

ONR-NGO groups – Written evidence (RSK0096)

Initially related to Sizewell B and proposed Sizewell C

Financial and corporate risks¹

Sizewell B (SZB) was ordered by **CEGB** in 1987 having been approved by the Secretary of State following the Layfield enquiry and first operated by Nuclear Electric in 1995, at a final cost believed to be **135% of budget**. (1)

The principle of a further Nuclear Power programme was Contrary to the recommendations made to [an earlier Labour] government by the **1976 Flowers report, (2)** in particular this recommendation on radioactive wastes :“ There should be no commitment to a large programme of nuclear fission power until it has been demonstrated beyond reasonable doubt that a method exists to ensure the safe containment of long-lived, highly radioactive waste for the indefinite future (page181, paragraph 338).

Lord Hinton, who built Sellafield, and was the first head of the nationalised electricity supply industry (CEGB) told a Lords debate on the Flowers report “The Commission [Sixth Report of the Royal Commission on Environmental Pollution on Nuclear Power and the Environment (Cmnd.6618)]is right in criticising atomic energy organisations for being dilatory in devising safe methods of disposing of fission products.”(Lords Hansard, 22 December 1976, <https://api.parliament.uk/historic-hansard/lords/1976/dec/22/nuclear-power-and-the-environment>

Subsequently the privatised Nuclear Electric was split off and partially taken over by British Energy who took on the operation of the Sizewell PWR, all AGR reactors and one coal fired station. Meanwhile Nuclear Electric purchased a large tract of additional land around Sizewell complex and claimed it would be only an environmental buffer. In due course British Energy was taken over by French firm EDF in 2008 and rebranded as EDF in 2010. EDF are in **debt** in France around 40billion Euros and are currently trying to split off their nuclear division from their successful worldwide renowned Renewables division. **EDF French finances** (3)are also hit by their failure to complete the pilot European Pressurised Water (EPR) reactor project at Flamanville and difficulties with castings at Le Creusot and a forced takeover of the reactor maker Areva. The film “the Nuclear Trap” exposes the financial problems of EDF France and the problems with the EPR reactor. Added to this is the cost to EDF of completing Hinkley Point C, refurbishing the French fleet of over 59 domestic reactors and the prospect of a huge decommissioning bill. EDF have publicly stated they would not build a Sizewell C themselves and would need other **financial arrangements to be made**. The financing and proper allocation of liabilities for nuclear new build, spent fuel and decommissioning are highly complex and could lead to huge extra cost to the public purse over future years. Further plans for up to 2 PWRs at Sizewell were **abandoned in** 1996 following an energy review, as was a plan for PWRs at Hinkley C.

¹ “Risk management”, while more usually a financial term, is used here to express the identification, forecasting, and evaluation of risks together with the identification of procedures to avoid or minimise impacts.

Decommissioning

Currently the UK Nuclear Liabilities fund (4) holds around £9billion specifically for EDF reactor decommissioning and spent fuel management for Sizewell B. There is however a UK shortfall in **decommissioning** finance of around £20billion, for which EDF is believed liable. A view held by BEIS officers that new build was essential to fund decommissioning is almost laughable.(5) A number of the EDF UK AGR fleet will shortly cease operation further reducing EDF nuclear generation income.(3) Potentially the cost of managing the AGR spent fuel could be added to the NDA liabilities for decommissioning of Magnox and Dounreay and Sellafield.

Risk to National Grid

The SZB station generally operates at 1200 megawatts but during the lockdown last Spring operated at half power on one of its two turbines. This was at request of National Grid to avoid **Grid Instability. Ministers and the industry refer to a need for firm baseload which is unproven and contrary to the advice of the former Chief Executive of National Grid.**

The main Sizewell 400 kv grid lines could be carrying power from 3 wind farms, up to 4.4 GW from Nuclear and also could link to a hypothetical off shore ring main or interconnectors. Risking major power cuts if there is damage to these gridlines, which cannot be protected from malicious acts or accident. Back-up power from the grid is needed for nuclear for longer term safety, alongside emergency diesel generation, all of this power was lost at Fukushima. The integrity of the National Grid would appear to merit a separate risk assessment.

Operation at half power is contrary to standing advice from Office of Nuclear Regulation as it risks damage to the reactor. The EPR reactor **may not be able to run at half power** as it only has one turbine. Operation of inflexible nuclear plant potentially conflicts with a smart electricity network dominated by far cheaper renewable generation from other operators, communities and individuals.

