Lessons for Hinkley from Sellafield

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November 2018

- The cost of building THORP increased from £300m in 1977 to £1.8bn on completion in 1992. With the additional cost of associated facilities this figure rose to £2.8bn.
- Originally expected to reprocess 7,000 tonnes of spent fuel in its first ten years, it has managed only around 9,300 in 24 years.
- The original rationale for THORP ended with the closure of the UK's fast reactor programme in 1994.
- The new rationale – to produce plutonium fuel for ordinary reactors was a disaster costing the taxpayer £2.2bn.
- The lesson for Hinkley Point C from Sellafield is stop now while the cancellation costs are relatively low. Leaving things any longer risks yet another Sellafield-scale financial disaster.

The controversial Thermal Oxide Reprocessing Plant (THORP) at Sellafield in Cumbria has started work on processing its final batch of waste fuel after operating for only 24 years. (1) THORP opened in 1994 to reprocess spent fuel from the UK's newer reactors – like Hinkley Point B - and overseas customers. Reprocessing is a chemical process which separates out plutonium and unused uranium from spent nuclear fuel.

There are strong parallels between THORP and the proposed £20bn Hinkley Point C nuclear power plant. Powerful arguments were put forward against the construction of both plants, but the Government and the Nuclear Industry continued to stubbornly pursue these massively expensive and dangerous projects. This Stop Hinkley Campaign briefing asks whether there are any lessons we can learn from the THORP experience to help us to evaluate the merits of continuing to build Hinkley Point C.

Currently, the ground-works for Hinkley Point C aren't even finished so, in theory, it should be straightforward not to go ahead with the project, if it looks like full construction and operation would be a mistake. In fact not going ahead with the plant could save electricity consumers between £27bn and £50bn over the 35 years that the plant would have operated. (2)

The construction of THORP was very controversial and was the subject of a Public Inquiry in 1977, which ran for one hundred days. It was argued that the Inquiry would be a way of rationally weighing up all the evidence in order to come up with the correct decision on whether or not to give the plant the go-ahead. However, Professor Brian Wynne has argued that the Inquiry was in fact a charade, meant only to give the impression of rational decision making. (3)

At the Inquiry it was argued that THORP would be needed to supply plutonium for a new type of reactor – the Fast Breeder Reactor. Justice Parker, the Inquiry Inspector, concluded that THORP should go ahead and the Government agreed. It was built in the 1980s and switched on in the 1990s. Within a week of THORP starting up, the prototype Fast Reactor at Dounreay in the north of Scotland was shut down – ending the whole UK Fast Breeder programme. (4)

By 1992 the original rationale for THORP had all but disappeared before it even opened so the Government decided to commission the consulting firm Touche Ross to examine the financial implications of THORP's operation or abandonment. It concluded that the economic benefit of operating THORP versus not operating it were £1.81bn for BNFL and £950m for the UK (5). In 1994, after a long and agonised debate, the Government decided to allow the plant to operate and the first waste spent fuel was 'sheared' - the outer cladding taken off - as the first step in the reprocessing process, in March of that year (6).

Another raison dêtre for THORP was quickly found, with construction work of the Sellafield MOX Plant beginning a few weeks later in April 1994. This was meant to produce plutonium fuel for ordinary reactors rather than Fast Breeders. The Sellafield MOX Plant was expected to generate £400m; instead it cost £2.2 Billion.

THORP was originally expected to reprocess 7,000 tonnes of spent fuel in its first ten years of operation. By the time it closes it will probably have reprocessed around 9,300 tonnes of spent fuel. If the plant had been working to its design capacity it should have completed 9,300 tonnes ten years ago in 2008 (7). THORP's throughput was never reliable, nor to specification.

The cost of building THORP steadily rose from £300m at the time of the public inquiry in 1977 to £1.8bn on completion in 1992. With the additional cost of associated facilities this figure rose to £2.8bn. The operator at the time – British Nuclear Fuels Ltd (BNFL) received advance payments from its customers of £1.6bn which largely covered the construction costs. The net result, according to BNFL was that over the first ten years the income would not only cover all building operating and future decommissioning costs, but would produce a profit of £500m. One economic analysis in 1993 pointed out that at a projected profit of only £50m per year, the economics of the project looked extremely vulnerable to unforeseen events, and British electricity consumers would be paying £1.7bn more than necessary to have British spent fuel reprocessed at THORP (8). This analysis turned out to be prophetic - there have certainly been plenty of unforeseen events since 1994. With THORP operating around a decade behind schedule, any notional profit originally expected must have long since been completely wiped out.

