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Submission to:

Transboundary Environmental Public Consultation - Wylfa Newydd Nuclear Power Plant, Anglesey, North Wales, UK

February 15th 2019 Version:Final

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Preface

This submission has been prepared by the ELIG Facilitator working at the Irish Environmental Network, (IEN)

It has been prepared as a preliminary response to the transboundary consultation on the Wylfa Newyd Nuclear Power Plant, Anglesey, North Wales, UK, (Wylfa B). It is submitted without prejudice to the right to submit further commentary to the Development Consent Process which as indicated on the UK National Infrastructure Planning website for National Strategic Infrastructure Projects, (NSIPS) and the Horizon application documentation, is to be done in accordance with EU law. Such rights are reserved very particularly in light of the obligations arising in particular from Article 6(3)c of the EU DIRECTIVE 2011/92/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (codification), (The EIA Directive, or EIAD). This being the version of the Directive which the applicant, Horizon Nuclear Power, (HNP) asserts they are entitled to proceed under.

We further submit that a full Environmental Impact Assessment is also required under the UNECE Convention on Environmental Impact Assessment in a Transboundary Context, (the Espoo Convention).

This submission can be relied upon by any of the IEN member organisations or those of the Environmental Pillar, and has been expressly prepared for our groups concerned with the protection of the environment through the proper transposition and implementation of Environmental law and the concerns arising in respect of this proposed project. It can additionally be relied upon by any party, group or individual wishing to adopt and sharing the concern about the issues raised in it.

It does not necessarily reflect the views of the network or pillar, or individual member groups.

Further detail or clarification can be sought from:

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ELIG Environmental Law Implementation Group at the IEN Irish Environmental Network

Introduction.

This submission addresses briefly

- The implications of Brexit;
- Issues arising consequent on suspension of the project and the UK's conflict of interest
- Inadequacies with the Application
- Failures in respect of Article 5 of the EIA Directive and the Espoo Convention, most particularly in respect of the analysis of severe accidents, and omission of basic information required
- Failures in respect of the Habitats Directive

This submission adopts in full the submissions made by the Austrian Government on the project, and all associated queries.

It also adopts in full the submission made by Nuclear Free Local Authorities, (NFLA) to the Irish transboundary Consultation, included here as Appendix B, and also the NFLA submission to the UK authorities.

It also adopts any additional arguments raised in the An Taisce submission, and all concerns raised in relation to the inadequacy of the application and transboundary impact assessment raised by any interested party in the context of all the consultations conducted on this project, and including all technical and legal arguments made regarding the application.

Implications of Brexit.

This section raises issues with regard to:

a) The legislative framework pertaining to the application and the uncertain implications for this arising consequent on the manner of the UK's withdrawal from the EU and Euratom;
b) The very particular additional dimension of transboundary risks which arises for the development and operation of the project consequent on Brexit.

In the context of the ongoing uncertainty pertaining to the manner of the UK's proposed withdrawal from the European Union, and the EURATOM treaty, the status of this application and the associated regulator regime governing the application and decision making are unclear. Additionally, the impact on the ONR of the further burden on it to replace the Euratom regime, and its ability to do this adequately, and the related issues set out below present the PINS and the Minister with a number of uncertainties and a lack of evidence which they cannot "rationally" discount. This is particularly in respect of the likelihood of transboundary impacts arising from the project.

What is clear is that:

- The application was submitted at a time when the UK is bound by the EU Environmental Acquis;
- There are certain statutory timeframes and limits in UK law for the decision process, specifically:
    - Following the preliminary assessment of the Planning Inspectorates process, the current assessment stage is due to complete April 23rd 2019[1], and
    - The subsequent decision required by the Secretary of State for Energy is required to be made a further 3 months
- The UK's EU Withdrawal Act, purports to implement existing EU legislation into a national framework, but there are outstanding issues and elements associated with addressing the implementation in full. Therefore the implications for the exact legislative framework which will pertain to the decision are thus unclear.
- The application is also governed by the UK's international law obligations – such as under the UNECE Aarhus* and Espoo* Conventions.
- The extent to which there is an ordered withdrawal by the UK from the EU and Euratom, and whether this is or is not a transitionary period is still unclear. This has a material bearing on the risks arising for the project and the operation of the plant and movements of materials associated with the plant, including radioactive materials, not limited to circumstances where this could manifest itself at the 12 mile nautical limit of Irish territorial waters. This is given the issues which will arise for the project consequent on the UK's withdrawal from Euratom. This arises in circumstances where the ONR's level of readiness to take on that regime is of the most serious concern and been the subject of expose on Sky news in recent

[1] https://www.housing.gov.ie/sites/default/files/public-consultation/files/25.09.18_uk_planning_inspectorate_notification_of_preliminary_meeting_rule_6_letter_and_appointment_of_examining_authority.pdf#page =44

months following leaked reports from the ONR[2]. The additional responsibilities arises in a context where it will add significantly to the existing burden on the ONR. Further detail on these issues is set out in Appendix A to this submission.

The lack of clarity continues following further votes of the UK Parliament on February 14th 2019 regarding the UK's position regarding Brexit and the manner of its withdrawal from the EU and Euratom. It thus creates a manifestly unfair situation for interested parties, particularly from other nations, wishing to comment on the project. It compromises their ability to comment on the associated legal requirements for the application, and obligations for the decision making framework.