Flood risks now and in future

Sizewell B and the redundant and defueled Sizewell A site are serviced by the public highway which is in **flood** zone 3. Following Fukushima specific attention was paid to flood risk. Yet the proposed Sizewell C site is partly in flood zone 3 and would probably require another site access for safety reasons. However an access road was rejected by Layfield Inquiry as being extremely damaging to the Suffolk Coast and Heaths AONB, SSSI and Ramsar sites. The industry admits that Sizewell C would require flood protection for up to 200 years in order to protect the storage of **spent nuclear fuel**. A proposed extension of the operational lifetime of Sizewell B will also have to consider the lifetime of storage of spent fuel. National policy EN6 (which is out of date) still includes 4 sites prone to flood risk, 3 of which are on the North Sea Coast.

Spent Fuel

Spent Magnox fuel for Sizewell A was wet stored and sent by rail to **Sellafield for reprocessing**. A final store for intermediate level radioactive waste is not yet available in the UK.

Both Sizewell B and a notional Sizewell C would **store spent nuclear fuel in dry casks** in a conventionally constructed store which relies **on passive cooling and which may be affected by climate change**. No reprocessing of Sizewell B spent fuel was ever envisaged. The integrity of the dry cask is anticipated to be 25 years by US manufacturer Holtec. The UK's first Dry Fuel store (DFS) at Sizewell B was required due to fuel pond storage problems and was constructed in 2014 following a stringent ONR safety case and was built at the highest ground level on the Sizewell complex. Sizewell C could be constructed on a higher platform than Sizewell B, but would then be significantly lower than the SZB DFS. The DFS for SZC is envisaged to be built at the same platform height as the plant itself. If constructed SZC would have to be protected by sea defences up to 14 metres and sited nearer to the North Sea than anticipated for either Sizewell A or B, whilst leaving the surrounding area and SZB and SZA unprotected. A similar situation arises at HPC where **flood risk to local villages has also been increased. EDF are on record as stating they do not accept liability for increased flood risk around Hinkley.**

No details of how spent fuel will be removed from SZB nor its final destination have ever been provided. The liability for the cost of spent fuel management and final "disposal" is again a responsibility of EDF. (9) The liability for spent fuel and decommissioning for EPR is not yet clarified for SZC although it should be the responsibility of the investor/operator. The risk that **high burn up** spent fuel (7) will add to an already growing stockpile of spent fuel **has not been addressed**. Extremely concerning is this statement from ONR regarding long term storage included in the 415 outstanding assessment findings on the UK EPR:-

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The licensee shall produce **a safety report for the long-term storage of spent fuel**. The report will contain information at least equivalent to that of a Preliminary Safety Case as defined in Guidance on the Purpose, Scope and Content of Nuclear Safety Cases,

If there has been no agreed study into long term storage how can there be a fully funded Spent fuel and Decommissioning fund set aside prior to Site Licencing or in place to advise a Final Investment Decision ?. ONR site licencing refers at Page 20.

Similarly the Magnox station Sizewell A owned by Nuclear Decommissioning Authority cannot be dismantled because of the highly radioactive core and the absence of a **disposal option. Despite this the out of date EN6 (11) states** :- "Geological disposal of higher activity waste from new nuclear power stations is currently expected to be available for new build waste from around 2130". **Clearly there is a major risk that a suitable disposal site will never be found. Disposal may not be an option thus adding considerably to the cost over future years.**

Sellafield - Observations from Sellafield include: Management of High Level Radioactive Waste

Reprocessing at Sellafield has generated large quantities of High Level Liquid radioactive waste. Concentrated Liquid HLW is stored in steel tanks on site prior to vitrification in glass blocks. It generates its own heat and so must be constantly cooled.

Risks relate to boiling and consequent atmospheric radioactive discharges due failure of the cooling system, and vulnerability to terrorist attack or accidental impact. The severity level could be catastrophic (Assessing the risk of terrorist attacks on nuclear facilities, Parliament Office of Science and Technology Report 222, July 2004).

Continued radioactive discharges to Irish Sea

The B205 Magnox Reprocessing Plant discharges radioactive substances to the Irish Sea – perhaps until 2028, yet continues to operate, contrary to the UK Government's commitment under OSPAR to bring discharges to zero by 2020.

