Statement to the transboundary Environmental Impact Assessment NPP Wylfa Newydd/UK

Introduction

Horizon Nuclear Power is proposing to construct and operate a new nuclear power plant (NPP) at the Wylfa Newydd site in Wales at the coast on the Island of Anglesey. The new NPP shall comprise two UK Advanced Boiling Water Reactors (ABWR). The site already hosts two Magnox NPPs that were shut-down in 2012 and 2015.

Horizon Nuclear Power submitted a Development Consent Order (DCO) application and also an application for a Marine License in June 2018; a DCO is required by the UK Government for Nationally Significant Infrastructure Projects (NSIPs) such as a new NPP. The DCO process is managed by the Planning Inspectorate.

Moreover, for this project an Environmental Impact Assessment (EIA) according to British law (Planning Act 2008, Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 and 2017) and the ESPOO Convention is ongoing. Austria is taking part in the transboundary EIA.

The NPP will take approximately seven years to build, construction should start in 2020. The first UK ABWR unit should become operational at the end of year seven from construction start (2027), and the second UK ABWR approximately two years later (2029). A spent fuel storage facility is planned to be constructed after NPP construction, and start operation about 10 years after the NPPs started operation.

Alternatives

The Non-Technical Summary includes a very short chapter "Main alternatives considered"[1]. Information on energy production alternatives are not given, only a short reference to the National Policy Statements EN-1 and EN-6 which "set out the urgent need for new electricity generation plant, including new nuclear power". In the Non-Technical Summary it is also referred on the UK Strategic Siting Assessment from 2011 (confirmed in 2017) when the Wylfa site was defined as one of the potentially suitable sites for a new NPP. As a consequence, in the Non-Technical Summary it is concluded on page 17 that alternative energy generating technologies and alternative locations have not been considered further as part of the assessment.

But according to EIA Directive of the EU and the ESPOO Convention the EIA Report has to present alternatives of the project. Especially interesting is an information of NFLA, the Nuclear Free Local Authorities, who submitted very recently a statement to the DCO application for Wylfa[2]. NFLA pointed out that when the UK Government first endorsed Hinkley Point C (HPC) it was projecting an

+ [1] Horizon Nuclear Power (2018): Wylffa Newydd Project. 6.11. Environmental Statement. Non-technical Summary, p.17f.

+ [2] NFLA New Nuclear Monitor Policy Briefing. Edition No. 54, August 2018.

increase in electricity consumption of 15% by now, whereas in practice the UK is now consuming 15% less than a decade ago.

Request: The missing assessment of alternatives for the EIA Wylfa should be conducted from an environmental perspective, and the future need of electricity production should be declared.

The site

Wylfa is directly at the coast of the Irish Sea. While this fact is not discussed in the Non-technical summary, it was discussed in the Appraisal of Sustainability of the National Policy Statement EN-6 in 2009: "Strategic Effects on Flood Risk: The AoS has identified small potential, adverse effects relating to flood risk due to rising sea levels, especially during the later stages of operation and decommissioning. This is considered a wider national issue, because of the potential impact on national energy supply and infrastructure. However, it is considered that the hard cliff geology and elevated nature of the nominated site will afford adequate protection and that there is no need for coastal protection measures."[3]

In the NPS EN-6[4] it is declared that "sea levels around Wales are predicted to rise by 86cm by 2080." But recent scientific work on climate change effects gives reason to question such assumptions from 2009. For example, in a study from 2016 "continued high fossil fuel emissions this century are predicted to yield […] nonlinearly growing sea level rise, reaching several meters over a timescale of 50–150 years"[5]

Request: The potential rise of the sea level caused by climate change can result in a higher risk of flood and coastal erosion than assumed in the National Nuclear Policy. This risk has to be assessed using new figures and knowledge on climate change, and also updated regularly over the whole lifetime of NPP and radioactive waste facilities at the site.

Reactor type

The new NPP shall comprise two UK Advanced Boiling Water Reactors (ABWR) producing about 3,100 MW of electricity per year[6].

The Generic Design Assessment (the first step of the UK licensing procedure) for the Advanced Boiling Water Reactors (ABWR) has been completed in Dec. 2017[7]. Therefore the reactor type as such is determined as suitable in UK, irrespectively of the site.

