

The Justification of Practices Involving Ionising Radiation Regulations 2004

The Secretary of State's decision as Justifying Authority on the Regulatory Justification of the Rolls-Royce Small Modular Reactor (RR SMR) designed by Rolls-Royce SMR Limited

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Chapter 1 - Overview

Executive summary

This document sets out the decision by Defra's Secretary of State (the Secretary of State) to justify the class or type of practice (CTP) proposed in an application by the Nuclear Industry Association (NIA) for a Regulatory Justification decision for the Rolls-Royce Small Modular Reactor (RR SMR).

Secretary of State's decision

The Secretary of State's decision is that the CTP:

"The generation of power from nuclear energy using uranium dioxide fuel of low enrichment in fissile content in a light water cooled, light water moderated thermal reactor currently known as the RR SMR designed by Rolls-Royce SMR Limited."

is justified under the [Justification of Practices Involving Ionising Radiation Regulations 2004 \(SI 2004/1769\)](#) referred to as 'the Regulations'.

In this CTP definition, 'power' refers to the thermal output of the reactor, expressed in megawatts-thermal (MWth). This thermal output can be used for heat production, electricity generation, or a combination of the two.

The Secretary of State considers that the RR SMR is justified because its benefits outweigh the health detriment or any other potential detriments it may cause.

As set out in further detail in chapters 2 to 7, the Secretary of State is satisfied that the RR SMR will:

- deliver significant climate benefits
- provide significant socio-economic benefits to the UK
- present only a very limited potential health detriment
- generate waste streams that can be safely managed and disposed of with a low level of detriment
- have an environmental impact that will be minimised and remains within acceptable limits
- not pose significant safety, security, or safeguarding risks

Summary of the RR SMR assessment

In July 2024, the UK government received an application from the NIA for a justification decision for a new CTP, as defined above, in relation to the RR SMR which is a Pressurised Water Reactor (PWR).

The application describes this reactor as a Small Modular Reactor (SMR) due to its smaller electrical output and physical footprint compared to conventional gigawatt-scale nuclear reactors, as well as the potential for standardised, repeatable manufacturing and construction processes.

A public consultation on the application's suitability for assessment was held between 6 October and 1 December 2025. The consultation did not identify any gaps in the information provided by the applicant that prevent an assessment of the benefits and detriments of the RR SMR.

Although we had previously indicated that we expected to run a further public consultation on the proposed decision, even though there is no requirement to do so, we now consider that the strength of the evidence, demonstrating a clear balance of benefits over detriments, means that an additional consultation would not serve a useful purpose. It is therefore unnecessary and would not represent a good use of public funds.

Accordingly, we have decided not to consult again. The decision presented above constitutes the Secretary of State's justification decision for the RR SMR.

Secondary legislation giving effect to the justification decision will need to be approved by a resolution of each House of Parliament.

The justification process

Justification is an early regulatory step for new nuclear technologies assessing whether the benefits outweigh the associated health detriments and is based on the internationally recognised principles of [Radiological Protection](#). It considers economic, social, environmental, health and safety, waste management and disposal and decommissioning benefits and detriments. The Department for Energy Security and Net Zero has published [guidance on the justification process](#).

For the purposes of justification, health detriment means the reduction in length and quality of life occurring in a population following exposure to ionising radiation, including those arising from tissue reactions, cancer and severe genetic disorder. At later stages of nuclear regulation, a comprehensive framework sets out the detailed requirements and controls needed to ensure safe operation, environmental protection and effective management of radioactive materials.

The justification process evaluates the CTP itself rather than a specific number of installations or reactor units. However, the assessment may consider whether deploying multiple units would affect the overall balance of benefits and detriments.

A person may apply to the Justifying Authority for a justification decision for a new CTP. A practice is defined as “a human activity that can increase the exposure of individuals to radiation from a radiation source and is managed as a planned exposure situation”.

A CTP is new if no practice of that class or type was carried out in the UK before 6 February 2018 and if the CTP is not already justified. Any new CTP must be justified before it can be introduced in the UK. [A register of existing practices is available on GOV.UK.](#)

Defra’s Secretary of State became the Justifying Authority responsible for assessing UK justification applications for nuclear power in 2020 and is supported by a Justification Co-ordination Committee (JCC), which comprises representatives from the devolved governments and statutory consultees. The statutory consultees are the:

- Environment Agency (EA)
- Office for Nuclear Regulation (ONR)
- Health and Safety Executive (HSE)
- UK Health Security Agency (UKHSA)
- Food Standards Agency (FSA)
- Scottish Environment Protection Agency (SEPA)
- Natural Resources Wales (NRW)
- Northern Ireland Department for Agriculture, Environment and Rural Affairs (DAERA)

Nuclear energy policy is a reserved matter, and the Secretary of State is the sole Justifying Authority for new nuclear reactors and justification decisions for new nuclear reactors are UK wide. However, many other relevant regulations, including planning and environmental regulations are devolved.

The Scottish Government opposes the building of new nuclear power plants using current fission technologies. In Northern Ireland, there are no existing or proposed nuclear power plants of any technology type.

In November 2025, the independent Nuclear Regulatory Taskforce, commissioned by the UK government to review nuclear regulation, published its final report, [Nuclear Regulatory Review 2025](#). The UK government’s response to the Taskforce recommendations reflects the Prime Minister’s strategic direction to make nuclear regulation more efficient, proportionate and cost effective while preserving robust public protections.

Summary of the consultation

We asked 3 questions about the application and asked for comments from respondents to explain their views in relation to those questions.

1. Do you agree or disagree with Defra's preliminary view that the proposed practice in the NIA's Rolls-Royce Small Modular Reactor application and supplementary information belongs to a new class or type of practice?
2. Do you consider the CTP definition to be suitable for a justification decision?
3. Is the information in the NIA application and supplementary information suitable for Defra to make an appropriate assessment of the balance of benefits and detriments of the proposed practice?

We received 50 responses: 40 from individuals and 10 from organisations or community groups. Of these, 46 responses were submitted through the Citizen Space website and 4 were sent by email. We are grateful to everyone who responded. All responses have been considered and analysed. An overview of consultation responses is set out below, with responses relevant to specific issues addressed in the relevant chapter.

Question 1: Whether the CTP is new

Just over half of respondents agreed that the CTP is new. Around 20% considered it to be existing and a similar proportion said they were unsure. Many who disagreed or were uncertain highlighted similarities with existing PWRs.

We recognise that the RR SMR shares some characteristics with existing PWR designs, and we have taken these into account when assessing whether the benefits outweigh the detriments. However, we have concluded that the RR SMR is a new CTP. This reflects the fact that no SMRs are currently operating in the UK and that the RR SMR design differs from previously justified gigawatt-scale PWRs.

Question 2: Suitability of the proposed CTP definition

70% of respondents agreed that the proposed definition is suitable for assessment. A small number suggested that the definition should be more specific, for example by including information on site location or whether sea or river water would be used for cooling. Some respondents also noted that the RR SMR's output of 470MWe is higher than that of many other SMRs in development, which commonly range up to 300Mwe.

