

Nuclear energy in Wales

Research Briefing

October 2025



The Welsh Parliament is the democratically elected body that represents the interests of Wales and its people. Commonly known as the Senedd, it makes laws for Wales, agrees Welsh taxes and holds the Welsh Government to account.

An electronic copy of this document can be found on the Senedd's website:
research.senedd.wales

Copies of this document can also be obtained in accessible formats including Braille, large print, audio or hard copy from:

Welsh Parliament
Tŷ Hywel
Cardiff Bay
CF99 1SN

X: **[@SeneddResearch](#)**
Senedd Research: **research.senedd.wales**
Subscription: **[Newsletter](#)**

© **Senedd Commission Copyright 2025**

The text of this document may be reproduced free of charge in any format or medium providing that it is reproduced accurately and not used in a misleading or derogatory context. The material must be acknowledged as copyright of the Senedd Commission and the title of the document specified.

Nuclear energy in Wales

Research Briefing

October 2025

Authors:

Bryn Townley and Dr Matthew Sutton

Senedd Research acknowledges the parliamentary fellowship provided to Bryn Townley by the Engineering and Physical Sciences Research Council (EPSRC) which enabled this briefing to be completed.

This research briefing provides an overview of civil nuclear energy in Wales, including historical, ongoing, and potential future developments. The briefing:

- provides a brief history of nuclear energy in Wales, particularly highlighting Wales' two former nuclear power stations – Trawsfynydd and Wylfa – and a potential future site at Llynfi;
- examines the direct and indirect impacts on Wales of nuclear developments elsewhere in the UK;
- explores the scientific principles and technology behind modern nuclear reactors, particularly focussing on the potential role of small modular reactors (SMRs);
- investigates nuclear safety and nuclear waste, including reserved and devolved regulatory roles and plans for the permanent storage of nuclear waste; and
- looks at the challenges and opportunities for nuclear energy in relation to the Welsh Government's commitments for net-zero greenhouse gas emissions by 2050 and the broader energy transition.



Contents

1. Nuclear energy in Wales and the UK	1
Decommissioned sites in Wales	1
Wylfa	1
Trawsfynydd	3
Future developments at UK nuclear sites	4
Prosiect Egni Glan Llynfi	4
Project ARTHUR	4
Hinkley Point C	5
Sizewell	6
2. Modern nuclear: how does it work?.....	8
Large-scale reactors	9
Small Modular Reactors	9
Nuclear fusion	11
3. Wales' current energy mix.....	12
Current energy production in Wales	12
4. Public financing for new nuclear and renewables	15
Contracts for Difference	15

Future nuclear financing: the Regulated Asset Base model.....	17
5. Uranium mining and fuel production	19
6. Safety and nuclear waste.....	20
Modern safety standards and risk assessment	20
Nuclear waste production.....	20
Nuclear waste storage	21
Geological Disposal Facility (GDF).....	21
Emergency preparedness and response.....	23
7. Jobs and skills.....	24
New nuclear in north Wales	24
Other nuclear related economic developments.....	24
8. Timeline of selected developments	26

1. Nuclear energy in Wales and the UK

There were two operational nuclear power stations in Wales during the late 20th century: Trawsfynydd (from 1965) and Wylfa (from 1971). Wylfa closed in 2015, ending 50 years of Welsh nuclear power. Across the UK, there are **five operational nuclear power stations** as of 2025. Four of these are in England: Sizewell, Hartlepool, Heysham 1, and Heysham 2; plus Torness in Scotland. All active sites are owned and operated by the French state-owned company EDF Energy.

The total installed capacity of the UK's operational nuclear sites is around 6GW, and accounted for approximately 14% of **UK electricity production in 2023**. Over the next decade, all of the UK's active nuclear sites are scheduled for decommissioning, with the last site, **Sizewell B, expected to close in 2035**. As well as domestic production, the UK consumes nuclear energy imported through interconnectors from continental Europe, which supplied 20% of all the **UK's electricity consumption** in 2024. In recent years, France has consistently been the largest supplier to the UK, and the **majority of its electricity is produced using nuclear power**.

The last UK Government set out its plans for the future of nuclear in the **civil nuclear roadmap to 2050**. It targeted 24GW of installed nuclear capacity by 2050, which would supply around 25% of predicted demand. Two new nuclear sites in England are currently under development: Hinkley Point C, and Sizewell C, each of which will deliver 3.2GW capacity. A further 17.6GW of capacity would be required from new nuclear developments, which may include both conventional large-scale stations, and a new technology called small modular reactors (SMR). The two closed Welsh nuclear sites are potential candidates for new developments over the coming decades. The Welsh Government has promoted the redevelopment of Trawsfynydd through **its company Cwmni Egin**.

Nuclear power stations provide a consistent and predictable supply of energy to the electricity grid. This contrasts with most other electricity sources, whose output is either intermittent (e.g. wind and solar), or can be adjusted quickly to meet demand (e.g. gas).

Decommissioned sites in Wales

Wylfa

The **Wylfa nuclear power station** was built on the north Anglesey coast during the 1960s. Its two 490MW Magnox reactors operated from 1971 until 2015.

In 2012, the Japanese company **Hitachi bought the Wylfa site** for £700m, with a proposal to develop ‘**Wylfa Newydd**’ – a new power station next to the inactive station containing two new advanced boiling water reactors (ABWRs) with 2.7GW total capacity. However, in 2020, **Hitachi scrapped its plans** after failing to reach an agreement with the UK Government over the upfront costs of building the power station. The site was subsequently **purchased by the UK Government** in 2024 for £160m. The **last UK Government earmarked Wylfa** as its “first choice site” for a new large-scale nuclear plant. However, Wylfa was not mentioned in its **civil nuclear roadmap**.

Speaking to the Senedd Environment, Trade, and Rural Affairs (ETRA) Committee **inquiry on nuclear energy and the Welsh economy** in 2023, a Nuclear Industry Association spokesperson **outlined the potential for future nuclear developments at the Wylfa site**:

If you were to speak to anybody involved in nuclear, it's a site that is very highly regarded because of its geography, geology, community support—a range of different factors that make it a very strong site for new-build development... And so, I think it's highly likely, if there's a gigawatt-scale reactor beyond Sizewell C, that it will be at Wylfa.

Figure 1. Wylfa Nuclear Power Station



Trawsfynydd

The **Trawsfynydd site** is based inland in the Eryri National Park in Gwynedd, North Wales. It became operational in 1965 and was the site of a twin Magnox reactor until generation ceased in 1991.

The site is now owned by the UK Government's Nuclear Decommissioning Authority (NDA). Cwmni Eginio was set up by the Welsh Government in 2021 to deliver the **Trawsfynydd Site Development Programme** and is now the site's project development company. It is planning a roadmap for **future SMR development**, which it hopes will be built from 2027/28, with power generation commencing in the 2030s. **Cwmni Eginio says** a future SMR deployment at Trawsfynydd could create 400 "high quality" jobs over 60 years of operation, and thousands more during construction.

