event of any faults.

3.1.4 The pressure in the 'primary circuit' is maintained by heating a pressuriser and the high pressure prevents the cooling water from boiling even though the temperature of the water is around 330ºC. The cooling water in this primary circuit is circulated by electrically driven pumps through four heat exchangers (known as steam generators) where water in a 'secondary circuit' is converted to steam. The reactor pressure vessel, steam generators and pressuriser are all contained within a reinforced concrete structure, designed to withstand the crash of a commercial airliner. Other essential buildings including the main control room and fuel building are also protected to the same extent.

3.1.5 Steam from the steam generators is used to power a single large turbine rotating at around 1,500 revolutions per minute (rpm). The turbine is directly connected to a generator capable of producing around 1,630MW of electrical power. Seawater circulates through a third circuit to condense the steam back to water before it is returned to the steam generators. See **Figure 3.1** for a schematic arrangement.

3.1.6 Electricity from the generator is converted to high voltage (400kV) via transformers before being exported by overhead lines connected to the National Grid transmission network.

Figure 3.1: Pressurised Water Reactor (schematic)



3.1.7 The nuclear power station is designed for a lifetime of 60 years and makes more efficient use of fuel than current designs, thus reducing the quantities of spent fuel that need to be disposed of. Technologies used in the waste processing routes will minimise the environmental impact of operation.

b) Safety Systems

3.1.8 There are two simple principles in delivering nuclear safety :

- the provision of protective barriers; and
- the application of the defence-in-depth.

3.1.9 The concept of the ‘protective barriers’ involves placing a series of strong, leak-tight physical barriers between the radioactive materials and the environment to contain radioactivity in all circumstances. These three barriers are as follows:

- the fuel, inside which nearly all of the radioactive products are already trapped, is enclosed within a metal cladding;
- the reactor coolant system is enclosed within a pressurised metal envelope that includes the reactor vessel which houses the core containing the fuel rods; and
- the reactor coolant system is itself enclosed in a containment building (a double shell resting on a thick basemat, the inner wall being covered with a leak-tight metallic liner).

3.1.10 The concept of ‘defence-in-depth’ involves ensuring the effectiveness of the protective barriers by identifying the threats to their integrity and by providing successive lines of defence to protect them from failure. These levels of defence are as follows:

- first level: the implementation of a safe design, high quality of construction and safe and reliable operation incorporating lessons from experience to prevent occurrence of failures;
- second level: effective surveillance for detecting anomalies that could lead to a departure from normal operating conditions, in order to anticipate failures or to detect them as soon as they occur; and
- third level: arrangements for mitigating the consequences of failures and preventing core meltdown. There are four safeguard buildings, each capable of performing the essential safety functions and designed to maintain cooling of the core under all circumstances. The probability of a severe accident leading to core melt is therefore extremely remote, but the UK EPR reactor unit is designed to contain such an event and to minimise the environmental consequences. There are also segregated diesel-powered generators to provide back-up electrical power in the event of a loss of off-site electrical supplies.

c) Fuel and Waste

3.1.11 Operational radioactive waste from a UK EPR reactor unit arises in solid, liquid and gaseous form.

3.1.12 New nuclear fuel and spent fuel are handled in the fuel building adjacent to the reactor building. The reactor is shutdown every 1-2 years for a period of a few weeks to allow for refuelling (around one third of the fuel is replaced each time), inspection and maintenance (outage). The reactor is generally run continuously at full output between these refuelling shutdowns. The design is intended to achieve an availability (i.e. the percentage of time that the nuclear power station is available to generate electricity) of around 90%.

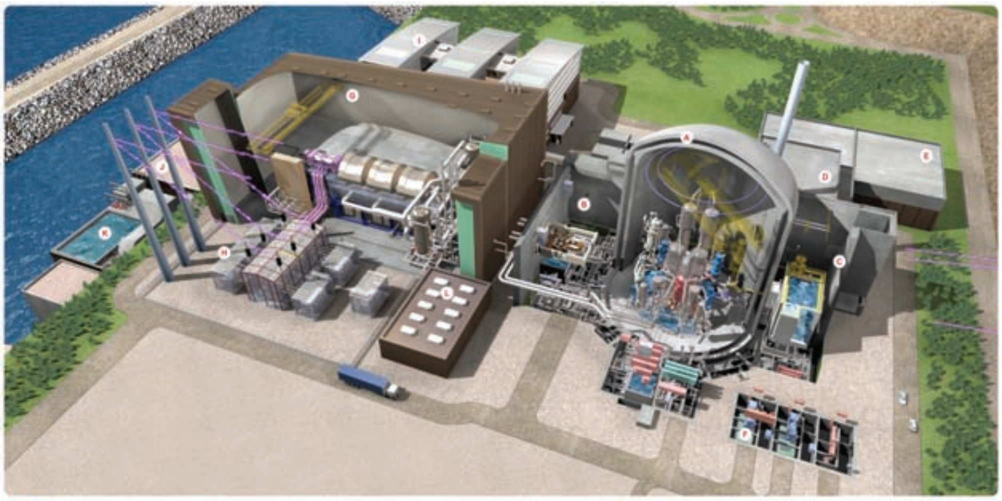
3.1.13 Spent fuel removed during refuelling is highly radioactive and is stored underwater in a fuel pond which provides cooling and shielding. Radioactive waste is treated and packaged in the waste building; which provides a shared service for both proposed UK EPR reactor units.