+ [3] Dept. of Energy & Climate Change (2009): Appraisal of Sustainability: Site Report for Wylfa. EN-6: Draft National Policy Statement for Nuclear Power Generation. P. 45
+ [4] same source, p.29
+ [5] Hansen et al. (2016): Ice melt, sea level rise and superstorms: evidence from paleoclimate data, climate modeling, and modern observations that 2◦ C global warming could be dangerous. In: Atmos. Chem. Phys., 16, p. 3761–3812.
+ [6]Horizon Nuclear Power (2018): Wylffa Newydd Project. 6.11. Environmental Statement. Non-technical Summary, p.1
+ [7] Office for Nuclear Regulation (2017): New Nuclear Reactors: Generic Design Assessment. Summary of the GDA Assessment of Hitachi-GE Nuclear Energy, Ltd.'s UK ABWR Nuclear Reactor and ONR's Decision to Issue a Design Acceptance Confirmation. http://www.onr.org.uk/new-reactors/uk-abwr/reports/uk-abwr-gda-dac-assessment.pdf

The ABWR is produced by Hitachi-GE for the UK market. If the project fails, Hitachi-GE has no markets other than the UK for this ABWR[8].

The development of the advanced BWR = ABWR began in 1978. The first ABWRs were built in Japan (Kashiwazaki-Kariwa units 6 and 7) and commenced commercial operation in 1996/1997. According to the Environmental Statement[9]design reference for the UK ABWR are the ABWRs built in Japan: Kashiwazaki-Kariwa-6 and -7, plus improvements implemented at Shika-2, Shimane3 and Ohma-1, in addition to incorporation of post-Fukushima enhancements. It is declared that the UK ABWR will incorporate further safety enhancements and additional resilience against severe external hazards. These include aircraft impact countermeasures and post-Fukushima countermeasures based on learning from that event.

When looking at these reference units mentioned in the Environmental Statement, it can be seen that Shimane-3 and Ohma-1 are still under construction. And experience of the others has been poor as Steve Thomas analyses in May 2018[10]: A 6.6 magnitude earthquake at Chuetsu-Oki in 2007 led to a two-year closure of all seven reactors at Kashiwazaki Kariwa, including the ABWRs; significant upgrades were required before the reactors could be restarted. Shika-2 was closed from late 2006until May 2008 due to a steam turbine failure. Hamaoka 5 (which is not even mentioned as a reference plant in the EIA documents) was shut-down for much of 2006 due to a turbine blade failure. Hitachi accepted responsibility for these failures and paid for the repairs. As a result of the 2007 earthquake, all five Hamaoka units were re-assessed and Units 1 and 2 permanently closed. The other units, including the ABWR, were upgraded leading to the closure of the ABWR for more than a year.

It is not explained in the EIA documents why the reactor type ABWR was chosen for the Wylfa project. No comparison to other reactor types was made, not even to the EPR that also has passed a Generic Design Assessment in UK.

Request: An assessment of different reactor types from an environmental point of view should be presented in the EIA, including a description of the method of decision.

+ [8] Thomas, Steve (2018): The failings of the Advanced Boiling Water Reactor (ABWR) proposed for Wylfa Nuclear Power Station. May 2018. Greenpeace
+ [9] Horizon Nuclear Power (2018): Wylfa Newydd Project. 6.4.98 ES Volume D - WNDA Development App D14-2 - Analysis of accidental releases, p.3. https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010007/EN010007-001544-6.4.98%20App%20D14-2-Analysis%20of%20accidental%20releases%20(Rev%201.0).pdf
+ [10] Thomas, Steve (2018): The failings of the Advanced Boiling Water Reactor (ABWR) proposed for Wylfa Nuclear Power Station. May 2018. Greenpeace

Severe accidents and transboundary impacts

The core question is: **Can a severe accident occur or can it be practically eliminated[11]?** A severe accident means that in case of a core melt the containment fails or is bypassed, resulting in the release of huge amounts of radioactive material in the environment.

In the Environmental Statement[12] a severe accident (core-melt accident) was analysed. The scenario of this chosen severe accident is described in chapter 3.4 on page 18ff. The source term for this severe accident scenario is presented on page 25: Caesium-137, an important reference nuclide, is considered to be released in a quantity of 1.86E+08 Becquerel (Bq), which, in other words, is 186 MegaBq (MBq) or 0.186 GigaBq (GBq). This release is not even the biggest in the list of scenarios that have been analysed – also a fuel handling accident scenario (FHA, a design base accident scenario) leads to 1.9E+08 Bq release of Cs-137.