The widespread contamination of the Irish Sea with Cs137 and of the entire groundwater under the plant, the history of discharges thanks to reprocessing, the resulting controversy over the Seascale leukaemia clusters in the 80s and the fact that the NDA are resuming their contamination of the Irish Sea by reprocessing the remaining Magnox fuel instead of dry storing it. The consequences of adding to the alpha content in the Irish Sea through plutonium and uranium in the discharges is unknown but is clearly returning to shore as evidenced by the plutonium found in peoples' Hoover bags in the 80s and the Groundhog machines attempting - and largely failing - to clean up 'hot particles' on the beaches. If this is about risk, then the low level radiation issue is entirely about that subject – full of unknowns about which the authorities are aware, but resulting in stonewalling by the regulators and CoMARE in particular.

Currently proposals are under consideration in Cumbria to build (1) a coal mine under the Irish Sea, only a few km north of the Sellafield plant, and (2) to host a GDF for high and intermediate level nuclear waste into the Irish Sea up to 12 km from the West Cumbria coast.

Risks relate to increased levels of radioactivity in the marine environment due to (a) continued discharges, (b) dispersion due to disturbance, and (c) in a severe case, from seismic events, which do occur in this region.

Fluvial flooding risk

The local fluvial catchment is very vulnerable to sea level rise and high rainfall. Risking a potential impact on the sewage works for the town of Leiston and a **risk to public health.**

Cooling water systems

The **cooling water system** on Sizewell B destroys fish and introduces heat and diluted chemicals to the fragile marine environment. Around 60% of the reactor thermal output goes back to the marine environment. The outflow of SZC is expected to be equivalent to that of the largest river systems like the Tweed, greater than the Thames, indicating a dramatic impact on **Coastal process.** The hugely powerful SZC or any other reactors would add significantly to this problem adding to the **risk of harm to Red data book bird and marine species.** The **risk to the environment from 10-12 years of construction** in a quiet and peaceful area cannot be mitigated and is contrary to the 25 year Environment Plan.(10) Temperature rise of cooling waters reduces the efficiency of all Thermal plant including Nuclear which also has an upper limit 26 degrees beyond which the reactor cannot be operated.

Town water demand for a PWR is considerable in this area of water stress as declared by the Environment Agency. **Demand and source of water for any SZC is unknown.** Potential risk to current licenced groundwater extraction by agriculture and RSPB Minsmere.

Emergency Planning

The detailed emergency planning zone (DEPZ) for Sizewell B declared by the operator and endorsed by the Suffolk County Council is 1.35 kms in radius. This is **contrary to International Atomic Energy Agency recommendation** for a PWR which is 3-4 kms **and contrary to BEIS officers recommendations** (5) and contrary to a recommendation by the **Office of Nuclear Regulation.** (12) The town of Leiston which is part of the Leiston-cum-Sizewell parish has a population of around 7,000. The current first stage emergency plan covers around 200 residents. Continued housing growth in the Outer protection zone of up to 30 kms continues unabated without public consultation. The risks and consequences of nuclear accidents are generally underestimated and as indicated at Fukushima the contamination zone is far wider than can be conceivably covered by any emergency plan. Contamination is clearly an unknown depending on severity of accident, prevailing wind and weather patterns. The situation at Fukushima is still unresolved 9 years after the event.

Additional comments from a former emergency planner further emphasise this point as follows:-

"Such a small evacuation zone goes against the learning points that come out of the 2011 Fukushima disaster. The rural nature of the area around Sizewell B includes a limited road network. In the event of an accident or malicious attack on the Sizewell B reactor there is likely to be the potential for the local population to self-evacuate clogging up those roads and preventing emergency service and Council ingress and egress to the site. A larger area would bring in more local people who could be pro-actively involved in a more controlled evacuation process amidst a greater level of understanding of the local emergency plan for the site. It is disappointing the Council has ignored the advice given by the IAEA, BEIS and ONR staff over the appropriate size of the emergency planning zone, particularly in excluding Leiston from this area.

Emergency planning works much better with an educated local community aware of the risks and ready to take on board the advice of the emergency agencies, particularly for something as serious as a nuclear accident.”

In France the authorities in a radius up to 20 kms around NPS have adopted the “I know what to do” principle and pre-distribute Potassium Iodate tablets and information to all residents.