d) Ancillary Buildings

3.1.14 The nuclear auxiliary building houses reactor support functions such as water make-up and treatment plant, protection and ventilation systems. A separate building houses offices and workshops for operations and maintenance staff for both UK EPR reactor units.

3.1.15 For illustrative purposes, the main buildings which comprise a single EPR reactor unit are shown schematically in **Figure 3.2**.

Figure 3.2: Illustrative UK EPR Reactor Unit Layout



Key

A Reactor building
B Four safeguard buildings
C Fuel building
D Nuclear auxiliary building
E Radioactive waste processing building
F Emergency diesel generator building
G Turbine building
H Power transmission platform
I Operator building
J Pumphouse building
K Outfall structure
L Conventional electrical building

3.2 The Permanent Development

a) Introduction

3.2.1 This section provides an outline description of the proposed operational development at Hinkley Point C including EDF Energy's approach to the planning and design of the nuclear power station.

b) Safety and Security Considerations

3.2.2 The design of the nuclear power station involves consideration of safety and security factors. The layout of the nuclear power station must ensure that operations can be conducted safely in the event of accidental or deliberate challenges on-site and natural and external hazards off-site. The design and layout of the nuclear power station must also enable the ability to monitor and control access to the site, and within the site, control and access to nuclear materials. The amount of land required for the nuclear power station and the configuration of buildings are a product of these essential safety and security requirements and have influenced the masterplan of the site.

c) Masterplanning

3.2.3 The approach to the design of the nuclear power station has been to develop an initial masterplan for the site, which has taken into account the key drivers of safety, security and engineering. The masterplan seeks to ensure that the nuclear power station structures work coherently together to create a comprehensive and legible site layout. The intention for the masterplan is for it to be functional and rational with clear principles in relation to site levels and building layout.

3.2.4 The developed masterplan builds on the surrounding landscape, as a natural amphitheatre sloping down towards the coast, and the predominant character of the immediate environment provided by the existing Hinkley Point Power Station Complex and surrounding undulating countryside. The masterplan seeks to minimise so far as possible the visual impact of the development from the Quantock Hills Area of Outstanding Natural Beauty (AONB) and other coastal views as the bay curves towards Burnham-on-Sea.

3.2.5 The layout of the Hinkley Point C Development Site is based on establishing clear longitudinal building lines which create a symmetrical relationship between the buildings and spaces. An image of the masterplan is shown in **Figure 3.3**.

Figure 3.3: Masterplan (Note – outage car park area not shown)

d) Main Buildings and Land Use

3.2.6 The progression to detailed design will take place following this first stage of consultation. However, the basic principles for the built form of the development have been established by the masterplan vision.

3.2.7 In summary, the Hinkley Point C Development Site will include:

- Main power station buildings – each UK EPR reactor unit would be located_within a 'nuclear island' including the reactor building, fuel building and nuclear auxiliary building. The 'conventional island' would accommodate facilities such as the turbine hall and ancillary buildings.
- Supporting infrastructure including cooling water tunnels and associated infrastructure, fuel and waste management facilities, transmission infrastructure, staff facilities, administration and storage.
- A public information centre to provide a public interface and education facility.
- Appropriate levels of security fencing and lighting, and a Sea Wall will be constructed incorporating the existing public footpath.

e) Access and Parking

3.2.8 The existing access road into the Hinkley Point Power Station Complex will also be the main access for the proposed development. In addition, it is proposed to construct an emergency access road from the south of the site as an alternative means of accessing the Hinkley Point C Nuclear Power Station (see **Figure 10.8**). The public highway route for this emergency access is proposed to be from Shurton to the A39 via Stogursey Lane (see **Figure 10.1**).