We recognise that a narrower definition could clarify potential local impacts. However, local impacts are assessed separately by regulators and are not part of the justification process. Retaining the proposed definition allows appropriate flexibility while still meeting the purpose of the justification process.

Question 3: Suitability of the information provided

70% of respondents agreed that the application and supplementary information submitted in January 2025 and May 2025 are suitable for a justification assessment. Among those who disagreed or were unsure, some considered that additional technical information was required, while others questioned whether certain comparisons were appropriate or whether impacts had been accurately described. Each of the following chapters summarises the relevant consultation comments and sets out our responses.

Chapter 2 - Carbon reduction

Introduction

The UK and devolved governments of Wales and Northern Ireland have committed to achieving net zero greenhouse gas (GHG) emissions by 2050 to help address climate change. The Scottish Government has set a 2045 target for net zero in its climate change policy. This chapter explores the carbon reduction benefits of the RR SMR and how it could support progress towards these commitments.

Summary of the application

The application states that nuclear power plants can make a significant contribution to the UK's efforts to address global climate change by generating electricity with a lower carbon footprint than many alternative energy sources.

It cites several lifecycle assessments (LCAs), including [a 2022 study by the United Nations Economic Commission for Europe \(UNECE\)](#), which estimates the lifecycle carbon intensity of nuclear power at 5.1-6.4 grams of CO₂ equivalent per kilowatt-hour (kWh). This is presented as the lowest of any electricity generating technologies, including intermittent renewables such as wind and solar.

The application also notes that the UK government's policy framework includes the potential use of SMRs, of which the RR SMR is an example.

Summary of responses to the consultation on the application

Only one consultation response commented specifically on GHG emissions. It highlighted that uranium mining requires significant energy and raised concerns that this could reduce nuclear energy's contribution to achieving net zero.

Although carbon dioxide emissions arise during mining, extraction, enrichment, fuel manufacture and waste management, the total emissions across the full lifecycle of a nuclear power station are low. Overall, nuclear power has similar lifetime emissions to renewable energy sources and produces far fewer emissions than electricity generated from fossil fuels.

Our carbon policy

The UK government is committed to using a wide range of measures to reduce carbon emissions, decarbonise the economy and support the creation of new green jobs and technologies. These efforts will help deliver the UK's ambition for a low carbon economy and achieve the target of reaching net zero by 2050.

The [Climate Change Act 2008 \(2050 Target Amendment\) 2019](#) established a legally binding target requiring the UK's net carbon account for 2050 to be at least 100% lower than the 1990 baseline. In support of this, the [Clean Power 2030 Action Plan](#) sets out the UK government's commitment to decarbonise the UK electricity supply by 2030, with 95% of generation coming from clean sources, subject to maintaining security of supply.

Achieving the legally binding 2050 net zero target will require a transformation of the UK power market and significant expansion of low carbon generating capacity. This need is reinforced by the expected growth in electricity demand, which may increase by more than two and a half times by 2050 as transport, homes, and industry become increasingly electrified and additional generation is required.

Lifecycle Assessments (LCAs)

LCAs typically examine the emissions associated with the entire nuclear energy production cycle, as well as the lifecycle emissions of a specific nuclear plant. The LCA reports cited in the application indicate that nuclear power is significantly less carbon intensive than most of the UK's current electricity generation sources.

Nuclear also has a much lower carbon intensity than projected for Combined Cycle Gas Turbine (CCGT) generation with 95% carbon capture and storage (CCS). Although CCGT with CCS technologies are not currently deployed at scale, like nuclear, they represent a comparable firm, flexible, reliable, and dispatchable source of electricity.

The RR SMR uses the same industry standard fuel, primary and secondary heat removal circuits and conventional steam cycle for electricity generation as the UK's justified PWR gigawatt-scale designs. These are based on the European Pressurised Reactor (EPR), which will enter operation at Hinkley Point C and Sizewell C, as well as the operating PWR at Sizewell B.

This provides confidence that the RR SMR will produce similarly low carbon emissions per kWh of electricity generated when compared with those designs. The supplementary information provided in January 2025 acknowledges that gigawatt-scale plants are likely overall to achieve lower lifecycle carbon intensity than the RR SMR, which has a single reactor. However, the RR SMR also incorporates measures to reduce carbon intensity, including efficient use of steel and concrete. As a result, the difference in carbon intensity does not materially affect the significant low-carbon energy benefit the RR SMR would provide.

Fuel efficiency

SMRs are generally expected to have slightly lower fuel efficiency than gigawatt-scale reactors due to factors such as neutron leakage and smaller core size. However, this is not universally true and varies by design. In the case of the RR SMR, features such as radial neutron reflectors and optimised fuel loading patterns are intended to reduce these effects, although operational evidence to support this remains limited. Any implications for fuel efficiency impacts will be examined during downstream regulatory processes, including the Environmental Impact Assessment. The resulting lifecycle emissions are expected to remain far below those of fossil fuel-based electricity generation.

Conclusion

The development of future UK nuclear capacity will play an important role in reducing climate impacts from human-generated GHG emissions and in meeting the legally binding requirement to achieve net zero. The RR SMR's capability to provide low carbon electricity represents a significant contribution towards these objectives and is a major benefit.

Chapter 3 - Security of supply and other economic impacts

Introduction

Reliable energy supplies are vital to the UK's interests. This chapter explores the potential contribution of the RR SMR towards the UK's energy security and assesses wider economic impacts. It also considers additional economic factors, including the potential consequences and associated costs of an accident at a new nuclear power plant.

Summary of the application

The application states that the RR SMR could support reliable, low carbon electricity generation while also delivering wider socio-economic benefits. It is based on widely deployed PWR technology, would offer good value for money, and strong regulatory oversight and robust corporate governance arrangements makes the likelihood of a severe nuclear accident very low.

Summary of the responses to the consultation on the application

No consultation responses specifically commented on RR SMR's contribution to the UK's energy security.

Three consultation responses raised concerns about potential cost and budget challenges. While large scale infrastructure projects can present financial challenges, the RR SMR is not considered to be particularly susceptible to these risks. It is deemed that the socio-economic benefits of the RR SMR outweigh the public funding required to support its delivery.

Nuclear power and its contribution to a secure and affordable energy system

Secure, reliable and affordable energy supplies are essential for the UK. PWR nuclear power is a proven and reliable source of large scale, dependable electricity generation and reduces reliance on imported energy. As a firm, always on, source of power, nuclear generation also plays a critical role in complementing intermittent electricity sources such as wind and solar.

Although the precise cost of electricity produced by an RR SMR cannot be determined at this stage, strong protections are in place to ensure value for money. Any access to public funding through revenue support mechanisms, such as [Contracts for Difference](#) or [Regulated Asset Base](#) schemes, would require a robust value for money assessment approved by the relevant Secretary of State.

The RR SMR is based on established PWR technology, the most widely deployed reactor type in the world. Its expected reliability draws on thousands of reactor years of operational experience from earlier PWR designs. Its fuel requirements are well understood and align with existing reactors which use the same fuel type as Sizewell B and proposed for Sizewell C and Hinkley Point C.