Figure 2. Trawsfynydd nuclear power station's twin reactors.



During the 2023 ETRA Committee inquiry, a **Nuclear Industry Association spokesperson said** Trawsfynydd is "not suitable for large-scale reactors because of the geography and the water supply", but that it would be a suitable site for a SMR. As with Wylfa, Trawsfynydd was not mentioned in the **last UK Government's civil nuclear roadmap**.

In July 2025, the Secretary of State for Wales, Jo Stevens MP, **described Trawsfynydd** as "one of a number of potential sites that could host new civil nuclear projects, subject to national planning policy, regulatory approvals and technical assessments". However, **Cwmni Eginio's 2024/25 annual report** says it is now "unlikely that our

proposition for Trawsfynydd to be one of the first UK sites to deploy SMR can be delivered as envisaged” due to UK Government prioritising alternative sites.

Future developments at UK nuclear sites

Prosiect Egni Glan Llynfi

The American company Last Energy, **plans to build the UK’s first micro modular nuclear reactors** at the site of the former Llynfi coal power station, near Bridgend. It acquired the site in October 2024 and plans to build four 20 MW PWR-20 micro nuclear reactors, the first of which would be commissioned by 2027. These reactors would be by far the smallest nuclear ever built in the UK. Each reactor would have a capacity 25 times smaller than the decommissioned reactors at Wylfa nuclear power station.

Last Energy **says it chose the site** “because of its proximity to a large existing industrial base, which is in need of secure 24/7 clean power”. It plans to deliver the project entirely using private capital, without public funding.

The project has been **accepted into the Welsh Government’s Development of National Significance (DNS) process**, and a formal application to the planning body PEDW must be made by February 2026, before a final approval decision is made by the Welsh Ministers. The PWR-20 reactor design **completed a Preliminary Design Review** (PDR) by the Office for Nuclear Regulation and environmental regulators in June 2025. Further design, safety, security, and environmental approvals will be needed before the project can go ahead.

Project ARTHUR

In January 2023, the Welsh Government **announced its intention to develop a new nuclear reactor** to produce radioisotopes for medical purposes. This would be called the ‘Advanced Radioisotope Technology for Health Utility Reactor’, or project ARTHUR, and would form part of a new technology cluster in north Wales. Outlining the plans, then Minister for the Economy, **Vaughan Gething MS, said** project ARTHUR would also support nuclear energy research:

The research component of ARTHUR would not confine itself to health research alone, but could also inquire into materials research for application in both fusion—that’s fusing hydrogen isotopes—and fission energy, which is the conventional nuclear energy. This research could help to deliver reliable, sustainable and affordable low-carbon energy, and improved nuclear technologies with less waste and environmental impact and with greater efficiency.

In its **2024/25 annual report**, Cwmni Eginio says it is working with Welsh Government officials to develop a business case for co-locating the Project ARTHUR nuclear reactor at the Trawsfynydd site.

Hinkley Point C

Hinkley Point is a nuclear site in Somerset, south west England. It hosts inactive Magnox (Hinkley Point A) and advanced gas cooler (Hinkley Point B) reactors, and is will be the site of a new 3.2GW pressurised water reactor (Hinkley Point C).

The construction of Hinkley Point C began in March 2017. EDF owns two thirds of the project and the remaining third is owned by China General Nuclear Power Group, which is owned by the Chinese Government. In 2015, EDF **estimated that the project would cost £18bn** and would be completed by 2025. However, **EDF now estimates** the project may cost three times the initial estimate, at around £46bn, and **won't be finished until 2029-2031**.

Due to its location, Hinkley Point C's development work has directly impacted Wales. A **2018 Senedd petition** signed by over 7,000 people called for the suspension of a licence to dispose of dredged material from Hinkley Point in a Welsh portion of the Bristol Channel at a site called Cardiff Grounds. A **later petition, in 2020**, demanded an Environmental Impact Assessment related to the disposal of the same material and was signed by over 10,000 people. Senedd Research produced articles on **the 2018** and **2020 petitions** before they were debated in Plenary.

In 2020, the **Welsh Government set up an independent panel** to review the implications of Hinkley Point C for Wales, particularly focussing on environmental impacts in the Severn Estuary, and the economic impacts for south Wales. The panel **published its final report** in March 2021. After its publication, the **then-First Minister, Mark Drakeford MS, said**:

Its conclusions include the need to put in place effective cross-border arrangements to deal with any emergency, and the need for remodelling of disposal at the Cardiff grounds as a result of its own detailed consideration of the suitability of the Cardiff grounds as a disposal site within a marine protected area and the wider resilience of the Severn estuary ecosystem. I will ensure that the report is made available to the regulator so that its conclusions can be properly taken into account when considering any application that might lead to the marine sediment being disposed at the Cardiff grounds.

In **responding to the independent panel's report** in December 2021, the Welsh Government outlined how it would address cross-border marine planning concerns,

particularly in the Severn Estuary.