3.2.9 A car park for station staff will be located to the south-east of the Hinkley Point C permanent development site. An additional permanent outage car park is proposed further south on land that would be occupied in part by the workers' accommodation campus during construction. The indicative design of the outage car park will be sympathetic to the local surroundings. The locations of these facilities are shown in **Figure 10.8**.

f) Transmission Infrastructure

i) EDF Energy – New 400kV Substation

3.2.10 In order to export power from the nuclear power station to the National Grid transmission system, it will be necessary to construct a new 400kV sub-station on the Hinkley Point C site. The indicative location of the sub-station is shown in **Figure 10.8**.

ii) On-site Overhead Lines

3.2.11 It is also proposed that output from the new nuclear power station to the 400kV sub-station will be transmitted by new overhead lines within the site boundary. This will require a number of new towers to be constructed to carry the overhead lines.

3.2.12 The 400kV sub-station and on-site overhead lines and towers will be included in EDF Energy's DCO application.

iii) National Grid's Overhead Lines

3.2.13 In order to connect the new sub-station into National Grid's existing transmission network, changes to the overhead line configuration in the immediate vicinity of Hinkley Point will need to be made. This will require re-routing or removal of existing overhead lines and new overhead lines to be constructed. The construction of a number of new towers will also be required. These grid works will form part of the separate NSIP on which National Grid is currently consulting. A decision on the final route will take into account engineering, ecology, archaeology and visual impact issues. The area within which the new transmission lines and towers will be located is shown on **Figure 10.8**.

g) Cooling Water Tunnels and Associated Infrastructure

3.2.14 The proposed nuclear power station will be directly cooled from Bridgwater Bay. EDF Energy has chosen to adopt separate intakes for each of the reactor units together with a common outfall. Two intake tunnels and one outfall tunnel, with approximate internal diameters of 6m and 7m respectively, will be connected to intake and outfall heads in the Bay. The locations of the intake and outfall heads are approximately 3.6km and 2km off-shore respectively. The area within which the works would be undertaken is shown in **Figure 10.7**.

3.2.15 The design of the intake heads incorporates measures to avoid the entrapment of fish against the screens.

h) Visual Impact of the Development

3.2.16 Some early work has been carried out to assess the impact of the permanent development on the surrounding landscape. To help visualise the location and scale of the Hinkley Point C Nuclear Power Station, four photomontages are provided in **Section 10** showing, for comparative purposes, the existing views together with the views of the proposed development. The viewpoints shown are from the following locations:

1. Quantock Hills AONB – See **Figure 10.9**
2. Holford Parking Bay – A39 – See **Figure 10.10**
3. Burnham-on-Sea Waterfront – See **Figure 10.11**
4. Shurton – See **Figure 10.12**

3.2.17 It should be emphasised that while the photomontages provide some useful early information on visual and landscape impact, these are being presented at an early stage of the assessment and further work is needed on detailed building and landscape design.

i) Landscape Treatment

3.2.18 It is important to incorporate a landscape design which is sympathetic to the immediate rural setting and the wider landscape which includes the Quantock Hills AONB. **Figure 10.8** shows the area which would be subject to restoration following the construction of the nuclear power station. **Figure 10.8** also sets out some options for restoration.

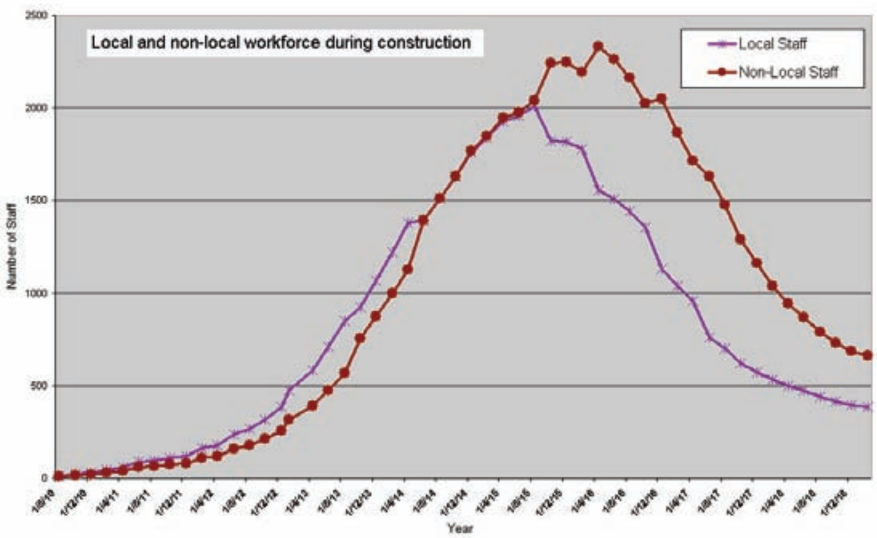
3.2.19 Further information on landscape and visual amenity is given in Section 3.14 of the Environmental Status Report at **Appendix A.1**.