The UK benefits from a diversified uranium supply chain, including Canada, Australia and Kazakhstan, and Urenco's Capenhurst facility is capable of producing the low enriched uranium (LEU) required.

Managing long-term responsibilities: decommissioning, waste, safety and liability

Under the [Energy Act 2008](#), operators of new nuclear power plants must have secure and independently assessed financing arrangements in place to cover the full costs of decommissioning and their share of waste management and disposal. This requirement ensures that financial responsibility does not fall to the UK government, even if decommissioning costs exceed initial projections.

According to the study, [Predicting the Cost of the Consequences of a Large Nuclear Accident in the UK \(2017\)](#), a large nuclear accident in the UK could produce costs of tens of billions of pounds, driven by evacuation, long-term relocation, and loss of agricultural production. However, the level of risk depends on the reactor design and safety and mitigation systems in place. The RR SMR design incorporates multiple layers of protection and backup systems to ensure that critical safety functions are maintained in the event of individual component failures. The UK's robust regulatory framework means the risk of a significant nuclear accident remains low.

Under the [Nuclear Installations Act 1965](#), UK operators carry strict and exclusive liability for compensating victims of specified nuclear incidents. Operators must hold insurance or other approved financial arrangements authorised by the relevant Secretary of State and HM Treasury. Revisions in 2022 expanded compensation provisions to cover environmental reinstatement, loss of income from the environment, preventive measures, and personal injury or property damage arising from those measures.

Economic and industrial socio-economic benefits

RR SMR has received public support through the 2021 award of a match-funded grant of up to £210 million from UK Research and Innovation (UKRI) to advance the reactor generic design.

Separately, following a robust, two-year procurement process, [RR SMR was selected by Great British Energy – Nuclear \(GBE-N\) as its preferred bidder to partner with to develop the UK's first SMRs](#), subject to final government approvals and contract signature. As announced in November 2025, the [SMR project is expected to be hosted at Wylfa on Anglesey in North Wales](#).

It is expected that GBE-N's project will support up to 3,000 high-skill jobs on site at peak construction and thousands more across the supply chain. With the aim of generating to the grid from the mid-2030s, the project could provide up to 1.5GW of low carbon electricity, powering the equivalent of up to 3 million of today's homes.

Conclusion

Nuclear power remains a proven and dependable technology capable of securing large scale electricity supply, while delivering wider socio-economic and social benefits. The economic risks associated with a nuclear accident are effectively mitigated by the strict regulatory regime and proven technology design.

Chapter 4 - Radiological health detriment

Introduction

While some radioactivity occurs naturally, nuclear power plants produce concentrated radioactive materials that require careful management during and after their operational life to protect employees and the public. Releases may occur through planned, permitted release of gaseous or liquid discharges, an unplanned event, or accidents, including malicious incidents.

This chapter assesses these potential radiological impacts, evaluates how effectively the regulatory framework mitigates them, and presents the resulting conclusions on the radiological health detriment associated with the RR SMR.

Summary of the application

The application states that the RR SMR will meet all UK radiological health requirements, resulting in very low risk. This is supported by the UK's regulatory framework for nuclear operations, waste and spent fuel management, and decommissioning.

During detailed design, all potential exposure pathways will be assessed and mitigated. Worker doses are expected to be similar to or lower than those in the current nuclear industry, and public doses will remain below the UK dose constraint for new nuclear facilities, which is taken as the bounding value for the RR SMR.

The UK regime also requires that all reasonably practicable measures are taken to prevent and mitigate nuclear or radiological accidents, with safety arrangements enforced by the Office for Nuclear Regulation (ONR).

Summary of responses to the consultation on the application

Five consultation responses cited studies, reports or academics' views, including reports from the Committee on Medical Aspects of Radiation in the Environment (COMARE), to express concerns about potential radiological health risks associated with nuclear energy.

One response also questioned the value of comparing potential accident-related detriment from an RR SMR with that from gigawatt-scale reactors and raised points about the effectiveness of mitigation measures.

These points are considered below.

Health detriments arising from radiation

As with all nuclear plants, the primary risk is the potential for release of material that emits ionising radiation. This must be understood in the context of overall radiation exposure.

The UK Health Security Agency (UKHSA) estimates that [the average annual effective radiation dose to a member of the public is 2.6 millisieverts \(mSv\)](#), most of which comes from natural sources. Artificial sources are dominated by medical exposures and all other artificial sources, including nuclear power, contribute less than 0.3% of average annual exposure.

At low doses, radiation causes no immediate or noticeable harm. However, any exposure is considered capable of slightly increasing the lifetime cancer risk and the potential for hereditary effects. Very high doses can cause [acute health impacts, including skin burns, organ damage, and, at extreme levels, death](#).

COMARE, the UK's expert scientific advisory body on medical aspects of radiation, has consistently found no clear evidence that living near a nuclear site increases adverse health outcomes from radiological exposure. This includes no strong evidence of increased childhood cancer or leukaemia rates near facilities. See:

- [Eleventh Report: The Distribution of Childhood Leukaemia and Other Childhood Cancers in Great Britain 1969–1993](#)
- [Fourteenth Report: Further Consideration of the Incidence of Childhood Leukaemia Around Nuclear Power Plants in Great Britain](#)
- [Seventeenth Report: Further Consideration of the Incidence of Cancers Around the Nuclear Installations at Sellafield and Dounreay](#)

In the event of an accident, released radioactivity could harm health through direct exposure or environmental contamination of air, land, or water, with potential ingestion through food or drinking water. This risk applies to all nuclear plants but is mitigated by a comprehensive regulatory regime that limits public exposure and ensures continuous monitoring and control at all stages by the relevant nuclear regulators. These protections are developed in detail through optimisation and dose limitation processes.

Role of the UK regulators

Radiological protection in the UK is delivered through a robust multiagency framework led by the ONR and the environmental regulators:

- Environment Agency (EA)
- Scottish Environment Protection Agency (SEPA)
- Natural Resources Wales (NRW)
- Northern Ireland Environment Agency (NIEA)

ONR licenses and regulates nuclear safety, security and safeguards across the full lifecycle of nuclear facilities. It assesses safety cases, organisational capability and emergency arrangements before granting a site licence or permitting operation and applies its Safety Assessment Principles to ensure risks are reduced so far as is reasonably practicable. ONR can inspect, intervene or halt activities where necessary.

Environmental regulators require Best Available Techniques (BAT) (and Best Practicable Environmental Option or Best Practicable Means where applicable) to be used to minimise radioactive discharges and their impact and ensure that facilities meet national and international environmental standards including dose limits. Nuclear operators must obtain environmental permits and comply with the conditions set by the relevant regulator.

Regulators monitor operator performance, require regular reporting of discharges and waste disposals, and may take enforcement action where an operator does not comply with their requirements including issuing enforcement or prohibition notices and prosecution where necessary.

Regulatory oversight continues throughout a plant's operational life, including management of ageing assets and long-term safety. Specialist bodies support this framework: Nuclear Waste Services oversees waste packaging and disposal requirements, including future geological disposal; UKHSA provides national advice on radiation protection; and COMARE offers independent scientific advice on health effects from environmental radiation.