Sizewell

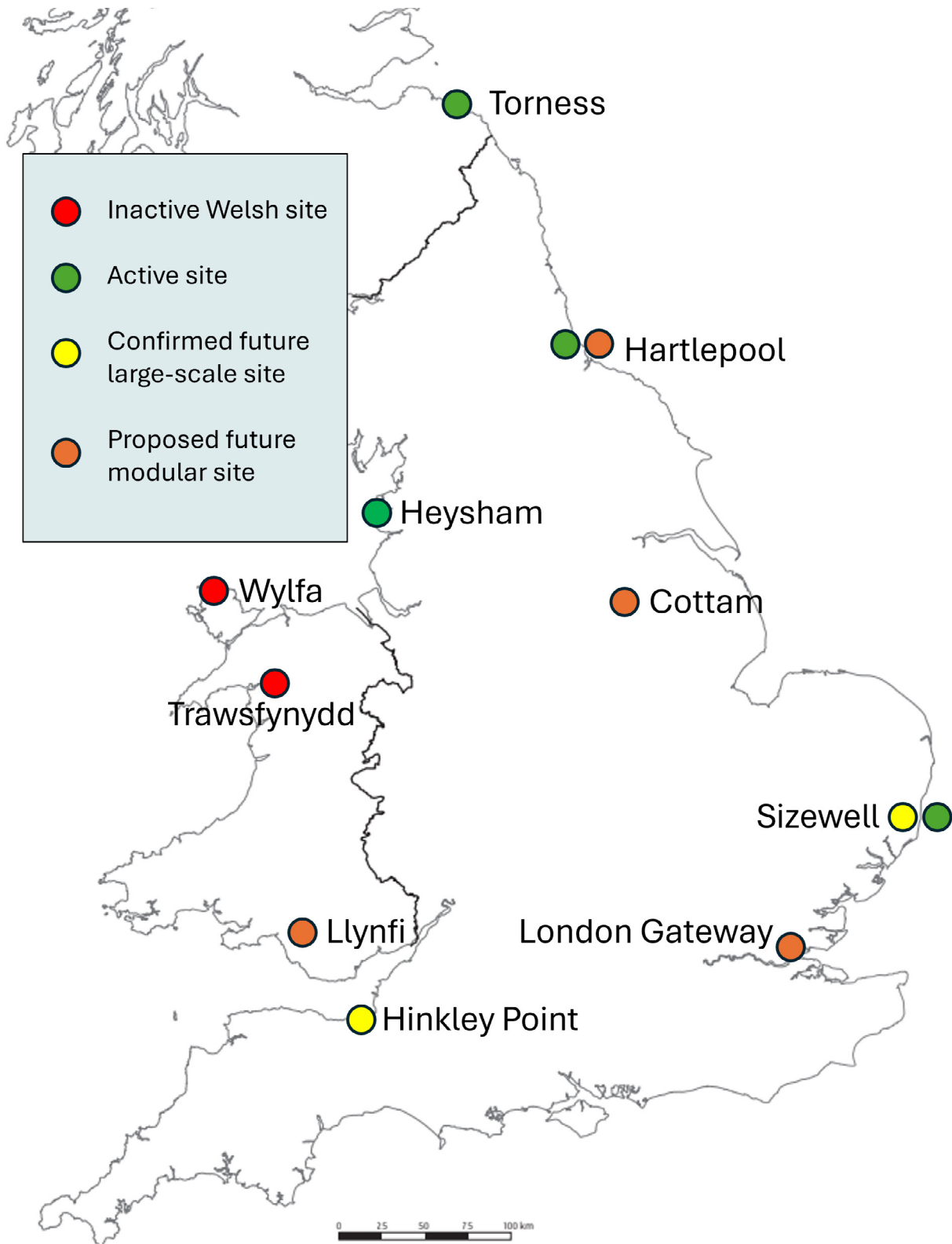
The Sizewell site in Suffolk, eastern England, hosts two decommissioned Magnox reactors (Sizewell A), and an operational 1.2GW pressurised water reactor (Sizewell B), which is planned to **remain operational until 2035**. In July 2025, the **UK Government announced a final investment decision** to construct a new nuclear plant, Sizewell C.

The UK Government had previously **committed to invest £14.2bn in Sizewell C** during the 2025 Spending Review. It will have a 44.9% stake in the project. EDF **agreed to own 12.5%**, with the remainder owned by Centrica (a British multinational energy company), La Caisse (a Canadian pension fund), and Amber Infrastructure (a British investment fund). The UK Government estimates that construction will take a decade, create 10,000 direct jobs at peak construction, and that the plant will generate enough power to supply six million homes. It says Sizewell C will have 900 permanent employees during operation. Sizewell C's design will be the same as Hinkley Point C, with the Secretary of State for Energy Security and Net Zero, **Ed Miliband MP, saying that Sizewell C** "will reap the benefits of replicating what happened at Hinkley. We are confident it can be built cheaper and faster". Sizewell C's 2020 **cost estimate of £20bn** has subsequently **risen to £38bn**.

In 2021, **the Sizewell C Consortium** (an organisation of businesses and trade unions involved in the UK nuclear supply chain) **agreed a Memorandum of Understanding** (MoU) with the Welsh Government. The MoU included a commitment that the Consortium would:

- explore "the possibility of transferring the Hinkley Point C supply chain in Wales over to Sizewell C, without delay or time lag"; and
- invest around £900m in Wales during the lifetime of the project and support up to 4,700 Welsh jobs.

Figure 3. Map of inactive Welsh, active UK, and confirmed new UK nuclear power stations

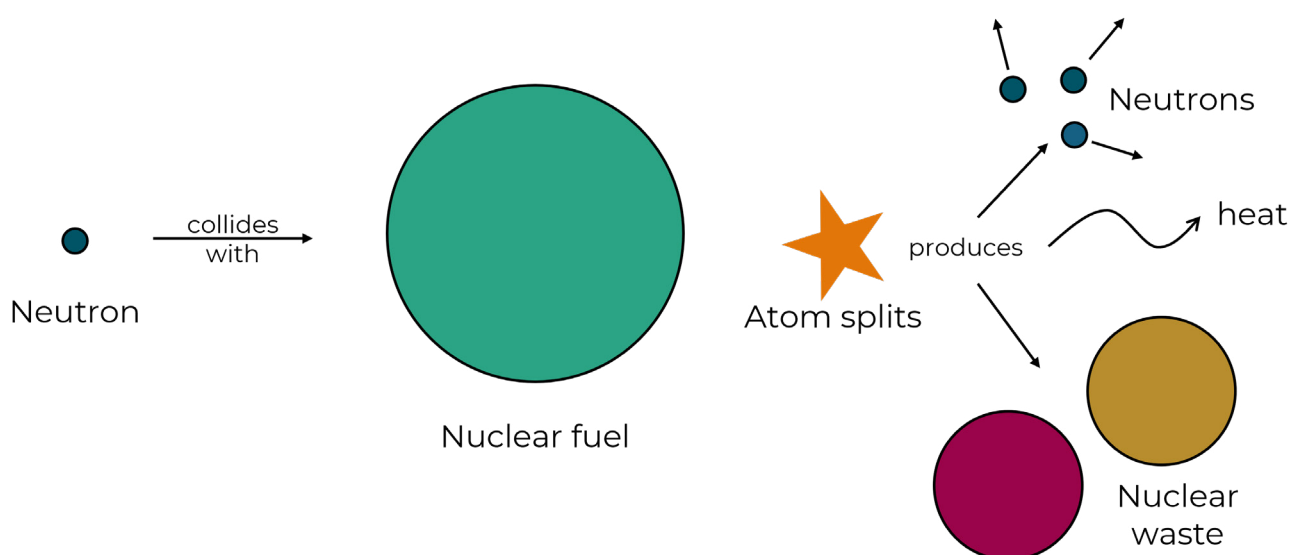


– **Source: Senedd Research**

2. Modern nuclear: how does it work?

Civil nuclear reactors utilise the process of nuclear fission. Fission involves firing subatomic particles called neutrons into uranium atoms. When a uranium atom is split, it releases more neutrons, which go on to split more uranium atoms, releasing more heat in a chain reaction. Large amounts of heat is generated during this process, which is harnessed to heat water into steam. The steam then powers turbines, generating electricity. This process does not release carbon dioxide, or any other **greenhouse gases, which contribute to climate change**, but requires refined uranium as a fuel source, which is finite and non-renewable. Nuclear fission reactions also produce nuclear waste, whose management is discussed in a later chapter.