Such a release of Cs-137 seems to be very low for the biggest severe accident one can think of. In comparison: In the still ongoing EIA for the new NPP in Dukovany/CZ[13] a release of Cs-137 for a severe accident with core-melt is assumed to be maximal 30 TeraBq (TBq) (3.0E+13), this is 160.000 times more than 1.86E+08Bq! In the Dukovany expert statement it is also declared that for the Dukovany reactor type AES-2006 releases of Cs-137 for severe accidents are assumed to be 100 TBq, 330 TBq or up to 500 TBq in assessment of other countries.

Even if the AES-2006 is not the reactor type which is chosen in Wylfa, it seems that Horizon Nuclear Power severely downplays the consequences of a possible severe accident. If the UK ABWR could guarantee that even in case of a severe accident not more than 186 MBq Cs-137 will be released it is not understandable why other countries are still choosing other reactor types.

A containment failure cannot be completely excluded without a "residual risk", especially if the former experiences with the reactor type ABWR are not as good as it is claimed by Horizon Nuclear Power (see above).

If such a severe accident happens, what are the consequences?

The **inventory and source term of an ABWR** can show us the maximum amount of radioactive material that can be expected to be released into the environment. In a study from 2014[14] the inventory of an ABWR was described as follows: Data on possible ABWR inventories are not publically available. However, neutronic characteristics of ABWR and the reactor type ESBWR allow

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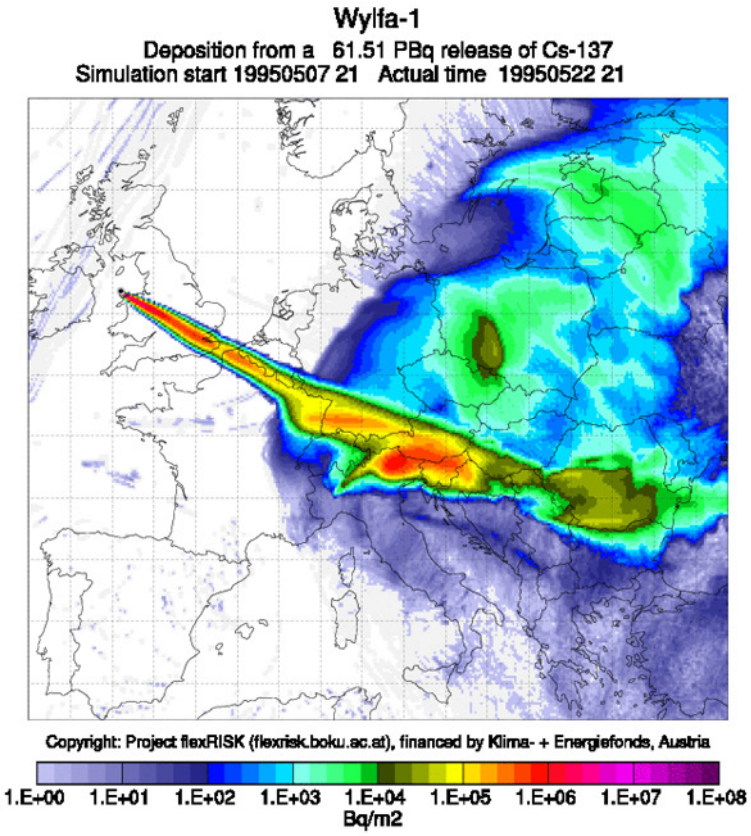
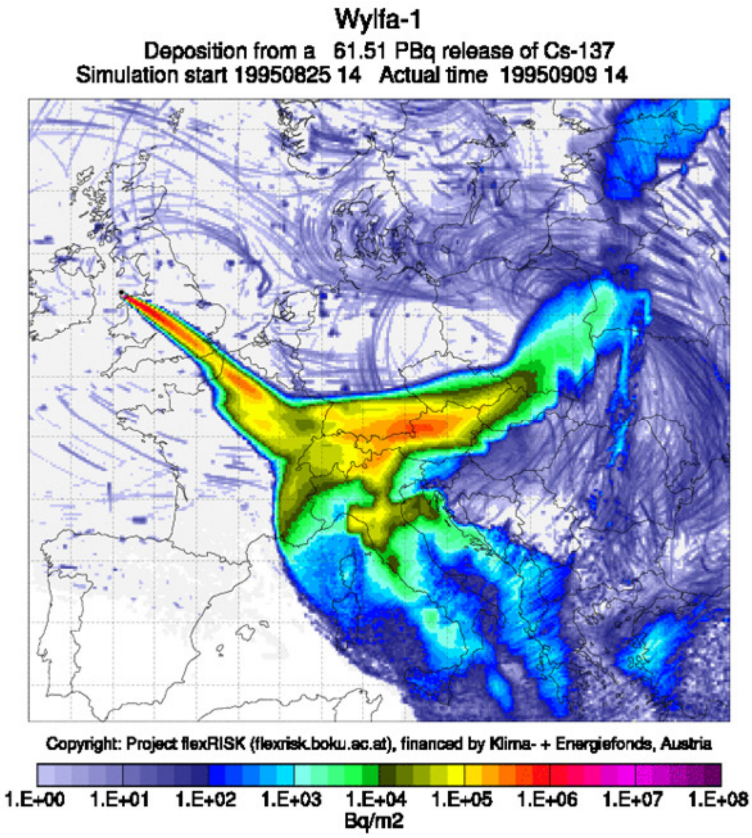
+ [11] Practically elimination means that the probability of an accident is very low or that the accident is physically not possible to occur.
+ [12] Horizon Nuclear Power (2018): Wylfa Newydd Project. 6.4.98 ES Volume D - WNDA Development App D14-2 - Analysis of accidental releases. https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010007/EN010007-001544-6.4.98%20App%20D14-2-Analysis%20of%20accidental%20releases%20(Rev%201.0).pdf
+ [13]Umweltbundesamt (2018): Neues Kernkraftwerk am Standort Dukovany. Fachstellungnahme zur Umweltverträglichkeitsprüfung. Chapter 4. http://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0639.pdf
+ [14] Sholly, S., Müllner, N., Arnold, N., Gufler, K. (2014): Source Terms for potential NPPs at the Lubiatowo site, Poland. Prepared for Greenpeace Germany.