Regulatory regime - members of the public

UK law limits [public exposure from artificial sources of ionising radiation to no more than 1 mSv per year](#), a level UKHSA indicates corresponds to a very small, often undetectable, additional cancer risk. This legal limit excludes exposures from medical procedures, natural background radiation and occupational exposures. In addition to operators being required to monitor discharges and their impacts, regulators independently monitor radioactive discharges and direct exposures, publishing annual Radioactivity in Food and the Environment (RIFE) reports, which confirm doses to people living near nuclear sites remain well within legal limits.

Regulatory regime - employees

Regulations made under the [Health and Safety at Work etc. Act 1974](#) require employers to restrict exposure to ionising radiation so far as is reasonably practicable.

Before undertaking any new activity involving work with ionising radiation, an employer must make a suitable and sufficient risk assessment for employees and the public and identify the measures needed to minimise exposure.

Employees at an RR SMR are expected to receive doses comparable to, or lower than, those experienced across the existing nuclear industry. The regulatory framework ensures that occupational exposures remain well within the legal dose limit, typically by a substantial margin. For assessment purposes, the application adopts a bounding design value of 10 mSv for the average annual effective dose, reflecting ONR's Basic Safety Level (BSL) and the regulatory occupational dose limit of 20 mSv.

This approach recognises that final dose levels cannot be fully confirmed until the reactor design process is complete, including optimisation and limitation. Although doses cannot be finalised at this stage, there is no evidence to suggest that actual exposures will deviate significantly from expectations or exceed the legal dose limit.

Public exposed to radiation under normal conditions

The maximum dose to the most exposed members of the public during RR SMR operation is required and expected to remain below the UK dose constraint for new nuclear facilities, at 0.3 mSv per year.

Initial radiological impact assessments by Rolls-Royce SMR Limited indicate that for an RR SMR, public doses would remain below the relevant dose limit, the source constraint, and the site dose constraint. Based on the information currently available and discussions with the relevant regulators and statutory consultees, there is no reason to expect that the RR SMR would exceed these limits. The same regulatory limits and constraints would apply where multiple units are deployed at a single site.

Aqueous and gaseous radioactive discharges

Annual discharges, normalised to power output, have been estimated for tritium, carbon-14, iodine-131, noble gases, and an 'Other' category, and these have been compared with corresponding discharge estimates for Sizewell B and for the UK EPR reactors currently under construction at Hinkley Point C and at Sizewell C. The estimates are based on conservative assumptions, so actual discharges are expected to be significantly lower. Discharges will continue to be optimised in line with BAT throughout the full lifecycle of any RR SMR. While some RR SMR discharge values are higher than those of the reference plants and others are lower, all are expected to remain well within acceptable limits and do not indicate a significant risk.

A benefit of the RR SMR design is its boron free coolant chemistry, which significantly reduces tritium production. In many PWRs, boric acid is used to control reactivity and lithium hydroxide to manage coolant pH, and both chemicals contribute to the formation

of tritium. Tritium is a radioactive isotope of hydrogen that is routinely discharged from nuclear power stations.

Although these discharges can be large numerically, the resulting public radiation doses from tritium are small. Although current UK power stations give rise to low public doses from tritium, further reducing tritium production in the RR SMR will also reduce potential environmental and health detriments.

As the design is finalised, Rolls-Royce SMR Limited will continue to apply and demonstrate BAT and As Low as Reasonably Practicable (ALARP) for radiological dose and waste. This is expected to reduce currently conservative discharge estimates, consistent with experience from other justified reactor designs. The discharges from the RR SMR are expected to meet all relevant dose limits and constraints.

Exposure to radiation under an accident scenario

Nuclear and radiation accidents are rare. However, because of their potential consequences, it is important that any proposed practice incorporates modern safety technologies and adheres to robust safety principles designed to minimise risk.

ONR sets BSLs and BSOs for accident scenarios, which define whether the risks posed to the public are sufficiently low. The RR SMR will be required to meet these standards.

As a modern reactor design, the RR SMR incorporates advanced active and passive safety features. For example, in the event of a loss of power, control rods would automatically insert into the core under gravity to shut down the reactor and natural circulation can be utilised to provide a cooling capability that does not require pumped reactor circuit flow. These features help mitigate accident consequences.

The NIA's application demonstrates a strong understanding of safety principles and the use of advanced modern active and passive features to reduce risk. All licensed nuclear sites in the UK, including any future RR SMR sites, are required to maintain and regularly rehearse emergency arrangements under ONR's licence conditions and [The Radiation \(Emergency Preparedness and Public Information\) Regulations 2019 \(REPP19\)](#).

While the precise radiological impact of an accident cannot be fully quantified due to the number of variables involved, Rolls-Royce SMR Limited has set out a systematic approach to minimising risk, supported by the inclusion of advanced safety systems. The design and associated safety arrangements are expected to comply with the requirements of REPP19 and align with the [International Atomic Energy Agency \(IAEA\) Fundamental Principle 8](#) that "All practical efforts must be made to prevent and mitigate nuclear or radiation accidents".

Radioactive waste impact on the radiological health detriment

Public doses arising from the transport, long-term storage and eventual disposal of spent fuel and other radioactive materials are expected to be low. All these activities will be carried out under the UK's established regulatory framework, which imposes strict controls on radioactive substances and ensures exposures to the public and employees remain well within legal limits. As a result, the radiological health impact associated with transport, storage and disposal is expected to be low.

The RR SMR has been designed with decommissioning in mind, drawing on operational experience to assess potential associated detriment. On this basis, all waste generated during decommissioning is expected to be managed with a low level of detriment.

Conclusion

Exposure to ionising radiation can have significant health effects. Although low levels of radioactivity occur naturally, nuclear reactions within an RR SMR generate high levels of radioactivity within the reactor and associated systems.

The RR SMR design is expected to result in a very limited potential health detriment on both employees and members of the public. This conclusion reflects the:

1. safety and design features assessed in the application
2. strength of the UK's regulatory regime, which ensures that any RR SMR operates within established dose limits

In reaching this conclusion, consideration has been given to the extensive powers available to regulators to oversee and take enforcement action, including issuing enforcement notices, directions and prohibition notices, prosecution and revoking permissions where appropriate.

Chapter 5 - Radioactive waste

Introduction

This chapter considers the potential detriment from radioactive waste management and disposal and eventual decommissioning. It then sets out our current assessment on the scale of detriment associated with radioactive waste from the RR SMR.

Summary of the application

The application notes that radioactive waste and spent fuel will inevitably be generated during operations and decommissioning. The compact design of the RR SMR, intended to simplify decommissioning, minimises the volume and activity of radioactive waste produced.

The precise quantities of each category of waste will be determined during optimisation. The supplementary information provided in May 2025 states that overall spent fuel volumes generated may be slightly higher relative to the amount of power produced but are expected to be broadly similar to those from existing UK nuclear plants.

Summary of responses to the consultation on the application

Several consultation responses noted that the application proposes using a geological disposal facility (GDF) to dispose of high-level waste and spent fuel, but that no such facility is currently available in the UK.

