Hinkley Point C and Nuclear Waste

Summary: Spent nuclear waste fuel from Hinkley Point C could be stored in wet storage ponds on-site for 160 years. By the time the station closes around 2085 the radioactive content of the waste will amount to the equivalent of 80% of the waste which already exists in the whole of the UK. The consequences of a fire in the Hinkley storage ponds could dwarf the accident at Fukushima.

Since Theresa May decided to review the Hinkley Point C nuclear project, and has now decided to go-ahead, most of the discussion has been about the huge cost of the reactors and the security implications of allowing the Chinese to get involved in building nuclear power stations in the UK. (1)

But there has been virtually no discussion about what we will do with the nuclear waste, despite the fact that we still don't know what is going to happen to the waste we have already created.

After more than 60 years of a civil nuclear power programme, the UK is still seeking a long-term solution for dealing with its higher activity radioactive waste. Government policy is that most higher activity waste (HAW) should be buried deep underground in what is known as a Geological Disposal Facility (GDF). But past experience has taught the Government and nuclear industry that it won't get away with imposing such a facility on a community without the community's consent. (2)

In January 2013 Cumbria County Council rejected plans to undertake preliminary work on an underground radioactive waste dump somewhere in the west of the County. That rejection sent the plans back to the drawing board and left the UK once again without even a potential site for a GDF.

Since then the Nuclear Decommissioning Authority (NDA) has published guidance on assembling and presenting information on geology, and the Government has amended the Planning Act 2008 so that in England a GDF can be pushed through the planning system as a Nationally Significant Infrastructure Project (NSIPs).

Two further consultations are expected in Autumn 2016 – one on a draft National Policy Statement (NPS) and another on a policy framework for Working with Communities.

Then in 2017 the search will begin for a community somewhere in England, Wales or Northern Ireland interested in hosting a GDF in the hope that this time a community somewhere will agree to host it.

What will happen to the waste from Hinkley Point C?

Unlike the spent fuel from Hinkley Point B which is transported by train to Sellafield in Cumbria for reprocessing[1], the Government does not expect spent fuel from Hinkley Point C to be treated that way. In fact the Thermal Oxide Reprocessing Plant (THORP) at Sellafield which reprocesses the spent fuel from Hinkley Point B is due to close in 2018, and there are no plans to replace it.

A GDF is not expected to be ready to receive waste until around 2040. Waste from new reactors like Hinkley Point C is not expected to be emplaced in the GDF until after all our existing waste has been

[1] Reprocessing involves chopping up the spent fuel rods and dissolving them in nitric acid. Plutonium and unused uranium are then extracted leaving a highly radioactive liquid waste which has to be continuously cooled.

emplaced which is expected to take around 90 years – around 2130. This means that spent fuel from Hinkley Point C could remain on the site in Somerset for at least the next 100 years.

The other factor which needs to be taken into account is that Hinkley Point C is expected to use high-burn up fuel which could require up to 100 years of cooling before it will be cool enough to be emplaced in a GDF. (5) So assuming Hinkley Point C comes on stream around 2025, with an expected reactor life of 60 years, this means spent fuel may need to be stored in Somerset until about 2185.

How much waste will Hinkley Point C generate?

The nuclear industry and government repeatedly claim that the volume of nuclear waste produced by new reactors will be small, approximately 10% of the volume of existing wastes; implying this additional amount will not make a significant difference to finding an underground dump for the wastes the UK's nuclear industry has already created. The use of volume as a measure of the impact of radioactive waste is, however, highly misleading. (6)

Volume is not the best measure to use to assess the likely impact of wastes and spent fuel from a new reactor programme, in terms of its management and disposal. The 'high burn-up fuel' which Hinkley Point C is expected to use will be much more radioactive than the spent fuel produced by existing reactors like Hinkley Point B. So rather than using volume as a yardstick, the amount of radioactivity in the waste, which affects how much space will be required in a deep geological repository, are more appropriate ways of measuring the impact of nuclear waste from new reactors.

According to Radioactive Waste Management Ltd, the radioactivity from existing waste (i.e. not including new reactors) is expected to be 4,770,000 Terabecquerels (TBq) in the year 2200. The radioactivity of the spent fuel alone (not including other types of waste) generated by a 16GW programme of new reactors is expected to be around 19,000,000TBq. Hinkley Point C would be a 3.2GW station, so the amount of radioactivity in the spent fuel from Hinkley Point C in the year 2200 would be 3,800,000TBq – or about 80% of the radioactivity in existing waste. (7)

How will spent fuel be stored at Hinkley?

Although EDF Energy says it is possible that spent fuel might start to be transported off site during the lifetime of Hinkley Point C, it is prudent to plan to store all of the lifetime arisings of the two reactors which are planned. (8) The plan is to store spent fuel from Hinkley Point C in spent fuel storage ponds. EDF is planning to be able to extend the life of the storage ponds for up to 100 years after the reactors close. (9)

A recent study in the US detailed how a major fire in a spent fuel pond "*could dwarf the horrific consequences of the Fukushima accident*." The author Frank von Hippel, a nuclear security expert at Princeton University, who teamed with Princeton's Michael Schoeppner on the modeling exercise said "*We're talking about trillion-dollar consequences*." (10)

(1) BEIS 15th Sept 2016 https://www.gov.uk/government/news/government-confirms-hinkley-point-c-project-following-new-agreement-in-principle-with-edf
(2) History of Nuclear Waste Disposal Proposals in Britain http://www.no2nuclearpower.org.uk/radwaste/history-of-nuclear-waste-disposal-proposals-in-britain/
(3) A White Paper on Nuclear Power, BERR January 2008 Page 30 http://webarchive.nationalarchives.gov.uk/+/http:/www.berr.gov.uk/files/file43006.pdf
(4) Consultation on a Methodology to Determine a Fixed Unit Price for Waste Disposal and Updated Cost Estimates for Nuclear Decommissioning, Waste Management and Waste Disposal, DECC March 2010 Para 3.2.23 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/42533/1_20100324145948_e___ConsultationonFixedUnitPricemethodologyandupdatedcostestimates.pdf

(5) See Footnote 20 on page 22 of Fixed Unit Price Consultation Document Ref (4) above.
(6) For example, Dr Peter Bleasdale who went on to become Managing Director of the National Nuclear Laboratory said: “Already there are significant volumes of historic wastes safely stored, and a programme of new reactors in the UK will only raise waste volumes by up to 10%.” BBC 13th May 2008 http://news.bbc.co.uk/1/hi/sci/tech/7391044.stm
(7) Geological Disposal: An overview of the differences between the 2013 Derived Inventory and the 2010 Derived Inventory, RWM Ltd July 2015 https://rwm.nda.gov.uk/publication/differences-between-2013-and-2010-derived-inventory/
(8) Hinkley Point C Pre-application Consultation, See para 6.30 here https://www.edfenergy.com/sites/default/files/V2%20C06%20Spent%20Fuel%20and%20Radioactive%20Waste%20Management.pdf
(9) As above para 6.42
(10) Science 24th May 2016 http://www.sciencemag.org/news/2016/05/spent-fuel-fire-us-soil-could-dwarf-impact-fukushima