3.3 Construction Activities

3.3.1 This section outlines the main construction activities and phases together with land use requirements for the proposed new nuclear development on the Hinkley Point C Development Site. Measures proposed to limit local environmental impact are also described.

3.3.2 The two UK EPR reactor units would take approximately ten years to build with a stagger between the commencement of each unit of 18 months. This period includes preliminary works. Workforce numbers are expected to peak at around 4,000. The following graph shows the expected profile of workforce numbers during the construction phase, both local and non-local.

Figure 3.4: Construction Workforce Profile



a) Summary of Construction Activities and Phases

3.3.3 Construction work would fall into three phases:

i) Site Preparation and Preliminary Works

3.3.4 This includes land clearance and topsoil stripping, establishing new levels for the development site, creating spoil storage areas, construction of access roads and temporary facilities for the contractors including materials laydown and marshalling areas, offices, messing facilities and car parking. During this period the construction of a new Sea Wall and the jetty to receive bulk aggregates would take place.

3.3.5 Following the establishment of the necessary site levels, excavation of the nuclear power station foundations can commence.

ii) Construction of Buildings

3.3.6 After preparation of the foundations, first structural concrete would be poured for each of the main buildings. The construction of the reactor building, auxiliary building, control building, turbine hall, cooling water tunnels and associated infrastructure and all other key buildings would take place during this phase. Material requirements during this period would be mainly sand, aggregate and cement, reinforcing steel and pipework. Materials would be handled using fixed tower cranes supplemented by mobile cranes as necessary.

iii) Installation of Plant

3.3.7 Mechanical and electrical plant would begin to arrive on-site about a year after pouring of first structural concrete as it would be necessary to install some of this equipment as the civil work proceeds. Main plant erection will take place approximately three years into the construction period and will include installation of the nuclear steam supply system and turbine generators. At this stage a steady flow of plant would be delivered to the development site, some of which would go straight into their final erection area while others would be prepared on-site for installation. During this period the construction site would be fully occupied with the UK EPR reactor units, equipment and temporary workshops.

b) Land Use Requirements for Construction

3.3.8 Activities required to construct the nuclear power station will involve the use of significant areas of land on a temporary basis. The way land is used necessitates careful assessment and planning to ensure the nuclear power station is built in a timely and efficient manner. It is also necessary to give due consideration to environmental impact.

3.3.9 In summary, key temporary land use requirements are:

- contractors' working areas – laydown, workshops, stores, offices, canteen, car parking;
- workers' accommodation campus;
- spoil storage;
- the jetty for bulk aggregates delivery by sea;
- construction roads, fencing, lighting and security features; and
- environmental buffers.

3.3.10 The proposed location and use of land has been guided by the following principles:

- to make use of land immediately adjacent to the Hinkley Point C Development Site for efficiency and ease of construction;
- to utilise land further away for less intensive temporary uses such as spoil storage;
- to ensure the existing Hinkley Point B Nuclear Power Station can continue operations without significant disruption;
- to ensure the Hinkley Point A Nuclear Power Station can continue decommissioning without significant disruption;
- to avoid disturbance to nearby residential properties;
- to avoid or minimise use of environmentally designated land; and
- within the construction zone, where possible, to protect features of environmental value.

3.3.11 **Figure 10.5** sets out, in outline, how the land at Hinkley Point C is proposed to be used during construction. The majority of construction activity will take place in areas immediately adjacent to the permanent development site north of Green Lane which approximately bisects the site east/west. Below Green Lane, land will be used generally for low level spoil storage and contractors' working areas. The workers' accommodation campus will also be located in the south-east part of the site.

3.3.12 Apart from the temporary use of the foreshore areas for the construction of the jetty, permanent Sea Wall and cooling water tunnels and associated infrastructure, all other construction land will be located away from areas which are statutorily designated for nature conservation. Nevertheless, consideration has been given to areas of local sensitivity within the construction zone and the following measures will be taken:

- Green Lane, which has some nature conservation, heritage and landscape value, will be mostly left undisturbed;
- the south-west border of the construction zone will be protected and fenced; and
- Holford Stream would be culverted to protect water quality flow to Wick Moor.

c) Reducing Impacts on Nearby Residential Properties

3.3.13 Careful consideration is being given to ensuring that those living relatively near to the Hinkley Point C Development Site will be protected as far as possible from disturbance during construction. Although the majority of construction activities likely to result in noise and disturbance will occur above Green Lane, it will be necessary to set out areas for spoil storage and a workers' accommodation campus to the south of Green Lane. While there is still a good physical separation between these uses and the nearest residential properties, it is proposed to create a substantial landscape buffer along the southern perimeter of the construction site as indicated in **Figure 10.5**.

d) Workers' Accommodation Campus

3.3.14 **Section 4** provides information on proposals for worker accommodation off-site. EDF Energy is also proposing to erect a temporary workers' accommodation campus within the Hinkley Point C Development Site. This facility would accommodate up to 700 workers and is expected to be in use for five years during the main phases of construction activity. The on-site campus is needed to ensure the accommodation 'load' is evenly distributed in the area. This is considered to be a practicable way forward to help ensure the nuclear power station is built as efficiently as possible as well as taking account of wider social and economic issues.