Figure 4. Simplified illustration of a nuclear fission reaction



– **Source: Senedd Research**

Large-scale fission reactors are referred to by 'Generation' number, based on when they were designed. For example, Hinkley Point C will be a Generation III reactor. Reactors are typically comprised of the same key components:

- a fuel source, such as uranium rods;
- a moderator, which slows down fast-moving neutrons produced during fission to sustain a controlled chain reaction; and
- control rods, which absorb excess neutrons to control reaction rate or to stop the reaction entirely.

Large-scale reactors

All nuclear power stations built in the UK to-date have been large-scale reactors. The UK's operational nuclear reactors all have a capacity of over 500MW, whilst the largest (Sizewell B) has a **1,198MW generating capacity**.

Reactor designs undergo an extensive approval process ahead of deployment. For a reactor to be issued a licence from the regulators (the **Office for Nuclear Regulation** (ONR), the **Environment Agency**, and **Natural Resources Wales** (NRW)) it must first pass through a **generic design assessment (GDA)**. The GDA focuses on design, security, and safety.

The Magnox reactor, used at Wylfa and Trawsfynydd, was a Generation I reactor. This was the earliest model of nuclear reactor used in the UK, and was used in the world's first civil nuclear power station, built in 1956 at the **Calder Hall site** in Cumbria, England. There are a total of **26 inactive Magnox reactors in the UK**. Wylfa was the final one to close, in 2015.

Modern reactors are typically Generation II and III. **European Pressurised Reactors (EPRs)** are an EDF-designed Generation III reactor. Other EPRs are currently operational in China, Finland, and France. Two EPRs are being built in Hinkley Point C, and this model is also planned to be used in Sizewell C. The **UK EPR received its GDA** in December 2012.

Generation IV reactors are designs currently at either research or prototype stage. The **Generation IV International Forum (GIF)** is an international collaboration between the UK and 12 other countries to research and test future nuclear reactor designs. Generation IV reactor concepts attempt to address the main challenges of current nuclear, and the **GIF has set out its priorities for future designs** on fuel efficiency, waste, economics, and safety. The GIF has identified six reactor concepts for future research. All of these would operate at higher temperatures than current reactors. The GIF hopes these designs will lower costs, introduce passive safety, and increase efficiency.

Small Modular Reactors

The International Atomic Energy Agency (IAEA) **defines small modular reactors** (SMRs) as a hypothetical type of reactor that could be mass produced and quickly assembled, but with a significantly lower capacity than traditional large reactors. SMRs' small size means they would have reduced cooling requirements and a smaller footprint than conventional nuclear plants, increasing the number of potential site locations.

As part of its approach to SMR development, **Rolls-Royce has said** mass factory production will reduce construction times compared to large one-off infrastructure projects, meaning more energy can be generated sooner. Modular reactors can also be installed closer to areas of high demand, reducing the strain on a renewable-dominated electricity grid. SMRs would increase reaction efficiency by using novel, more highly enriched nuclear fuels compared to current fuels.

In its **2025 Spending Review**, the UK Government announced **a £2.5bn investment into SMR development**. In June 2025 it also **identified Rolls-Royce** as its preferred bidder to build the **UK's first SMR**. In the same announcement, the UK Government said its company GB Energy – Nuclear would aim to allocate a site for SMR deployment during 2025, with a target to connect to the grid by the mid-2030s. Rolls-Royce's 470MW SMR design is now at the **final step (3 of 3) of the GDA process**, during which it will undergo a detailed technical assessment, which is **expected to finish by December 2026**. Two other SMR designs have also completed GDA step 1: **Holtec International's SMR-300**; and the **GE-Hitachi BWRX-300 SMR**.

In September 2025, the UK and US Governments signed the **'Atlantic Partnership for Advanced Nuclear Energy' agreement**, which increased the mutual recognition of the regulation process between the two countries. The **UK Government says** the deal will "help speed up approvals for nuclear, to around 24 months, for advanced designs like the Rolls-Royce SMR".

Development consent for future SMR projects with a generating capacity up to and including 350MW in Wales is devolved under the provisions of **section 39 of the Wales Act 2017**. Other aspects of SMR development, including site licensing are reserved. Rolls-Royce's SMR design is expected to have a 470MW capacity, meaning development consent would fall to the UK Government through its **Nationally Significant Infrastructure Project (NSIP) process**. However, the other two SMR designs progressing through the GDA process are both planned to have a 300MW generating capacity.

Cwmni Egino, the Welsh Government company managing the Trawsfynydd site, says SMRs have **the potential to be developed and deployed quickly** at sites such as Wylfa and Trawsfynydd, due to their flexible and modular design.

Several companies are developing 'micro modular reactors', a type of SMR with a capacity significantly smaller than the designs discussed above. Last Energy's **planned modular reactors in Llynfi**, Bridgend, would each have 20MW capacity. Unlike other SMR designs, Last Energy is not applying for a GDA, **but will instead** "apply directly for nuclear site licensing and environmental permitting for the Llynfi site in Wales".

Any company that wants to construct or operate a nuclear facility in Wales would need to **apply to NRW** for a range of environmental permits, licences, and consents. NRW works with the Environment Agency (England's environmental regulator), and the ONR when assessing new applications on the grounds of safety, security, environmental protection, and waste management.

Nuclear fusion

All commercial nuclear power stations rely on nuclear fission reactions – these types of reactions occur naturally in some rocks as large, unstable elements break down into smaller, more stable states. In contrast, nuclear fusion is distinct process that occurs naturally under extremely high pressures and temperatures in the Sun and other stars. It involves **combining multiple light atomic nuclei to form a single heavier one**, releasing vast amounts of energy.

If nuclear fusion could be used to generate electricity, it would have the advantage of not producing any radioactive waste products. Multiple international research projects have successfully undertaken **small-scale nuclear fusion experiments**, but fusion is not currently a technically or economically viable way to generate electricity.

The **UK Government is investing in nuclear fusion research**, and developing fusion-specific planning rules to enable further research. In 2023, it gave consent for the construction of a **fusion demonstrator plant** in Oxfordshire, England.

3. Wales' current energy mix

Although the construction of nuclear power infrastructure is energy and emissions intensive, electricity production in nuclear plants produces no greenhouse gas emissions, but does produce nuclear waste. Hence, nuclear power is sometimes referred to as a 'zero-emission' or 'low-carbon' technology, but it is not renewable.

In June 2024, **the Senedd passed an amended motion** supporting:

...the role that nuclear power plays alongside renewables in the Welsh Government's plans for a green and fair transition to a low-carbon economy, ensuring all new power generated in Wales is zero emission.

