

Tsunami geohazard – Lack of transparency on the precautions and mitigating actions for the proposed Sizewell C development.

This paper has been drafted in response to the DCO application by EDF to the Planning Inspectorate to build Sizewell C nuclear power station.

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Summary Paper:

- 1.1. The Sizewell C site is vulnerable to the impact of a tsunami (termed a geohazard) that could cause significant damage to the Sizewell C nuclear station and the spent fuel store by increasing the risk of flooding. Tsunamis are comparatively rare but the Indian Ocean Boxing Day event 2004 and the Fukushima disaster 2011 are well-known recent examples.
- 1.2. EDF states in its Relevant Representations Report (P198) published in May 2021:
“The assessment of tsunami risk is taken very seriously by SZC Co. and the ONR and a complete assessment has been made for Sizewell C as part of the Nuclear Site Licence application.”
- 1.3. However in the DCO application this risk has been largely ignored and barely mentioned. There is no evidence open to public scrutiny through the DCO process and the Nuclear Site Licence process will not report until mid-2022. Therefore the mitigating actions through the lifetime of the site to the end of spent nuclear fuel being storage (probably 2190) and the wider planning issues are opaque. This is unacceptable particularly with the consequences on the adjoining coastline and overall nuclear safety.
- 1.4. Some of the risks and consequences of a tsunami are outlined in this paper and must not be hidden from wider public examination.
- 1.5. Tsunamis are by their very nature unpredictable however there is increasing scientific research into the phenomena which is recognised as not being well understood especially regarding its frequency and predictability. A recently published academic paper in Frontiers Earth Science identified that
*“Tsunamis are unpredictable infrequent but potentially large impact natural disasters. To prepare, mitigate and prevent losses from such catastrophes, probabilistic hazard and risk analysis methods have been developed and have proved useful. However, large gaps and uncertainties still exist and many steps in the assessment methods lack information, theoretical foundation, or commonly accepted methods.”*¹
- 1.6. Recent research has also identified that the frequency and severity of tsunamis will be exacerbated by climate change and the past may not be a good predictor of the future.

¹ Front. Earth Sci. | doi: 10.3389/feart.2021.628772

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Prof H Kunreuther² states '*Despite the historical inevitability of the earthquake and tsunami, the earlier events happened so long ago that there was a tendency to ignore them*'

- 1.7. Analysis of the height of the Storregga tsunami (8,000 BC) which occurred off the Norwegian coast indicated that the wave reached over 30m in height. At this time, there was still a land bridge between Britain and Europe which dissipated the power of the waves before it reached the Sizewell area. However no there is no such protection now and so the Sizewell site would be vulnerable when another such event occurs.
- 1.8. Published documents indicate that there is at least a 5 % chance of another such event in the next 200 years affecting the North Sea. When this happens there will be very significant consequences for many coastal communities and infrastructure but nuclear power stations would be especially hazardous.
- 1.9. Whilst the risk of a tsunami may be relatively low, it must still be accepted as a risk that needs to be appropriately mitigated for. Tsunamis are catastrophic events, if previous tsunami events were repeated, then the current proposed height of sea defences may not be sufficient. Whilst the east facing defences are proposed at 14m AOD the access road on the SSSI crossing is proposed at 7.2m AOD. The height of the rest of the flood defences around the site is not clarified. Flood water will always find the weakest point of any flood defence and therefore Sizewell is vulnerable to such an event.
- 1.10. EDF in their future scenario planning including their estimates of sea level rise have deliberately chosen to ignore the hazard posed by waves and a tsunami. Even the Expert Geomorphological Assessment Group is only working to 2070. However, a much longer-term view needs to be taken considering that even with the (most optimistic) EDF build schedule and with the expected life span (unless extended) the nuclear station will be in operation till 2090.
- 1.11. There is a requirement from the Office Nuclear Regulation and Environment Agency³ to protect the site for a further 100 years as there will be both decommissioning and the storage of spent fuel on site before it can be moved to a longer-term storage location. This assumes there is another location as this has yet to be identified let alone built. Flood defences must be in place and effective for the entire period identified.
- 1.12. EDF in their supporting document for the Environmental Statement note:
*"coastal geo-hazards [inc tsunamis] is an area where urgent work is required to establish even the baseline risk."*⁴. EDF are partners in the ASTARTE academic programme looking at tsunami risk but the learning from this work is not available for public review.

² Howard Kunreuther is the James G. Dinan Professor Emeritus of Decision Sciences and Public Policy, and Co-Director of the Wharton Risk Management and Decision Processes Center at the Wharton School, University of Pennsylvania.

³ Principles for Flood and Coastal Erosion Risk Management Office for Nuclear Regulation and Environment Agency Joint Advice Note July 2017 – Version 1

⁴ 6.12 Reports referenced in the Environmental Statement P25

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1.13. However EDF in their DCO application have failed, despite the issue being raised in some of the supporting documentation, to acknowledge the geohazard and therefore have taken no appropriate identified mitigating action. Failure to recognise and act on even their own advice leaves a potential catastrophic legacy for future generations.

1.14. The conclusions of this report are as follows:

- 1.14.1. EDF's proposal to build Sizewell C is a very significant proposal with long-term consequences. There will be a nuclear installation and repository for highly radio-active spent fuel rods on this vulnerable coastal site for at least 160 years.
- 1.14.2. EDF's own predictions indicate that the site is at flood risk in the long term and this is based on predictions that do not take into account tsunami risk.
- 1.14.3. The predictions of the impact of climate change over this timespan are recognised to be both significant and uncertain. Moreover, research indicates that these impacts could exacerbate the likelihood of a tsunami.
- 1.14.4. It is clear that academic researchers regard another tsunami as a credible risk in the Arctic. Dr Jon Hill has written: *"there is a 5% probability of a major submarine slide, and possible tsunami, occurring in the next 200 years."*⁵
- 1.14.5. The risk and the consequences of such events have not been adequately investigated and therefore not mitigated for. If research has been completed and conclusions have been reached then it must be published asap and the implications for all flood defences examined. This needs to be addressed by EDF as a matter of urgency.

In summary there is a quantifiable geohazard risk of a tsunami, that EDF have not taken this into account. The level of risk is such that it makes Sizewell C site too vulnerable to be built. Sizewell C is the wrong solution in the wrong place and should be rejected by the Planning Inspectorate.

⁵ [Will climate change in the Arctic increase the landslide-tsunami risk to the UK? - Research Database, The University of York](#)