3.3.15 Regarding services provided for the workers' accommodation campus, EDF Energy's plans are at an early stage. However, best practice experience from the Sizewell B project, which included a 900-bed on-site facility, the Flamanville 3 project currently under construction in Normandy, together with other major project examples, will be examined before proposals are finalised. EDF Energy's aim is to provide a good standard of accommodation for the workforce and include a range of services which will ensure any adverse social impacts are kept to a minimum.

3.3.16 The location of the facility is proposed in the south-east of the Hinkley Point C Development Site (see **Figure 10.5**).

e) Public Rights of Way

3.3.17 The construction and operation of the nuclear power station will impact on Public Rights of Way (PRoW) across the Hinkley Point C Development Site. Further information on this issue is provided in **Section 3.16** of the Environmental Status Report in **Appendix A.1**.

3.4 Operational Considerations

3.4.1 The UK EPR reactor unit has an operational design life of 60 years. During normal operations the number of staff required on the site will be around 700. This includes those involved in support functions such as technical support, laboratory work, routine maintenance, training and procurement. Approximately 1,000 additional staff will be employed on each UK EPR reactor unit during planned refuelling and maintenance outages. A public information centre will also be opened on the site.

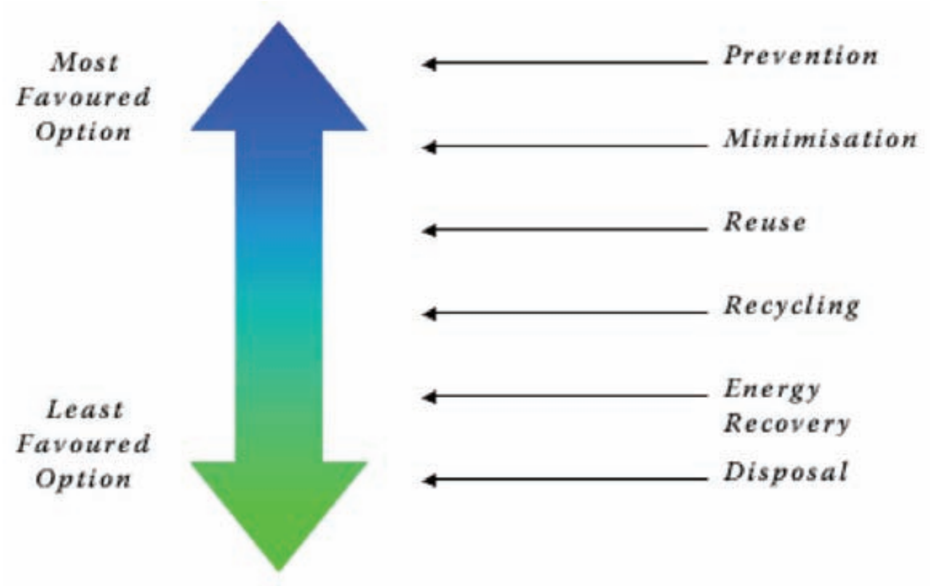
a) Waste Management Strategy

3.4.2 There is significant public interest in the waste management strategies for nuclear power stations. The 'protective barriers' and 'defence-in-depth' concepts (discussed in paragraphs 3.1.8 – 3.1.10) ensure that only very small quantities of radioactivity are released into waste streams.

3.4.3 The UK EPR reactor unit design applies the core principle of minimisation of the generation of radioactive and non-radioactive wastes, as far as is reasonably practicable, by application of the waste hierarchy.

3.4.4 The waste hierarchy requires avoidance of waste in the first instance and reducing as far as possible the volume requiring disposal once the waste has been produced. The waste hierarchy gives an order of preference for waste management options to minimise the volume for disposal, as shown in **Figure 3.5**.