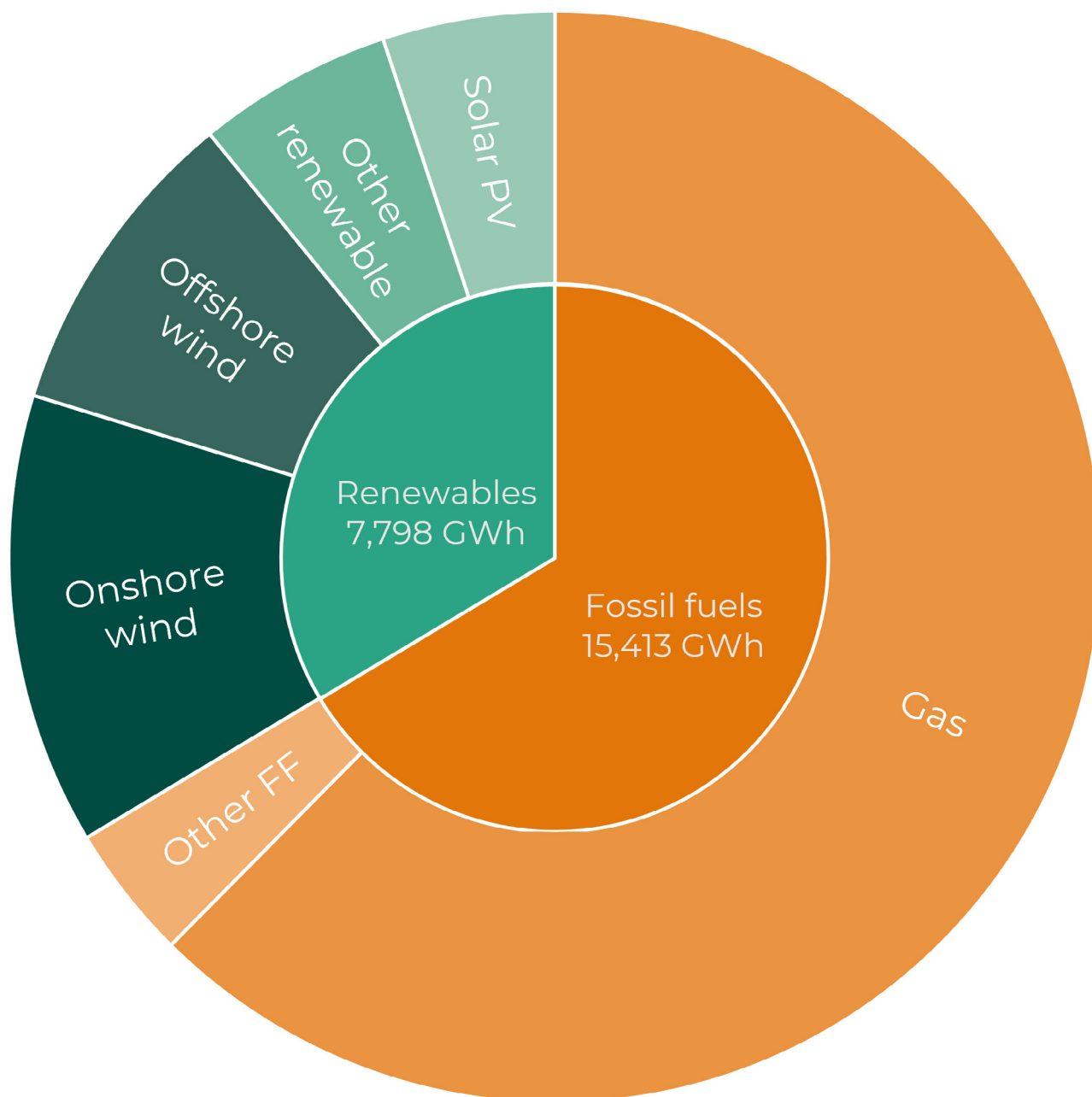
The motion also called on the UK Government to work with the Welsh Government on exploring plans for new nuclear generation at Wylfa and Trawsfynydd.

Current energy production in Wales

Wales doesn't currently generate any power from nuclear, even so it is a net-exporter of electricity. **Figures from 2023** show Wales produced 23.2TWh of electricity but only consumed 14.3TWh. Figure 5 shows the energy generation mix in Wales in 2023.

The majority of Welsh electricity is generated using gas, mainly at Pembroke and Connah's Quay power stations. However, electricity production **from gas peaked in 2016**, and has generally declined since. Gas is a fossil fuel, burning it releases greenhouse gases and **contributes to climate change**.

In 2023, the Welsh Government **set a target** to generate the equivalent of 100% of Welsh electricity consumption from renewable sources by 2035. The **UK Climate Change Committee's 6th UK Carbon Budget report** estimates that by 2035, Welsh electricity consumption will approximately double to 29TWh. In 2023, Welsh renewables generated 7.8TWh of electricity, or 53% of Welsh electricity consumption. Installed renewable energy capacity must therefore almost quadruple in the next decade to achieve the Welsh Government's target.

Figure 5. Energy production in Wales in 2023

– **Source:** Welsh Government

Different energy sources have their own strengths and weaknesses. The **World Energy Council** – an international body of public, private, and third sector organisations – provides **a framework promoting a secure, sustainable, and affordable energy supply**. To achieve a balance of all three, it says there may be trade-offs, and a mix of sources of energy may be required. For example, nuclear energy could supply a baseload of steady energy to the grid, improving security, but potentially at a higher cost than other technologies.

For a stable electricity grid, energy supply must always be equal to demand. Energy generated from nuclear power is finely controlled, but because of the amount of time required to ramp generation up or down, nuclear cannot be used on its own to meet real-time fluctuating demand. Similarly, a renewables-dominated grid, with generation from intermittent sources, cannot respond to fluctuating demand unless coupled with stored, or quick-responding energy sources, such as gas, **battery storage**, or **grid-scale hydrogen**.