A report for the Government by management consultants Arthur D Little predicted in 2001 that the Sellafield MOX Plant would earn the UK more than £200m in foreign currency by exporting MOX fuel to Japan and several other countries. After the plant opened it was plagued by production problems due to its faulty design and layout. Instead of producing 120 tonnes of MOX a year, it managed less than 14 tonnes in eight years. The plant was closed in August 2011. (9) The plant is thought to have cost British taxpayers about £2.2bn in capital, operating and decommissioning costs since it was built. An internal report concluded that the facility was "not fit for purpose" and its performance over a decade was "very poor". (10)

The economics of THORP and subsequently the Sellafield MOX Plant (SMP) depended on the constructors and operators being able to build and operate the facilities according to the specification. But nuclear facilities being built in the west have suffered from delays and almost always tended to have large cost overruns. Recent ones have ALL suffered horrendous cost overruns – in the USA (4), France (1) and Finland (1). Yet otherwise sensible, financial analysts have, in the past produced reports to justify building facilities at Sellafield and Hinkley which seem to ignore this fact and assume construction and operation will proceed precisely on target.

The prospects of avoiding a Sellafield-scale financial disaster with Hinkley Point C do not look good. As Emeritus Professor Steve Thomas has pointed out: "*Hinkley Point C would use a technology unproven in operation – the EPR – which has run into appalling problems of cost & time overruns in the 3 projects using it. It would be supplied by Areva NP, which is in financial collapse and might not be saveable and has been found to be falsifying quality control records for safety critical items of equipment for up to 50 years – a bizarre situation*."

Time to cancel Hinkley Point C now while the cancellation costs are relatively low. Leaving things any longer risks yet another Sellafield-scale financial disaster.

(1) North West Evening Mail 26th October 2018 http://www.nwemail.co.uk/news/17009882.residents-urged-to-have-their-say-on-sellafield-review/ and Environment Agency 26th October 2018 https://consult.environment-agency.gov.uk/cumbria-and-lancashire/sellafield-rsa-major-permit-review/ In Cumbria 14th Nov 2018 http://www.in-cumbria.com/news/nuclear/Thorp-reprocessing-ends-at-Sellafield-788459cb-b779-45f7-863d-1827a6800d17-ds

(2) Time to Cancel Hinkley? By Professor Steve Thomas, Emeritus Professor of Energy Policy University of Greenwich September 2017. http://www.no2nuclearpower.org.uk/wp/wp-content/uploads/2017/09/Time-to-Cancel-HinkleyFinal.pdf

(3) Rationality and Ritual: Participation and Exclusion in Nuclear Decision-making, by Brian Wynne, Earthscan, 2011.

(4) A Guide to Dounreay, NDA & DSRL. April 2008 http://webarchive.nationalarchives.gov.uk/20120405092238/http://dounreay.com/UserFiles/File/Publications/PR%20First%20time%20Visitors%20Booklet%202.pdf

(5) Walker, W. Nuclear Entrapment: THORP and the politics of commitment, IPPR, 1999, page 87.

(6) Forwood, M. The Legacy of Reprocessing in the United Kingdom, International Panel on Fissile Materials, July 2008 http://fissilematerials.org/library/rr05.pdf

(7) Commercial Operations at Sellafield, CORE's Evidence to the Public Accounts Committee 18th October 2013 http://www.no2nuclearpower.org.uk/wp/wp-content/uploads/2014/02/CommercialOperations-at-Sellafield.pdf and CORE Press Release 12th Nov 2018 http://corecumbria.co.uk/news/sellafields-thorp-reprocessing-plant-an-epitaph-never-did-what-it-said-on-the-tin/

(8) Aubrey, C. THORP: The Whitehall Nightmare, Jon Carpenter 1993

(9) Guardian 3rd August 2011 https://www.theguardian.com/environment/2011/aug/03/sellafield-mox-plant-close

(10) Independent 9th June 2013 https://www.independent.co.uk/news/uk/politics/revealed-2bn-cost-of-failed-sellafield-plant-8650779.html