Figure 3.5:
The Waste Hierarchy



3.4.5 Use of the waste hierarchy will be adhered to in the construction, operation and ultimate decommissioning periods of the nuclear power station.

b) Solid Radioactive Waste

3.4.6 Depending on the radioactivity level of the waste produced, arisings will follow one of three routes for disposal:

1. Appropriately authorised sites for Very Low Level Waste (VLLW).
2. The national Low Level Waste Repository (LLWR) for Low Level Waste (LLW).
3. Geological disposal facility for higher activity wastes (Intermediate Level Waste (ILW)).

3.4.7 LLW and VLLW will be sent off-site promptly after it has been generated; typically the equivalent of several lorry loads per year will be despatched. Higher level radioactive waste will be kept on-site in a store designed to accommodate the nuclear power station's lifetime arisings and capable of lasting for at least 100 years, pending despatch to a national geological disposal facility. Typically the final volume of packaged solid radioactive waste produced annually by the station has been estimated in the GDA process to be less than 150m^3.

c) Liquid and Gaseous Radioactive Waste

3.4.8 Systems and plant are operated in a manner so as to minimise the environmental impacts of discharges and all discharges are monitored and recorded to demonstrate this. Gaseous wastes are discharged via a stack on the reactor building designed to ensure maximum rapid dispersion and dilution in the air. At present, the height of each proposed stack is up to 80m, however, the final decision on height is dependent on detailed dispersion modelling.

d) Conventional Waste

3.4.9 Similar to many manufacturing activities, the non-radioactive wastes consist of 'industrial waste' (e.g. chemical additives and effluents), 'inert waste' (e.g rubble) and 'commercial waste' (e.g. canteen and office waste). Several waste types will be classed as hazardous under the Hazardous Waste (England and Wales) Regulations 2005 and require special storage and treatment arrangements in accordance with the relevant legislation in order to minimise their impact. Hazardous wastes include solids (e.g. batteries, aerosol spray cans and electrical equipment), liquids (e.g. solvents and oils) and sludge (e.g. paint residues and decontamination products). Typical quantities for the site have been estimated at 1,200 tonnes per year of which less than 20% is hazardous waste.

3.4.10 Chemicals derive from various processes within the nuclear power station. These include:

- discharges from treatments of the primary and secondary circuits and of corrosion products;
- discharges from biological fouling treatments; and
- water collected from rainwater drains and wastewater.

3.4.11 The main sources of gaseous non-radioactive discharge are linked to the exhaust gases from periodic testing of the engines of the back-up diesel-powered generators.

3.4.12 Nuclear power is a recognised low carbon technology. Its CO_2 emissions are significantly lower than from fossil fuelled generation and are comparable with many renewables e.g. wind power. Therefore it can make a material contribution to climate change and to helping the UK meet its long-term carbon reduction goals.

e) Spent Fuel

3.4.13 Spent fuel assemblies are discharged from the UK EPR reactor unit and placed into the spent fuel pool to cool and to allow levels of radioactivity to decay for a period of about ten years. Spent fuel is then moved to an on-site storage facility, designed to accommodate the nuclear power station's lifetime spent fuel arisings and capable of lasting for at least 100 years. Such interim storage of spent fuel is practised worldwide and facilities can be based on either wet or dry storage concepts and is consistent with the approach advised by Government to developers of new nuclear stations.

3.4.14 The current long-term strategy for the management of spent fuel is that it will ultimately be disposed of in a geological disposal facility. EDF Energy supports this strategy and welcomes the increased certainty as the Government's Managing Radioactive Waste Safely programme progresses. Through the Funded Decommissioning Programme (FDP), EDF Energy will agree arrangements for funding of its spent fuel liabilities and a schedule under which Government will take title to and liability for the spent fuel.

3.4.15 At any given time a single UK EPR reactor unit will contain around 127 tonnes of enriched uranium fuel. Reactor refuelling will take place at the end of reactor cycles. The quantity of spent fuel discharged from a single UK EPR reactor unit during each refuelling outage is typically up to 80 fuel assemblies. The total number of spent fuel assemblies produced by both reactors by the end of the nuclear power station life is estimated to be around 7,000.

3.5 Decommissioning Activities

3.5.1 This section describes EDF Energy's overall decommissioning strategy and how it meets Government policy and regulatory requirements. It outlines the key elements of the strategy and how it would apply specifically to the decommissioning of the proposed UK EPR reactor units at the Hinkley Point C Development Site.

a) Policy and Regulatory Background to Decommissioning

3.5.2 EDF Energy's decommissioning strategy has been developed to meet UK national policy and regulatory requirements. Government policy on decommissioning is set out in The Decommissioning of the UK Nuclear Industry's Facilities Statement published by the Department of Trade and Industry in September 2004.