While we acknowledge this, geological disposal is the policy of the UK government and devolved governments of Wales and Northern Ireland for managing the UK's most hazardous radioactive waste. A site selection process is underway in England and Wales. The Scottish Government does not support deep geological disposal.

Some consultation responses also raised concerns that spent fuel volumes may be higher per unit of energy generated than those from a gigawatt-scale reactor. This is considered later in this chapter.

Regulatory framework

All radioactive waste arising from the RR SMR will be controlled at levels that are ALARP using BAT, in line with the UK regulatory regime described in Chapter 4. This approach

effectively reduces the potential detriment from radioactive waste throughout the lifecycle of any future RR SMR.

In the absence of a proposed site for a UK GDF, a detailed assessment of the impact of the volume of spent fuel and waste requiring geological disposal from the RR SMR cannot be made. However, any GDF would need to comply with regulatory requirements and be safe, secure and protect the environment. Additionally, any licensee using an RR SMR to supply electricity to the National Grid must have an approved Funded Decommissioning Programme (FDP) and a disposability assessment in place.

Types of radioactive waste

In the UK, waste is classified as High Level Waste (HLW), Intermediate Level Waste (ILW), and Low Level Waste (LLW). These classifications are based on the type and amount of radioactivity present and the waste's ability to generate heat. The types of waste the RR SMR will create are similar to those already managed in the UK.

HLW is immobilised and sealed in robust, engineered containers designed to provide long-term containment. These containers, together with the surrounding geology, form multiple protective barriers within a GDF.

Unlike HLW, ILW does not generate significant heat. ILW requires shielding during handling and disposal and is placed in engineered packaging to meet UK requirements for safe storage, transport and eventual disposal. ILW waste packages currently in use are acceptable for disposal in all potentially suitable UK geological settings.

LLW contains relatively low levels of radioactivity and generally does not require shielding.

Spent fuel is classified separately from waste. However, once spent fuel is declared by its owner as waste for disposal and not for reuse or reprocessing, it is classified as HLW.

UK policy framework

The [UK policy framework](#), published in May 2024, sets out the expectations of the UK government and devolved governments for managing radioactive substances and nuclear decommissioning.

- England and Wales: Any waste from an RR SMR that requires geological disposal will be disposed of in a GDF.
- Scotland: A [separate higher activity radioactive waste policy](#) and [supporting implementation strategy](#) sets out Scotland's approach. In Scotland, waste will be managed over the long-term in near surface facilities as close as possible to the site where the waste is produced. The Scottish Government does not support deep

geological disposal and is not participating in the GDF programme.

- Northern Ireland: Nuclear waste management arrangements are not required because there are no existing nuclear facilities and no plans to develop a nuclear energy programme.

Spent fuel

Characteristics and quantity

The vast majority of the radioactivity generated during operation of the RR SMR would come from spent fuel. Around ten tonnes of spent fuel assemblies are expected to be removed from the reactor every 18 months. The RR SMR uses PWR technology and industry standard LEU fuel and builds on operational experience from existing PWR reactors. These similarities indicate that the characteristics of the spent fuel will be broadly similar to those from existing UK gigawatt-scale PWR designs.

Because the RR SMR is smaller than existing UK nuclear plants, it is likely to be slightly less efficient. As a result, it may produce slightly more spent fuel per unit of power generated. The main factors influencing spent fuel volumes, as described in the supplementary information provided in May 2025, include:

- the use of a radial neutron reflector, which reduces spent fuel volumes
- novel fuel loading patterns, which increase spent fuel volumes

These fuel loading patterns are necessary to maintain efficient fuel use and to ensure safety in a compact reactor core. Although they increase spent fuel volumes, this effect is substantially offset by the reflector design. Overall, spent fuel volumes per unit of energy will be broadly similar to those produced from existing nuclear plants in the UK.

Interim storage and geological disposal

Spent fuel will be stored at the reactor site until a GDF is ready to receive it as waste. This approach is consistent with current practice for similar spent fuel in the UK.

Spent fuel will first be stored under water in the spent fuel storage pond for up to 10 years. The RR SMR design also includes space for dry storage, allowing further radioactive decay before disposal in a GDF. Interim storage, initially in water and then in dry stores, can continue safely for several decades in line with UK policy and international good practice.

UK and international experience of interim storage, together with licensing and permitting requirements, indicates that spent fuel will remain in safe, secure and environmentally acceptable storage until a GDF becomes available.

Although the RR SMR may produce slightly higher volumes of spent fuel per unit of energy generated than the already justified Westinghouse AP1000 PWR, the characteristics of this spent fuel are well understood and should not present new technical challenges for safe disposal. While the volumes of spent fuel from any RR SMR requiring disposal in a GDF have not yet been fully assessed, the considerations outlined above indicate that spent fuel from any RR SMR built in the UK will be safely disposed of in a GDF.

High Level Waste (HLW)

While detailed information on the HLW the RR SMR will generate is not yet available at this stage of the design, the supplementary information provided in January 2025 and operational experience from PWRs indicate that all RR SMR waste streams will be broadly similar to those already managed in the UK and suitable for established waste disposal routes.

A single RR SMR will produce more HLW per unit of energy generated compared to existing UK gigawatt-scale PWR designs. This is partly because the smaller reactor core is slightly less efficient, resulting in a greater proportion of internal components being exposed to radiation during operation. However, the resulting increase in waste volumes is considered to represent an acceptable detriment.

International operational experience from other PWRs, referred to in the supplementary information provided in January 2025, provides confidence that the HLW produced from the RR SMR can be safely stored in interim facilities until a GDF is ready to receive it and subsequently disposed of in line with requirements.

Some HLW arising from decommissioning of the reactor structure may, following a period of decay storage, be suitable for reclassification and disposal as ILW.

Intermediate Level Waste (ILW)

The supplementary information provided in January 2025 indicates that the waste streams generated by the RR SMR will be broadly consistent with those arising from existing UK gigawatt-scale PWR designs and are not expected to present significant management challenges. The RR SMR design incorporates features such as indirect steam generation and filtration within coolant lines to minimise waste production.

However, given the higher quantity of HLW per unit of energy noted above, a single RR SMR may also produce greater quantities of ILW per unit of energy than current UK PWR gigawatt-scale designs. While it is difficult to provide a precise estimate of the increase at this stage of the design process, any additional volumes are expected to be manageable and associated with a low level of detriment.

Barrier designs and materials suitable for the immobilisation and packaging of ILW from the RR SMR are already available. These technologies are well established, with waste packages routinely manufactured and held in safe interim storage until a GDF is ready to receive them.

Low Level Waste (LLW)

Although the precise quantities of LLW from the RR SMR cannot be determined at this stage of the design, the waste streams will be similar to those from existing UK PWR gigawatt-scale designs. This suggests that LLW volumes per unit of energy will be comparable, providing confidence that these streams can be effectively managed and disposed of through existing waste management routes.

Geological disposal

A GDF will provide a disposal solution by placing the UK's most hazardous radioactive materials deep underground within suitable rock formations. This approach uses multiple engineered barriers, such as waste containers and sealing materials, working together with the natural geology to prevent harmful levels of radioactivity from reaching people or the environment.