4. Public financing for new nuclear and renewables

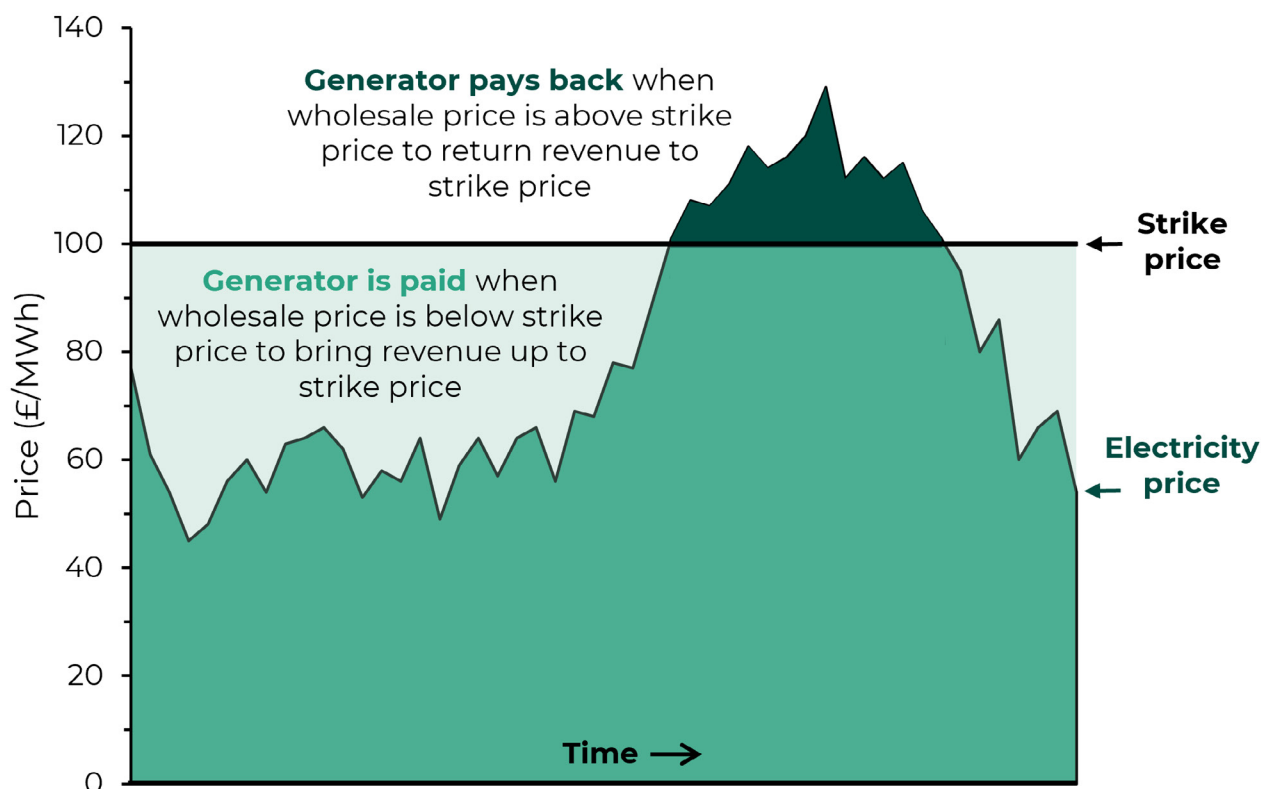
New nuclear and renewables projects can be eligible to receive financial guarantees from the UK Government, in order to improve investor confidence and project viability. Since 2015, renewable projects have been eligible for the **Contracts for Difference (CfD) scheme**, which is managed by the UK Government's **Low Carbon Contracts Company** (LCCC). Hinkley Point C was also supported within the CfD regime, but in 2022 the UK Government said it would instead **support nuclear funding through the Regulated Asset Base (RAB) model**. Both the CfD and RAB models are discussed in the sections below.

Contracts for Difference

CfDs are a policy mechanism that provides developers with a fixed 'strike price' for generating electricity. As shown in Figure 6, if the wholesale market price for electricity is lower than the strike price, the LCCC will pay the difference to the developer, and if the wholesale market price is higher, the developer will pay back the difference. In CfDs, the developer is wholly responsible for the initial cost and risk of building generating infrastructure, and is only eligible for public money once electricity is being produced.

The LCCC reports its CfD awards in 2012-equivalent prices (this convention is also followed throughout this section), which allows for direct comparisons between projects. Note however that the nominal value paid by or to generators **changes annually in line with CPI inflation and electricity market change**. For example, in 2015 the Mynydd y Gwair onshore wind farm near Swansea was **awarded a 2012-equivalent strike price of £79.99**, which is now worth £114.61 in the **April 2025 adjustment**.

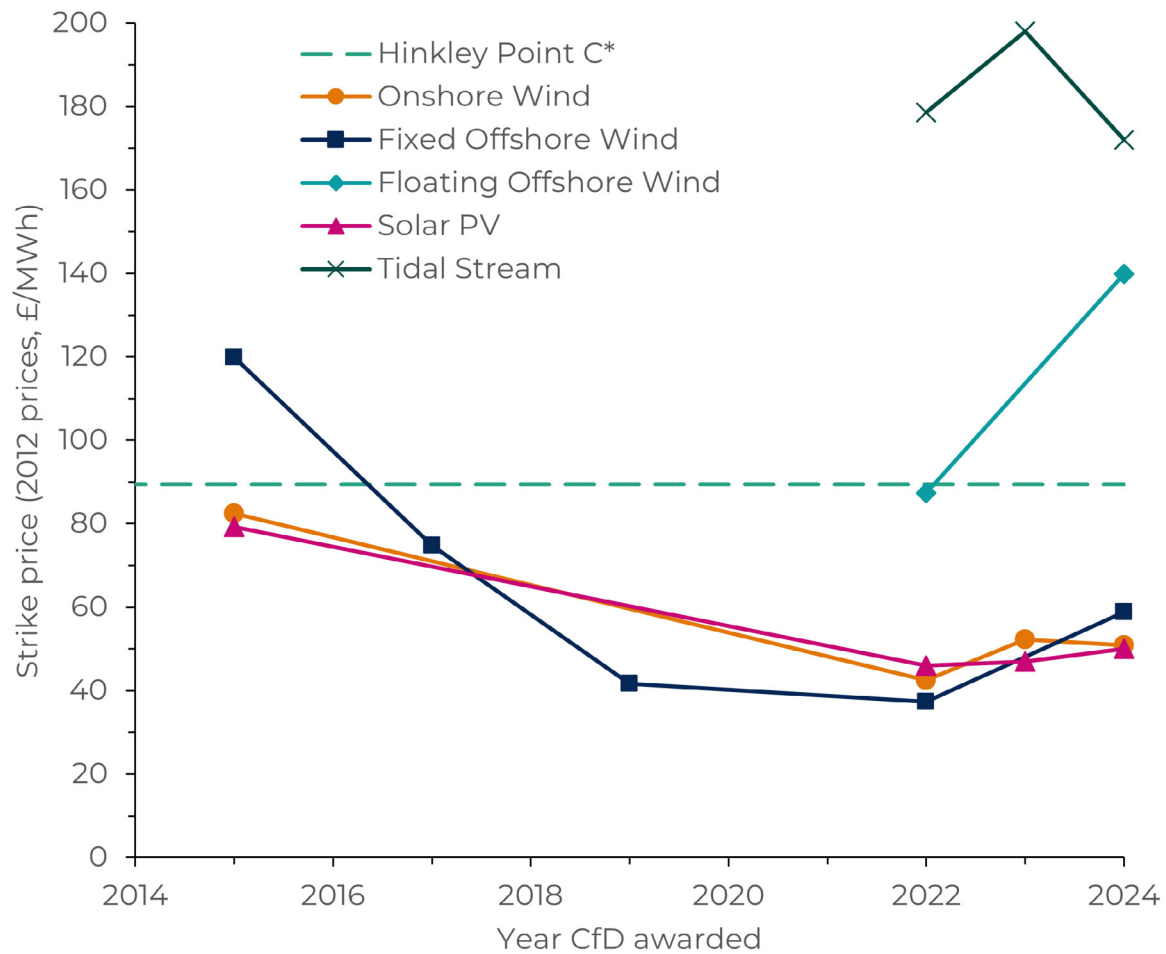
In 2013, Hinkley Point C was **awarded a 'bespoke' CfD** with an initial strike price of £92.50/MWh for 35 years, which **dropped to £89.50/MWh** when EDF took its final investment decision on Sizewell C.