Regulation

Nuclear regulators are bound to work to support the industries they regulate by the **Regulators Code. (13)** This is contrary to **EU Directive 2014/87 (14) Which demands wholly independent regulation.** The EPR is being constructed **at HPC despite 415 regulatory issues (known as Assessment findings) still remaining.** The content of the assessment findings list (which can be made available) will no doubt lead to **further risk issues.**

There is also a risk that Regulators views are not fully taken into account during the planning process which limits debate to 6 months. Site licencing and other licences and permits may take 2 years to conclude meaning that the Secretary of State planning decision is not fully advised by regulators. This situation is made worse by developers changing plans and introducing late data during the planning process.

Radiation impacts

Continuing knowledge about the impacts of low level radiation continue to accrue. What can we do with research findings which challenge the underpinning evidence used at the time the decision was made? In addition to those already known about it is now recognised that young children under the age of 5 living within 5 kms of nuclear installations are twice at risk of developing leukaemias (KKK study 2008); and women are much more susceptible to radiation impacts (BEIR VII, study 2007); and work by Mary Olson, 2010, presentation to Low Level Radiation and Health conference, Stirling University, July 2018. Females are more harmed by radiation, particularly when exposed as young girls than is predicted by use of Reference Man; the difference is as much as 10-fold. Since females have been ignored in regulatory analysis, this has resulted in systematic under-reporting of harm from ionizing radiation exposure in the global population.

KiKK, 2008, study, Germany: The main finding was an increased risk of leukemia in children less than five years of age with decreasing distance from a NPP. Kaatsch P, Spix C, Schulze-Rath R, Schmiedel S, and Blettner M, 2008. Leukaemia in young children in the vicinity of German nuclear power plants. *International Journal of Cancer* 122(4): 721-726.

Olson, Mary, 2019, Disproportionate impact of radiation and radiation regulation, Gender and Radiation Impact Project, Asheville, NC 28806, USA, *Interdisciplinary Science Reviews*, VOL. 44, NO. 2, 131-139; <https://doi.org/10.1080/03080188.2019.1603864>

Presentation at Low Level Radiation and Health Conference, University of Stirling, July 2018; *Gender Matters in the Atomic Age*, Mary Olson, US Nuclear Information + Resource Service, NIRS. <https://youtu.be/0IABP90CqQ4>

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Submitted on behalf of

Blackwater Against New Nuclear Group (BANNG); Parents Concerned About Hinkley (PCAH); Stop Hinkley; Cumbria Trust; Cumbrians Opposed to a Radioactive Environment (CORE); Ayrshire Radiation Monitoring Group (ARM); People Against Wylfa B (PAWC) PAWB; West Cumbria and North Lakes FoE; Low Level Radiation and Health Conference; Nuclear Consulting Group; Nuclear Waste Advisory Associates; Low-Level Radiation Campaign (LLRC); Greenpeace; Radiation Free Lakeland; Friends of the Earth Nuclear Network; Shut down Sizewell Campaign; Together against Sizewell C (TASC); Stop Sizewell C / Theberton and Eastbridge Action Group on Sizewell, Highlands Against Nuclear Transport
Non Government Organisations, NGOs which are members of both the BEIS and ONR Fora.

References

1. Wikipedia. [Sizewell nuclear power stations - Wikipedia](#)
2. Flowers report. [Flowers Report \(UK\) : Excerpts \(ccnr.org\)](#)
3. EDF annual report <https://www.edf.fr/sites/default/files/contrib/groupe-edf/espaces-dedies/espace-finance-en/financial-information/regulated-information/reference-document/edf-urd-annual-financial-report-2019-en-2.pdf> Page 58 onwards
4. Nuclear liabilities fund <http://nlf.uk.net/>
5. BEIS/NGO forums <https://www.gov.uk/government/groups/non-governmental-organisation-forum>
6. ONR. [ONR - Office for Nuclear Regulation - Health, safety and security in the nuclear industry](#)
7. Environment Agency. Design https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/301502/geho0510-bsjt-e-e.pdf
8. Flood risk planning go to IP16 4 UP. [Learn more about flood risk - GOV.UK \(flood-warning-information.service.gov.uk\)](#) Further information is available
9. EDF site licence application. https://www.edfenergy.com/sites/default/files/sizewell_c_nuclear_site_licence_application.pdf
10. 25year environment plan https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf
11. EN6 National policy https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47860/1943-nps-nuclear-power-annex-volII.pdf
12. ONR Safety principles <http://www.onr.org.uk/saps/saps2014.pdf>
13. Regulators code. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/300126/14-705-regulators-code.pdf
14. <http://www.onr.org.uk/documents/2017/council-directive-2014-87-euratom.pdf>

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