The Committee on Radioactive Waste Management (CoRWM) published [an independent report on progress towards a GDF](#) in February 2025.

Aqueous and gaseous radioactive discharges

Some discharge types may be higher per unit of energy generated compared to existing UK gigawatt PWR designs, while others will be lower. Aqueous and gaseous radioactive discharges and the consequences for human health are considered further in Chapter 4 (Radiological Health Detriment).

Decommissioning

The RR SMR is designed with decommissioning in mind from the outset, with the aim of minimising material activation and reducing the volumes of waste generated. For example, structural steel is used in place of concrete in certain areas to limit bulk waste.

All waste arising from RR SMR decommissioning will be managed in accordance with the UK's established waste management and disposal routes. Some decommissioning waste will be ILW, although some components may initially meet HLW criteria before undergoing decay storage.

Operational experience from existing reactors provides confidence that all RR SMR decommissioning waste streams can be effectively managed with a low level of detriment.

Further guidance on decommissioning is provided in the [2024 guidance published by EA and NRW](#).

Transport of radioactive waste

The UK government and devolved governments expect transport to be explicitly considered in radioactive waste management plans, taking into account factors such as waste volumes, levels of radioactivity and transport distances. Alternatives to long distance transport are also considered and must be balanced against other operational and safety considerations on a case-by-case basis.

[Transport of spent fuel and radioactive waste materials during normal operation and decommissioning is a justified CTP](#). The UK regulatory framework for transport is aligned with IAEA transport regulations and ensures high standards of protection for employees and the public.

Ongoing work by Rolls-Royce SMR Limited on waste packaging, informed by operational experience from the nuclear sector, provides confidence that transport of all spent fuel and waste materials will be carried out safely.

Conclusion

The RR SMR will minimise the generation of spent fuel, HLW, ILW, LLW and aqueous and gaseous discharges.

The characteristics of the RR SMR waste stream will be broadly similar to those from existing UK gigawatt-scale PWR designs. Quantities of spent fuel, HLW and ILW generated may be higher per unit of energy, while LLW quantities are expected to be comparable. No waste types without management and disposal routes have been identified.

All RR SMR waste streams will be managed safely and securely through environmentally acceptable interim storage, safe and secure transport, and disposal in a GDF, with a low level of detriment.

Overall, the detriment associated with managing and disposing of spent fuel and radioactive waste arising from the RR SMR is expected to remain small and acceptable.

Chapter 6 - Environmental detriment

Introduction

In line with published guidance and previous justification decisions, a broad range of environmental impacts beyond those related to radiation exposure has been considered. This includes potential effects arising from the construction, operation and decommissioning of the RR SMR, such as impacts on biodiversity, landscape, air quality, soils and water quality.

These matters will be fully assessed at the site-specific stage, following individual applications to build nuclear reactors, as detailed design considerations and local environmental conditions fall outside the scope of a justification decision.

Summary of the application

The application acknowledges that new nuclear plants have environmental impacts. It highlights the RR SMR's offsite modular construction, which reduces construction traffic and shortens build time. The application assesses environmental impacts and proposes mitigations for transport, noise, light, air quality, waste, resource use, water abstraction and discharge, and landscape and visual effects.

Summary of responses to the consultation on the application

Four responses noted the likely impact of the RR SMR on water bodies and the environment more broadly. These included requests for further information on the cooling towers that may be required.

Some responses also expressed concerns about disruption during the construction phase of an RR SMR, including increased traffic and noise.

These impacts are assessed below and are considered to be minimised and within acceptable limits.

Environmental assessment and regulatory framework

The existing planning and environmental permitting frameworks include the [Planning Act 2008](#) in England and Wales, equivalent planning legislation in Northern Ireland and Scotland, and the respective environmental permitting and authorisation regulations.

Together with site licensing, these frameworks provide a robust basis for identifying and assessing the potential environmental impacts of the RR SMR. They also ensure consultation with regulators and the public.

Planning and permitting frameworks across the UK will continue to operate effectively and will not be affected by changes to the wider planning regime.

In England and Wales, the UK government's [Infrastructure and Planning Act 2025](#) introduces reforms to streamline consenting processes for Nationally Significant Infrastructure Projects (NSIPs), including energy developments, without altering the underlying environmental requirements.

These reforms sit alongside the [National Policy Statement for nuclear development EN-7](#), aimed at reducing delays and modernising planning procedures while maintaining high environmental and safety standards.

Scotland and Northern Ireland, which have their own separate consenting regimes for major infrastructure projects, are not affected by the NSIP-related changes.

Impact on species and habitats

The impact on protected species and habitats will depend largely on where the RR SMR is sited. The [Overarching National Policy Statement for Energy \(EN-1\)](#) provides guidance for energy infrastructure developers on the protection of sites of ecological and geological importance, as well as for safeguarding protected species.

EN-7 reinforces these requirements by mandating early consideration of ecological impacts and ensuring that any proposed site meets high standards of environmental protection, and meets legal requirements, including compliance with the Habitats Regulations.

Water use and cooling considerations

Deployment of an RR SMR will cause site-specific impacts that will depend on the environment of the deployment site. These could include freshwater, coastal margin and marine habitats through cooling water abstraction and the discharge of heated water.

Marine organisms can be harmed through impingement (being trapped on intake screens) or entrainment (being drawn into the cooling system and discharged back to the water body). The RR SMR would use a low velocity side entry intake to reduce inlet velocity and overall marine impacts where appropriate.

Discharging cooling water that is warmer than the ambient environment can raise local water temperatures, potentially affecting organisms, increasing biological productivity, reducing dissolved oxygen, and gradually altering species composition over time.

Mitigation measures will be assessed by the relevant environmental regulators, with approval required before any development proceeds.

Because the RR SMR uses the same steam cycle and has similar thermal efficiency to justified UK gigawatt-scale PWRs, its cooling needs are broadly comparable and proportionate to the energy generated. At coastal sites using seawater, water abstraction rates would therefore be similar.

Inland sites would rely on indirect cooling with towers which use less water overall and release most heat to the atmosphere, reducing thermal effects on rivers or lakes. In all cases, the chosen cooling system would comply with the [Water Environment \(Water Framework Directive\) Regulations 2007](#) for England and Wales and equivalent devolved regulations.

The supplementary information provided in January 2025 outlines further measures to mitigate noise and vibration from the plant, including from the cooling towers, such as the use of ultra quiet fan blades and acoustic enclosures. It also describes measures to reduce visual impacts, including the use of smaller mechanical draft cooling towers, which include vapour plume abatement systems.

Radiological impact on non-human biota

Planned radiological discharges from nuclear facilities can affect non-human biota, so in England and Wales these discharges are regulated under the [Environmental Permitting Regulations 2016](#) through site-specific limits for air and water. Scotland and Northern Ireland apply separate permitting frameworks to set equivalent limits.

As part of this framework, across the UK the environmental regulators assess potential doses to non-human biota during site-specific planning and permitting, and development is only allowed if the assessed impact is below limits and acceptable. Despite the differing legislative bases, these parallel regulatory processes ensure a consistent level of environmental protection.