Figure 6. A hypothetical example of a Contract for Difference (CfD) strike price

– **Source: Senedd Research**

Renewable technologies compete for funding through a competitive bidding process known as **CfD Allocation Rounds** (ARs). There were six **ARs between 2015 and 2024**, with a **seventh round due to open in 2025**. The strike price of established renewable technologies (solar PV, onshore wind, and offshore wind) has fallen significantly, and in the latest CfD funding round the strike price (and effective public subsidy) of these renewables is around 50% lower than that awarded to Hinkley Point C. Emerging renewable technologies – **floating offshore wind and tidal stream energy** – remain more expensive than Hinkley Point C, but **may fall over time as the technology develops**. Figure 7 compares renewable and Hinkley Point C CfD strike prices over time.

Figure 7. Strike price trends for renewable technologies compared with Hinkley Point C



— **Source:** Low Carbon Contracts Company

*Hinkley Point C's CfD was awarded in 2013. The strike price value is projected forwards in time for comparison purposes.

Future nuclear financing: the Regulated Asset Base model

In 2022, the UK Government **decided to change the funding model** for future nuclear developments. It highlighted the downside of using a CfD approach for Hinkley Point C, saying it:

...places the entire construction risk on developers, and ultimately led to the cancellation of recent potential projects, such as Hitachi's project at Wylfa Newydd in Wales and Toshiba's at Moorside in Cumbria.

Future nuclear infrastructure will instead be financed through a Regulated Asset Base (RAB) model. This has been used for other construction projects such as the Thames Tideway Tunnel and Heathrow Airport Terminal 5. The RAB model allows companies

to charge consumers a regulated price on energy bills to support the capital costs of construction. The charge will be **managed by the energy regulator Ofgem**.

Sizewell C will be the first nuclear project funded by the RAB model. Addressing costs to energy customers, Sizewell C's **Joint Managing Director said**:

Sizewell C will cost consumers around £1 per month as an average over the duration of construction. Once operational, the project could lead to savings of £2bn a year across the electricity system.

5. Uranium mining and fuel production

Although **there are some minor uranium deposits in the UK**, no mining takes place here. The UK therefore imports all of its uranium from other countries via the **partially UK Government-owned company Urenco**. The **UK Government says** the procurement of nuclear fuel, including its countries of origin, is “a commercial matter for reactors operators”. Therefore information related to procurement is disclosed at those companies’ discretion. However, **New Civil Engineer has quoted a nuclear policy expert** saying that the UK’s nuclear fuel is often imported from mines in **Canada, Australia, and Kazakhstan**.

Uranium ore must be processed and enriched before it can be used in nuclear reactors. Most of the UK’s nuclear fuel is **produced by the Canadian-owned company Westinghouse** in Lancashire, England. It raises the concentration of uranium and enriches the fuel to increase the proportion of uranium-235 – the main isotope used in reactors. **Low enriched uranium** (LEU) has a uranium-235 concentration of around 5% and is used in conventional large reactors. Smaller future reactors, such as SMRs, **would use high-assay LEU** (HALEU), which is more strongly enriched than conventional fuel. The **last UK Government invested £196m** into a programme to produce HALEU for domestic advanced reactors.

6. Safety and nuclear waste

Modern safety standards and risk assessment

The UK Government has detailed **guidance and policy on civil nuclear safety**, which details its binding legal framework. The UK adheres to the **International Atomic Energy Agency's (IAEA) Fundamental Safety Principles**, and is a signatory of the **Convention of Nuclear Safety (CNS)**. The **Office for Nuclear Regulation (ONR)** is the independent statutory regulator responsible for nuclear safety and security standards across the UK.

Nuclear waste production

Nuclear fuel is typically made up of **ceramic pellets, surrounding uranium, which are stacked into rods**. Multiple rods combine to make a fuel assembly, which is used in the reactor. When a neutron splits a uranium atom, the reaction produces heat used for energy, nuclear waste, and more neutrons which begin the chain reaction process (Figure 4). Nuclear waste is the material produced after a uranium atom is split, and any other material in the surrounding area that may be irradiated. Nuclear waste can be unstable, and may continue to release radiation for thousands of years, with potentially **harmful impacts on human and environmental health**.

Nuclear waste is **classified according to the type and quantity of its radioactivity** and how much heat it produces. The vast majority of nuclear waste produced by volume is Low Level Waste (LLW), which has relatively low radioactivity levels. LLW produced in the UK is mainly kept at a dedicated LLW Repository in Cumbria, England. Higher Activity Wastes (HAW), such as spent fuel arising from the Wylfa and Trawsfynydd sites, has the potential to be more hazardous and must be managed, transported, and stored in specific ways. The majority of HAW arising from Welsh sites has been transported to **Sellafield in Cumbria**, where it is **stored in stainless steel silos**.

Additionally, a relatively small amount of HAW is produced through the **routine use of radiopharmaceuticals in healthcare and medical research**. Some of this material was previously stored at the G.E. Healthcare site in North Cardiff, but this was removed before the site was **de-licensed by the ONR in 2019**.

Currently, there is no permanent solution for storing HAW anywhere in the UK.

Radioactive waste disposal policy is a **devolved matter, and the Welsh Government is responsible** for determining the policy for the disposal of waste

within Wales. For HAW policy, it works with Nuclear Waste Services (NWS), a subsidiary of the UK Government's Nuclear Decommissioning Authority (NDA). If a nuclear waste disposal site were ever built in Wales, **NRW would be responsible for its regulation.**

Nuclear waste storage

Geological Disposal Facility (GDF)

In 2019, the **Welsh Government said it** supported the long-term management of HAW in **geological disposal facilities** (GDFs). This would involve permanently storing radioactive waste many hundreds of meters underground, beneath stable layers of rock. The UK Government also supports the development of a single GDF for HAW from Wales, England, and Northern Ireland. In contrast, the **Scottish Government does not support storing HAW in a GDF**, preferring storage in near-surface facilities.