3.5.3 Key aspects include:

- each operator is expected to produce and maintain a decommissioning strategy and plans for its sites;
- decommissioning operations should be carried out as soon as reasonably practicable, taking all relevant factors into account as provided for in the operator's strategy and plan;
- strategies should minimise the volumes of radioactive wastes which are created, particularly the volume of ILW. Wherever possible wastes should not be created during decommissioning until an appropriate management solution is, or will shortly be, available for use; and
- any new facility should be designed and built so as to minimise decommissioning and associated waste management operations and costs.

3.5.4 Regulation of the decommissioning of a nuclear facility is carried out under essentially the same regulatory regime that applies to construction and operation.

3.5.5 Before decommissioning can take place, there is a requirement for the operator to obtain consent from the HSE under the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations (EIADR) 1999. This requires the submission of an EIA and a period of public consultation. For the Hinkley Point C UK EPR reactor units this will take place immediately prior to the end of operation and will consider fully the environmental impacts of decommissioning. Decommissioning will therefore be subject to a separate extensive consent and consultation exercise, including its own specific EIA.

3.5.6 In addition to the arrangements described above, the Energy Act 2008 requires operators of new nuclear power stations to prepare a FDP for approval by the Secretary of State. The FDP will set out the technical basis for decommissioning the nuclear power station as well as the financial and legal arrangements to ensure that operators will meet the full costs of decommissioning and their full share of waste and spent fuel management costs in the future. The FDP will have to be approved by the Secretary of State before the construction of a UK EPR reactor unit can take place under the Nuclear Site Licence arrangements. The FDP will be subject to annual reporting; a quinquennial (five yearly) review and any changes to the arrangements will require the consent of the Secretary of State.

b) Decommissioning Strategy

3.5.7 PWRs, such as the UK EPR, are inherently more straightforward to decommission than gas-cooled reactors because of the overall smaller size, improved accessibility and modular nature of the reactor and its associated irradiated primary circuit. Modern PWRs incorporate a range of design features which facilitate decommissioning, including the use of shielding and barriers to minimise the radioactive activation or contamination of equipment; the design of systems to minimise the creation, transportation and deposition of radioactivity; and the use of materials which minimise the creation of radioactive activation products. Consequently there is less benefit to be gained from deferring decommissioning so as to allow radioactivity levels to reduce over time.

3.5.8 EDF Energy will be adopting a prompt decommissioning strategy. Under this approach, the nuclear power station buildings, including the reactor building, would be progressively removed following final shutdown and defueling. There is no deferral period to allow radioactivity levels to reduce and decommissioning typically takes around 20-25 years.

c) Decommissioning Activities

3.5.9 The principal elements of the UK EPR prompt decommissioning plan are described below. The activities overlap significantly in time and are not necessarily sequential.

i) Pre-Closure Preparatory Work

3.5.10 Prior to the planned closure a programme of preparatory work will be initiated to ensure that the site is decommissioned as safely, efficiently and economically as possible.

ii) Defueling

3.5.11 Fuel will be removed from the core within a few weeks of the end of generation and will remain in storage in the fuel pond for a period of cooling before transfer to the interim on-site storage.

iii) Decommissioning Engineering Preparatory Work

3.5.12 Some systems will continue to be required during decommissioning to maintain safe operations. The remaining systems will be taken out of service and isolated, drained and purged or flushed and vented to make them safe.

iv) Plant Decommissioning

3.5.13 This covers the removal of all equipment, facilities and buildings on the site. It includes both the non-radioactive plant and buildings, such as the turbine hall, which are technically simple to remove, as well as radioactive parts and systems. This activity also covers the management of the radioactive and conventional waste materials.

v) Site Clearance and Release for Re-use

3.5.14 The final step of the decommissioning process will be the eventual de-licensing of the site. An environmental monitoring programme will be undertaken and, following any necessary ground remediation work, the site will be de-licensed and made available for re-use.

3.5.15 The final site clearance and de-licensing of the whole of the site will only be carried out when the spent fuel is removed from the on-site interim store and disposed of off-site and the spent fuel store is fully decommissioned. However, partial site clearance and de-licensing could be carried out to allow the re-use of most of the site in advance of this.

3.6 The Nuclear Regulatory Regime

3.6.1 Nuclear power stations are subject to the wide range of legislation and regulation that are typical of large industrial installations. In addition, in order to oversee the handling of radioactive materials, their design, construction, operation and decommissioning is subject to strict regulation from a safety, security and environmental perspective by the UK's nuclear regulators. EDF Energy is developing applications for a Nuclear Site Licence, a Radioactive Substances Act 1993 (RSA) discharge authorisation and other environmental consents, which will be considered in parallel with the DCO application to the IPC. These will be supported as appropriate by organisational arrangements, safety cases, and detailed arrangements which meet the licence conditions, security and environmental requirements. This site specific information will progressively build upon that provided to the UK's nuclear regulators as part of the GDA process.