Extensive UK and international evidence show that permitted discharges do not harm wildlife. This includes the EA assessments [Habitats Assessment for Radioactive](#)

[Substances](#) (2007) and Habitats Assessments for Radioactive Substances: 2017 Review (R Allott and others, 2019). These publications demonstrate no adverse effect on the integrity of the Natura 2000 sites in England from permitted radioactive discharges. Additionally, a [World Nuclear Association review](#), found that controls used to protect human health also provide protection for non-human biota during normal operating conditions.

Non-radioactive waste

Non-radioactive waste, including materials such as oils and laboratory chemicals, will arise during operation, maintenance and decommissioning. These wastes will be managed under the relevant hazardous waste legislation in each nation, and all wastes are disposed of through established, approved routes.

Hazardous waste volumes during construction and decommissioning will be similar to other major infrastructure projects and manageable through standard waste minimisation techniques. A Site Waste Management Plan is also likely to be required.

Non-radiological health detriment

Development, operation and decommissioning of the RR SMR may create non-radiological health impacts typical of major infrastructure projects, including construction hazards, noise, vibration, temporary reductions in air quality, and the use of non-radioactive chemicals. These impacts will be assessed and mitigated in accordance with UK regulations covering air quality standards, environmental protection, hazardous substances (CoSHH), and major accident hazards (COMAH):

- [The Air Quality Standards Regulations 2010](#)
- [Environment Act 2021](#)
- [The Air Quality Standards \(Wales\) Regulations 2010](#)
- [Environment \(Air Quality and Soundscapes\) \(Wales\) Act 2024](#)
- [The Air Quality Standards \(Scotland\) Regulations 2010](#)
- [The Control of Substances Hazardous to Health Regulations 2002](#)
- [The Control of Major Accident Hazards Regulations 2015](#)

Conclusion

The development of an RR SMR, as a major infrastructure project, will involve potential environmental detriment that must be managed.

Other aspects, including biodiversity, landscape, air quality, soils, water quality and flood risk, will be fully assessed at the site-specific stage. Established planning, permitting, and

licensing processes will ensure that any environmental effects are minimised and kept within acceptable limits.

The RR SMR will not significantly increase hazardous non-radioactive waste or create additional requirements for future disposal capacity.

Any environmental detriment resulting from the RR SMR's construction, operation and decommissioning will be well controlled, remain within acceptable limits, and outweighed by its overall benefits.

Chapter 7 - Additional considerations including safety, security and safeguards

Introduction

This chapter considers additional risks associated with adopting the RR SMR that are not addressed elsewhere, including nuclear proliferation, security threats, conventional health and safety hazards, and vulnerability to extreme weather.

An accidental or planned release of radioactivity, or one triggered by extreme weather, could result in significant health and long-term environmental impacts through direct exposure to ionising radiation or contamination of air, land, and water. Such contamination could lead to human exposure over a wide area through inhalation, water supplies, or the food chain, depending on the scale and nature of the incident.

Summary of the application

The application confirms that the RR SMR will only proceed if it meets all relevant legal, regulatory and safety requirements, introduces no new proliferation risks beyond those managed through existing IAEA and ONR safeguards, and incorporates appropriate security measures, including an ONR approved Nuclear Site Security Plan.

It states that conventional health and safety risks are expected to be very low, that projects must comply with the flood risk requirements of the National Policy Statements, and that any RR SMR will include robust flood defence measures accounting for climate related changes.

Summary of consultation responses to the application

Some respondents raised concerns about security threats, including terrorism. Others noted that the RR SMR could be vulnerable to climate change and extreme weather events, such as flooding. The analysis below concludes that these risks are well understood and can be effectively managed through established design, security and regulatory measures.

Security regulatory regime

Security arrangements for RR SMRs and their support facilities are expected to be comparable to those for large scale nuclear plants, and no material security detriment is anticipated. Risks are similar to those already managed at existing nuclear sites.

Each RR SMR operator must prepare a Nuclear Site Security Plan that sets out how the site, sensitive nuclear information, and nuclear or radiological materials, both on site and in transit, will be protected against theft or sabotage. The plan must also take account of the surrounding environment and is subject to scrutiny and approval by ONR.

Non-proliferation

Proliferation risks associated with RR SMR nuclear material are low because the reactor uses LEU, which is unsuitable for weapons production and would remain under strict international safeguards and verification by the IAEA and ONR.

The UK is party to [several agreements with the IAEA](#), including the UK Voluntary Offer Agreement and Additional Protocol, which establishes obligations for implementing nuclear safeguards. Following withdrawal from the European Atomic Energy Community (Euratom), the UK established its own domestic safeguards regime to meet international non-proliferation obligations and ensure effective accounting and control of nuclear materials.

The regime is set out in the [Energy Act 2013](#), as amended by the [Nuclear Safeguards Act 2018](#), and the [Nuclear Safeguards \(EU Exit\) Regulations 2019](#). The RR SMR will operate fully within this established framework with no material detriment.

Reactor shutdown and safety protocols

The RR SMR design includes reactor shutdown and safety protocols that includes incorporating four independent cooling systems to remove decay heat during planned and unplanned shutdowns. Additional backup heat removal systems provide a further layer of defence.

Before construction can begin, ONR must be satisfied that the design provides multiple levels of protection against potential faults or failures, includes comprehensive accident management and emergency preparedness arrangements.

Conventional (non-nuclear specific) health and safety

Risks throughout a facility's lifecycle including construction, operation, and decommissioning must be identified through safety assessments, with prevention, protection, and mitigation measures applied to reduce them to ALARP. The same principles that underpin nuclear safety are embedded in organisational culture and leadership, ensuring clear governance and accountability.

The RR SMR is not expected to introduce occupational health and safety requirements beyond those typical of similar large scale infrastructure projects and any risks are manageable within existing regulatory frameworks.

Extreme weather and climate change

Climate change and extreme weather can disrupt operations at nuclear facilities and potentially contribute to accident scenarios. Any RR SMR must include adaptation measures for climate related impacts and provide robust flood defences.

As a Nationally Significant Infrastructure Project, any RR SMR will also require a Development Consent Order or a Development of National Significance application.

This process ensures that proposals demonstrate how the design incorporates adaptation measures to account for climate change and extreme weather, including:

- coastal erosion and increased likelihood of storm surge and rising sea levels
- effects of higher temperatures
- increased risk of drought, which could lead to a lack of available process water

The resilience of the RR SMR to climate change and extreme weather will be assessed and assured through site-specific planning and regulatory processes, with progression dependent on meeting all requirements.

Conclusion

Accidents or security threats at nuclear power plants can pose significant health and environmental risks, but these must be viewed in the context of the UK's robust regulatory regime and the strong safety record of the nuclear industry. The RR SMR will operate within an acceptable level of risk regarding accidents and terrorism.

Proliferation risks are managed through international safeguards, ensuring any RR SMR in the UK remains within acceptable safeguarding standards.

Conventional health and safety risks associated with the RR SMR are expected to be comparable to those of other large scale infrastructure projects. When managed through established regulatory processes and effective controls, these risks can be maintained at a very low level of detriment. Resilience to extreme weather and climate change will be assured through comprehensive planning and regulatory processes.

