

Assessing new nuclear power station designs

Our consultation on our assessment of General Nuclear System Limited's UK HPR1000 nuclear power station

Background - New nuclear power stations

Government is responsible for the UK's energy policy and set out its current position in the December 2020 white paper, "Powering our Net Zero Future".

In the white paper government highlights the need to address climate change urgently and sets out its strategy for wider energy systems so as to achieve the UK's target of net zero greenhouse gas emissions by 2050.

New nuclear power stations are an important part of the government's strategy to help ensure that we have secure supplies of low carbon electricity in the future.

As it encourages the development of new nuclear power stations, it has asked regulators to begin assessing the safety, security and environment protection features of new designs early in the development of any proposals.

Regulating new power stations

As regulators of the nuclear industry, we are working with the Office for Nuclear Regulation (ONR) to make sure that any new nuclear power stations built in the UK meet high standards of safety, security, environmental protection and waste management.

Assessing new nuclear power station designs

Our assessment process - 'Generic Design Assessment' (GDA) - allows us to begin scrutinising new nuclear power station designs well in advance of construction starting. This means that we can identify any potential design issues at an early stage and ask the reactor design company to address them. This will help to avoid potential costly and time consuming design changes for regulatory reasons during construction.

The assessment of a design takes around four years. At the end of the process we will say if a design should be acceptable or not.

Any company that wants to operate a nuclear power station has to show that it can build, operate and decommission it safely, securely, properly protect the environment and manage and dispose of radioactive waste.

Site specific permissions

The company needs a number of site specific permissions from regulators and government. These include a nuclear site licence and relevant consents from ONR and environmental permits from the Environment Agency. The company must also obtain planning consent and other approvals from the Department for Business, Energy & Industrial Strategy's Secretary of State.

If we, ONR and EA, receive applications for development of a new nuclear power station at a specific site we will carefully consider those proposals and take into account the work we have done on GDA when making decisions about whether the proposals are acceptable. We won't issue a site licence or environmental permits unless we are satisfied that site specific proposals and the proposed operating company meet our high standards.



Image copyright of China General Nuclear

Consultation on our assessment of General Nuclear System Limited's UK HPR1000 nuclear power station

The UK HPR1000 design

There are various types of nuclear reactors around the world, with over 440 in operation. One of the most common types is the pressurised water reactor (PWR), of which the HPR1000 is one of the latest designs under construction. It is capable of providing around 1,180 megawatts of electricity, enough to power more than 1.5 million homes on average. The HPR1000 is currently under construction in China.

How does the reactor work?

In the reactor core, 'fissions' or splits occur in some of the uranium atoms of its fuel. This produces energy in a continuous process called a 'chain reaction'.

The energy created by fission heats water inside the reactor, which is circulated by pumps in the 'primary circuit' to a 'steam generator'. In the steam generator, the very hot primary circuit water is used to heat water in the separate 'secondary circuit', producing steam which is fed to a turbine. This makes the turbine spin and drives a generator that produces electricity.

Both the primary and secondary circuits are at very high pressures, giving this type of reactor its name. There is a third water circuit which is used to cool the condenser of the turbine, converting the steam of the secondary circuit back to water, which is pumped back into the secondary circuit to flow through the steam generator again. In UK nuclear power stations, sea water is usually used in the third water circuit, but this can be replaced by water from rivers or estuaries or by cooling towers.

Bradwell Power Generation Company is developing proposals for 2 UK HPR1000s to be constructed at the Bradwell site in Essex, adjacent to the existing Magnox power station.

Assessment of the UK HPR1000

We began generic design assessment of the UK HPR1000 in January 2017. We published our initial assessment in November 2018. Since then, we have been carrying out our detailed assessment.

Our consultation

- We are consulting from 11 January 2021 to 4 April 2021.
- This consultation asks for your views on our preliminary conclusions following our detailed assessment of environmental aspects of the UK HPR1000 new nuclear power station design.
- This consultation is not about the need for nuclear power, UK energy policy, policy relating to the siting of nuclear power stations, or the safety and security of the design.
- We've published 8 assessment reports and an independent dose assessment alongside our consultation document and summary.
- All comments and matters raised will be carefully considered and can help inform our assessments.
- We will publish the issues raised during our consultation in a report on GOV.UK in May 2021.

How to get involved and respond

- **Online:** <https://consult.environment-agency.gov.uk/nuclear/assessing-new-nuclear-power-station-ukhpr1000>
- **Email:** nuclear@environment-agency.gov.uk
- **Post:** Dr Paula Atkin, Environment Agency, Ghyll Mount, Gillan Way Penrith 40 Business Park, Penrith, Cumbria CA11 9BP
- **Online events:** Information will be advertised to stakeholders

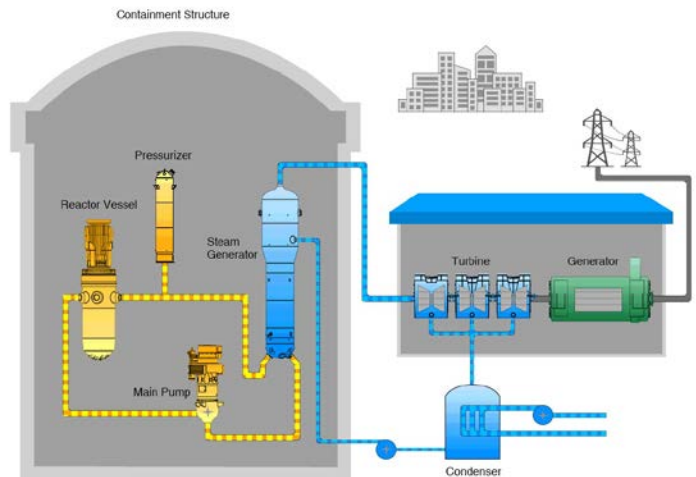


Figure 1. A simplified illustration of the UK HPR1000 reactor
Image copyright of China General Nuclear