3.6.2 GDA involves a rigorous and structured examination of detailed design information by all the nuclear regulators over a period of several years. At the end of their assessment the regulators will issue reports on their findings, confirming whether they judge the generic design to be satisfactory from a safety, security and environmental viewpoint.

3.6.3 As part of the DCO determination, the IPC will consult with the key regulators, including the HSE and the Environment Agency. Before a decision is made the IPC will need to be satisfied, in principle, that the development can proceed safely and with due consideration given to the environment.

a) Safety

3.6.4 The main element of the UK nuclear regulatory framework is the Nuclear Installations Act 1965, which sets down the requirement to obtain a Nuclear Site Licence from the HSE before installing a nuclear reactor on a site. It is underpinned by the more general Health and Safety at Work Act 1974.

3.6.5 The HSE through its Nuclear Installations Inspectorate (NII) has responsibility for the nuclear safety regulation of nuclear facilities operating in the UK. The NII regulates nuclear power stations by means of a licensing and permissioning regime. The HSE incorporates a standard set of licence conditions in a Nuclear Site Licence. Within these conditions the NII has wide legal powers including the ability to shutdown operations. The NII will maintain a high level of scrutiny over all of the operator's nuclear activities including the deployment of site inspectors and the continual inspection and assessment of safety related activities and documentation.

b) Security

3.6.6 The HSE through its Office for Civil Nuclear Security (OCNS) is the security regulator for the UK's civil nuclear industry. The OCNS conducts its regulatory activities under the authority of the Nuclear Industries Security Regulations (NISR) 2003 (as amended). Under NISR 2003, operators of licensed nuclear sites must have site security plans approved by the OCNS. These plans detail the security arrangements for the protection of nuclear sites, nuclear and other radioactive material and sensitive nuclear information on such sites. These arrangements cover, for example, physical security protection features such as fencing, CCTV, access controls, intruder alarms and the roles of security guards and of the Civil Nuclear Constabulary. Also covered are the arrangements for the protection of IT systems.

3.6.7 Transporters of nuclear material to or from civil nuclear licensed sites must be approved by OCNS and transport security plans are required to be in place before the transport of certain nuclear materials can take place.

3.6.8 The security vetting of nuclear industry personnel who require access to nuclear material and sensitive nuclear information is also conducted by the OCNS. The OCNS carries out regular inspections to ensure compliance with the requirements of security plans.

c) Environment

3.6.9 Operation of a nuclear power station creates radioactive materials that must be managed and ultimately safely disposed. Under the RSA, the Environment Agency regulates all such disposals of radioactive waste (in England and Wales), including discharges into the atmosphere; discharges into the sea and rivers; disposals to land; and disposals by transfer to another site. The Environment Agency enforces the regulations within the UK that require the operator of a nuclear power station to ensure that any risks are minimised and are acceptably low. Site regulators will be appointed by the Environment Agency who will maintain an ongoing oversight of the operator and the site's environmental performance.

3.6.10 In addition to this radioactive substances regulation and in order to minimise the wider environmental impact of the nuclear power station operations, the Environment Agency also regulates:

- abstraction from and discharges to controlled waters, including rivers, estuaries, the sea and groundwaters;
- operation of specific 'conventional' plant;
- assessment and, where necessary, clean-up of contaminated land;
- disposal of conventional waste; and
- certain flood risk management matters.

d) Emergency Preparedness

3.6.11 Potential for an accidental release of radioactive material from nuclear power stations can never be completely ruled out. However, the risk of this type of release can be demonstrated to be extremely low by considering the measures taken to ensure the overall safety of the nuclear power station. Indeed the operator has a legal obligation to demonstrate risks are reduced to be as low as reasonably practicable.

3.6.12 It is a condition of a Nuclear Site Licence that an operator of a nuclear power station has in place on-site emergency arrangements in the event of a release of ionising radiation outside the site. Additionally, the Radiation Emergency Preparedness and Public Information Regulations 2001 require the relevant local authority to prepare adequate off-site emergency plans (working closely with the operator) to restrict exposure to ionising radiation and maintain the health and safety of persons who may be affected.

3.6.13 The emergency plan must be regularly reviewed, exercised and updated and all employees must have appropriate training to ensure that the plans can be implemented efficiently and effectively if the need ever arises.

e) Transport

3.6.14 The Department for Transport (DfT) Dangerous Goods Division would be the Competent Authority for the transport of all radioactive material to and from the Hinkley Point C site. The DfT issues Design and Shipment Approvals for transport package designs and directly regulates road and some aspects of rail transport.