calculating an ABWR core inventory based on an ESBWR inventory by multiplying with a factor of 0.86. The Cs-137 inventory of an ABWR can therefore be assessed as 507 PetaBq (PBq). Under the assumption of the study that 58% of the Cs-137 could be released in case of a severe accident, a release of 294 PBq can be expected in worst case.

The project **flexRISK** made a dispersion calculation based on real European meteorological conditions to show how the released radioactive material will be spread all over Europe. For this assessment a Cs-137 release of 61.5 PBq was assumed which is less than the inventory of an ABWR and less than the assumed severe accident in the above mentioned study.

The following figures show weather situations leading to a maximum contamination of Austrian territory from the Wylfa site.





Austrian territory could be contaminated with several 100 kBq Cs-137/m^2 (between the orange and he light red scale). This is more than the contamination after Chernobyl, when 186 kBq Cs-137/m^2 was the Austrian maximum, the average[15] was 21 kBq/m^2.

In Austria, agricultural countermeasures[16] have to start at an expected contamination with Cs-137 of 0.65 kBq/m^2, a contamination which could be exceeded in the whole Austrian territory in case of such a severe accident.

In case of a severe accident in Wylfa with a containment failure, whole of Europe could be contaminated severely.

Request: Any new NPP in UK needs to prove that a severe accident with a containment failure is not possible!

Request: If an accident happens, it has to be guaranteed that the full damage will be covered.

+ [15] UBA and BMGK (1996): Cäsiumbelastung der Böden Österreichs. Monographien Band 60. Wien.
+ [16] BMLFUW (2014): Maßnahmenkatalog für radiologische Notstandssituationen. Arbeitsunterlage für das behördliche Notfallmanagement auf Bundesebene gemäß Interventionsverordnung, Wien, Juli 2014.

Consequences of Brexit?

Nuclear safety, radiation protection, management of spent fuel and radioactive waste etc. are regulated by law of EURATOM. As of today, it is not clear how the Brexit will be executed, and it is not clear what consequences the Brexit will have on these legal EURATOM rules and regulations and subsequently on all nuclear projects in UK.

Request: In the EIA documentation it should be explained what consequences the Brexit will have on the whole project.

Spent fuel and radioactive waste

UK does not have a final repository for spent fuel and high radioactive waste until now. In the Non-Technical Summary on page 25 it is declared that "[s]torage facilities for spent fuel and intermediate level waste would remain operational until the waste can be transferred to the UK Government's planned Geological Disposal Facility." But UK does not have a final repository for spent fuel and high radioactive waste until now, neither has anyone else in Europe. It is problematic that a new NPP is planned to be built without the possibility to dispose of its radioactive waste safely. It can be assumed that long-term interim storage will be the alternative option if no geological repository will be available when needed.

Request: For every new NPP the safe disposal of all spent fuel and radioactive waste has to be proven in an EIA. It is not enough to present only plans for future disposals, especially if no functioning solutions for final disposals exist anywhere in this world.