Globally, there are not yet any GDFs actively receiving waste, although the **Onkalo GDF in Finland** is in its **final testing phase**. The site is up to 450m deep with tens of kilometres of storage tunnels, which are intended to house **all of Finland's nuclear waste for thousands of years**. Other countries are actively developing GDFs, including **Sweden, France, Canada, and Switzerland**.

Whilst the Welsh Government is **supportive of GDFs in principle**, it is not actively looking for sites. In 2019, it issued **a statement on GDFs**, which said:

The Welsh Government has not identified any potential sites or communities to host a GDF in Wales nor will it do so. Our policy is very clear, a GDF can only be sited in Wales if a community is willing to host it.

It said this approach "does not necessarily mean a GDF will be built in Wales". Communities that do volunteer would be eligible for investment through **Community Investment Funding of up to £1m a year**. Funding for a GDF in Wales would come from the UK Government, via its **NWS** company, which is part of the NDA group.

The Welsh Government elaborated on how a proposed Welsh GDF might progress through the planning system in the 2024 **joint UK policy framework for managing radioactive substances and nuclear decommissioning**. It said that a GDF "constructed at a depth of at least 200 metres beneath the ground will require an Infrastructure Consent issued by Welsh Ministers". It further stated that:

...geological disposal can only proceed in Wales on the basis of the consent of a willing Potential Host Community via a Test of Public Support. The discussions may last for 15 to 20 years and a planning

application for a GDF would be made only after a positive Test of Public Support. Applications for planning approval for exploratory boreholes would be made during the discussion period and would, as part of the planning process, be subject to public consultation...

In its **most recent annual GDF progress report**, the ONR says it is currently working with three GDF community partners in England, but none in Wales. In its 2024 **GDF community guidance document for England**, Nuclear Waste Services said:

Although the [UK] Government has expressed in policy its strong preference to construct and operate a single GDF it has not ruled out having more than one, if necessary.

NWS has set out its **indicative timescale for the development of a UK GDF**, which is summarised in the table below. Development currently remains subject to a Test of Public Support, and so there is no guarantee that a GDF will ever be built.

Table 1: Key events in NWS’s indicative timescale for the GDF programme

Event	Time
Decision on “communities to take forward” for further investigations	Late 2025 – early 2026
Move to a “single Area of Focus”	Autumn/winter 2028
Commencement of site characterisation	2030
Emplacement of intermediate-level waste	2050s
Emplacement of high-level waste	2075

– **Source:** Nuclear Waste Services

Not all places are **suitable for a GDF**. Geological stability is essential for a GDF, with the greatest potential for storage in granites, clays, and rock salt deposits. The UK as a whole is very geologically stable, as it is located far from tectonic plate boundaries, and these rock types are relatively abundant. **Wales is geologically diverse**, but in general its rocks are more heavily fractured and folded than in England due to a history of mountain-building events over the past billion years.

When the now-defunct nuclear industry body Nirex **identified potential sites for a GDF in the 1980s**, it long-listed eighteen Welsh sites. Nine of these were found unsuitable on the basis of location (including the islands of Bardsey, Ramsey, Skokholm, and Skomer). The other nine sites were found to have a suitable location, ownership, size, and ‘characteristics’, but were discounted based on unsuitable subsurface geology.

Emergency preparedness and response

Nuclear sites in the UK are built and operated in a way that minimises the risk from radioactivity. However, the potential for harm and the reality of **past nuclear emergencies in the UK** and internationally, means emergency preparedness is essential.

The ONR regulates emergency preparedness across the UK. In the event of a radiation emergency, **response efforts would occur at four different levels**. This would scale from on-site management to international engagement. The ***Radiation (Emergency Preparedness and Public Information) Regulations 2019 (REPPIR)*** places a duty on relevant local authorities to produce off-site emergency preparedness plans, which are **assessed by ONR**. The **REPPIR framework** aims to **ensure that members of the public are provided with relevant information before and during a radiation emergency**.

Command and control mechanisms during a radiation emergency are reserved to the UK Government. However, as set out in Annex L of the UK Government's Nuclear Emergency Planning and Response Guidance, the Welsh Government has responsibilities for:

- keeping Ministers and members of the Welsh Cabinet fully informed;
- keeping local authorities and members of the public informed;
- advising the central government on adjustments to priorities, or redeployment of resources necessary to meet Welsh needs; and
- acting as a central reporting point for local agencies.

7. Jobs and skills

New nuclear in north Wales

Future nuclear development would require a variety of skilled jobs in manufacturing, maintenance, and planning, going beyond direct jobs in the industry. Several witnesses to the **ETRA Committee's 2023 nuclear inquiry** highlighted concerns that skill shortages could be a barrier to delivering nuclear ambitions. Renewable developments (including in **wind and tidal energy**) mean energy sector skills and supply chains are in high demand, particularly in north Wales. In many cases, new nuclear projects may need to compete for the same skilled workforce.

The **Welsh Government either accepted, or accepted in principle**, all of the **ETRA Committee's six recommendations** following the inquiry. These included setting out how it will work with regional education and skills organisations when the UK Government announces a programme for new nuclear in Wales; and saying how it will work with the UK Government on local workforce planning.

Other nuclear related economic developments

The French company Boccard recently announced it would be opening a **new nuclear manufacturing facility in Deeside**, which will produce components for Hinkley Point C and Sizewell C. Boccard says it will bring 200 jobs to the local area. The project was backed by **£1.2m in Welsh Government funding** from the **Economy Futures Fund**.

The Welsh Government has supported the development of nuclear research, education and training hubs in north Wales, including:

- **Awarding £6.5m to fund two research centres** in Bangor University's **Nuclear Futures Institute** in 2017 as part of the **Sêr Cymru programme**.
- **Providing over £6m to Grwp Llandrillo Menai (GLM)** – a partnership of further education colleges – to develop an engineering campus at Llangefni, Anglesey, which **opened in 2019**. GLM's campus was co-funded by the NDA and Horizon Nuclear Power, and was originally intended to support the cancelled Wylfa Newydd project. Despite its cancellation, GLM continue to **offer several courses focussed on nuclear skills**.

The Welsh Government has also promoted the development of the north Wales nuclear industry by developing the **Anglesey** and **Snowdonia Enterprise Zones**. The zones include both of Wales' former nuclear sites, and the **Welsh Government says** the benefits of these locations include government support, a skilled local workforce, proximity to existing industry, and strong infrastructure. The UK and Welsh governments have also **established the Anglesey Freeport**. The **Freeport company says** local businesses will benefit from "exclusive customs and tax arrangements". The Wylfa site lies within the **North Anglesey Tax Site**, which does not currently form part of **the Freeport**, but is expected to be approved at a later date.

8. Timeline of selected developments

The graphic on the next page provides a brief summary of key past and future nuclear developments relevant for Wales.. Note that many future dates are only indicative, and may change or not occur at all.

Figure 8. Timeline of relevant past and potential future nuclear developments