The RR SMR's design features and adherence to robust regulations ensure that safety, security, and safeguarding risks remain low and are outweighed by the benefits the technology offers.

Chapter 8 - Conclusion

Following a detailed assessment of the evidence and relevant regulatory frameworks, the Secretary of State concludes that the benefits of the RR SMR outweigh both the potential health detriment associated with ionising radiation and the other detriments identified.

Accordingly, the CTP:

"The generation of power from nuclear energy using uranium dioxide fuel of low enrichment in fissile content in a light water cooled, light water moderated thermal reactor currently known as the RR SMR designed by Rolls-Royce SMR Limited"

is justified under the Justification of Practices Involving Ionising Radiation Regulations 2004 (SI 2004/1769).

In this CTP definition, 'power' refers to the thermal output of the reactor, expressed in megawatts-thermal (MWth). This thermal output can be used for heat production, electricity generation, or a combination of the two.

This justification decision found no reason to restrict how many SMR units could be located on a single site. The potential benefits and detriments of deploying several units, on one site or on multiple sites, do not introduce any additional factors beyond those expected from scaling up a single unit deployment. All applicable regulatory requirements, including limits on radioactive discharges and controls on radiation exposure, will continue to apply and must be fully complied with.

This decision is aligned with the [UK Advanced Nuclear Framework](#), published in February 2026, outlining the UK government's plans to speed up deployment of advanced nuclear and attract private investment.

The next step is for Parliament to approve this decision through secondary legislation. Any deployment of RR SMRs would then be subject to further planning consents, environmental permits and other regulatory approvals.

Key terms

As Low as Reasonably Achievable (ALARA): An approach to safety that requires ionising radiation doses to be kept as low as reasonably achievable, taking into account technical feasibility, economic factors and social benefits, even if the doses are below regulatory limits.

As Low as Reasonably Practicable (ALARP): An approach to safety that requires risks to be reduced to the lowest level that is reasonably practicable. ALARP sets goals for duty holders rather than being prescriptive on how to manage risk. This flexibility can be advantageous as it allows the best methods to be applied and encourages innovation.

Best Available Techniques (BAT) or Best Practical Means (BPM): An approach to regulation and safety where the industry uses the most effective methods, technologies or practices available.

Development Consent Order (DCO): A statutory authorisation under the Planning Act 2008 that grants permission to construct and operate a Nationally Significant Infrastructure Project (NSIP) in England and Wales. A DCO can incorporate multiple consents (e.g., planning permission, compulsory purchase powers, environmental permits) into a single streamlined approval process. Applications are examined by the Planning Inspectorate and decided by the relevant Secretary of State.

Dose Constraints: Advisory or planned levels on the radiation dose that individuals may receive from planned activities with exposure to ionising radiation. They are used to support the principle of As Low as Reasonably Achievable (ALARA).

Dose Limits or Limitation: Legal limits set to protect employees and members of the public from the effects of ionising radiation. They are set at a level that balances the risk from exposure with the benefits of using ionising radiation. The effective dose limit for employees aged 18 and above who work with ionising radiation is 20 millisieverts (mSv) a year. The effective dose limit for members of the public is 1mSv a year.

Funded Decommissioning Programme (FDP): A legally required plan that sets out how the operator of a new nuclear power station will make secure financial provision to cover the full costs of decommissioning the facility and managing and disposing of radioactive waste, ensuring these responsibilities are not passed on to the taxpayer.

Geological Disposal Facility (GDF): Geological disposal involves isolating radioactive waste deep underground, inside a suitable rock volume to ensure that no harmful quantities of radioactivity ever reach the surface environment. A GDF will be a highly engineered structure consisting of multiple barriers that will provide protection over hundreds of thousands of years.

High Level Waste (HLW): Highly radioactive waste that generates significant heat due to radioactive decay. This heat must be considered in its long-term management. HLW can include spent fuel where the owner has declared it as waste for geological disposal and not for reuse or reprocessing.

Higher Activity Waste (HAW): Term used in the application to refer to waste that includes High Level Waste (HLW), Intermediate Level Waste (ILW), and some Low Level Waste (LLW) that is not currently suitable for disposal in the Low Level Waste Repository (LLWR). The [UK policy framework](#) does not use the term HAW in the waste categories it defines, except to note that “higher activity radioactive waste” is used in Scottish Government policy.

Intermediate Level Waste (ILW): Waste that exceeds the upper boundaries of radioactivity levels for Low Level Waste (LLW) but does not generate a significant amount of heat.

International Atomic Energy Agency (IAEA): United Nations body that promotes the safe, secure, and peaceful use of nuclear technologies worldwide, and works with the UK and other nations to develop international safety standards, conduct peer reviews, and support non-proliferation efforts.

Low Enriched Uranium (LEU) fuel: Nuclear fuel in which the proportion of uranium-235 has been increased above natural levels but remains below 4.95% by mass, in line with international standards and UK regulatory practice.

Low Level Waste (LLW): Waste that has a relatively lower radioactive content. LLW has a radioactive content not exceeding 4 gigabecquerels per tonne of alpha activity or 12 gigabecquerels per tonne of beta-emitting, gamma-emitting, or beta and gamma-emitting radionuclides.

Millisievert (mSv): Unit used to measure the effective dose of ionising radiation received by a person, reflecting its potential biological impact. One millisievert equals one-thousandth (1/1,000) of a sievert (Sv). This unit provides an estimate of health risk associated with radiation exposure.

Effective Dose: Measure of how much radiation affects a person’s whole body, taking into account which parts are exposed and how sensitive they are. It helps indicate the overall health risk from radiation.

Nationally Significant Infrastructure Project (NSIP): Large scale development in sectors such as energy, transport, water, or waste that meets thresholds set out in the Planning Act 2008 and applies only in England and Wales. NSIPs follow a streamlined consent process managed by the Planning Inspectorate and require approval from the Secretary of State, rather than local planning authorities. Scotland and Northern Ireland have separate consenting regimes for major infrastructure projects.

Optimisation: Process to keep the magnitude of individual radiation doses, the number of people exposed, and the likelihood of potential exposure As Low as Reasonably Achievable (ALARA), taking economic and social factors into account.

Pressurised Water Reactor (PWR): Type of nuclear power reactor that uses water under high pressure as both a coolant and a moderator to provide energy through controlled nuclear fission that is used to generate power.

Safety Assessment Principles (SAPs): [Set of regulatory guidelines](#) used by the UK's Office for Nuclear Regulation (ONR) to assess the safety of nuclear facilities which include numerical targets known as the Basic Safety Levels (BSLs) and Basic Safety Objective (BSO) values:

- **Basic Safety Levels** are an upper limit on the acceptable risk or dose that a new nuclear facility or activity should not exceed.
- The **Basic Safety Objective** forms a benchmark of expected levels of safety for a new facility or major modification that reflect modern nuclear safety standards and expectations.

Spent fuel: Fuel that has been used in a nuclear reactor and can no longer effectively produce energy through a chain reaction because of the accumulation of byproducts.