We have framed our comments largely based on the EU environmental acquis which pertains currently. However, this submission is made without prejudice on the rights to be consulted further and make further submission. This in particular with reference to the rights afforded us under international law to which the UK remains party to, and fundamental and basic principles of fair procedures which the UK we have no doubt will want to be seen to uphold as part of its international reputation, and in particular in respect of what transpires in relation to Brexit on March 29th 2019.

We also submit the uncertainties arising consequent on the going lack of clarity regarding the manner of withdrawal is fundamental to the issue of transboundary risk assessment. We note that while acknowledging likely significant effects on Ireland consequent on impacts to cetacean and birdlife in Natura 2000 sites[3], the UK's transboundary screenings rely on the robustness of regulatory regime to discount impacts arising from normal operations or accidents. However the nature of that regime is now entirely uncertain and the quality of its operation, particularly in circumstances where the funding, staffing, training, IT systems and equipment to replace the extensive operation that Euratom operates on nuclear facilities in the UK is so uncertain. It is not "rationale" or credible for the PINs or the SoS to assert that no such risk arises, and to continue to discount transboundary risks and impacts when there is no evidence, and certainly no adequate evidence to support any such conclusion.

In this context, while the UK will invariably assert that of course they will put in place a sufficiently robust regime, the credibility of this has to be considered regrettably in the context of recent and historic events, not limited to the following examples:

> ***Current***: The UK Government initiated an emergency response plan for Freight Services to the UK following Brexit. We understand that further to pressure from UK Transport Unions, one of the companies selected was to be a UK company. The final selection of 3 thus included Seabourne Freight, a company without freight experience, ships, and terms and conditions taken from a pizza delivery company and a website portal which was a mere mock-up, verbal assurances with no backup etc. The embarrassing circumstances of this have been well aired in the media, and the contract has been eventually dropped following efforts to defend it by the Transport Minister, Chris Grayling . We need hardly highlight the concern that naturally arises on the due diligence and regulatory regime. Yet this is the

[2] https://news.sky.com/story/red-warnings-for-uks-post-brexit-nuclear-safeguards-11374097

[3] Sites designated in Ireland in accordance with the EU Birds and Habitats Directives.

administration and regime which the UK relies on in dismissing any potential risk arising from accidents at the Wylfa B plant, and which was applied in circumstances to respond to emergency requirements in the UK's best interests and further to the Transport Minister petitioning Parliament in 2018 for emergency funds in relation to same.

Historic: The robustness for the UK's future governance has to be of concern, given the extent of economic uncertainty which the UK faces consequent on Breixt has also to be of key concern. The implications and risks this will introduce and present when one considers this chilling narrative from the late John Large, expert nuclear consultant. Large gave evidence to the House of Commons environment committee investigation into nuclear safety in 1986. The article indicates the spent fuel ponds were abandoned after they were overwhelmed with spent fuel during the 1974 miner's strike when Britain was put on a three-day working week by Prime Minister Edward Heath, one must also reflect on the ongoing consequences of this at Sellafield. The statement indicates the spent fuel ponds were abandoned after they were overwhelmed with spent fuel during the 1974 miner's strike when Britain was put on a three-day working week by Prime Minister Edward Heath. Large is quoted as follows:

> "In order the 'keep the lights on', the UK's fleet of nuclear power stations were run at full tilt, producing high volumes of spent fuel that the Sellafield reprocessing facilities were unable to keep up with. During the three-day week they powered up the Magnox reactors to maximum, and so much fuel was coming into Sellafield that it overwhelmed the line, and stayed in the pool too long,"
>
> "The magnesium fuel rod coverings corroded due to the acidity in the ponds, and began to degrade and expose the nuclear fuel itself to the water, so they just lost control of the reprocessing line at a time when the ponds were crammed with intensely radioactive nuclear fuel,"

It would be remiss in the context to rule out the extent of uncertainties and pressures which will arise to compound the issues already set out in the above, and which present only a limited set of considerations relevant to the considerations necessary in making a Development Consent Decision and any report or assessment by PINS on the potential and actual transboundary risks.

Issues arising consequent on suspension of the project and the UK's conflict of interest

The Hitachi board announced on January 17th 2019 they were suspending the Project, and the applicant for this project, Horizon Nuclear Power, (HNP) is a wholly owned subsidiary of Hitachi.

This followed on a period of incredible uncertainty for the project following the difficulties in attracting the necessary levels of investment to advance the project.

We have also been given to understand from the Irish Department of Housing Planning and Local Government, that they have formally confirmed that the application for the project has not been withdrawn.

It is submitted that the extent to which the configuration of investors, and/or the project, and the extent to which the UK Government invests and supports the project, are all matters material to the decision making process, and matters which the interested public should be able to comment upon. This is because they necessarily impact upon the risks associated with the project, and the extent of conflict of interest which arises for the UK Government. Any further level of support will serve to compound its already conflicted position as: project funder, project co-developer, power purchaser, regulator and decision-maker on this project.

In the context of:

- A National Policy Statement in 2008 which incorrectly predicted an increase in energy demand of 15%, whereas energy demand has in fact fallen by 15%;
- The significant advances in the development of renewables and the more competitive price available for renewable energy;
- The extraordinary and still uncertain costs associated with decommissioning plants like Wylfa B
- The extraordingary and still uncertain costs associated with dealing with the radioactive waste arsing from Wylfa B
- The spiralling costs of nuclear and the slippages associated with the delivery of plants like Hinkley Point C;
- The difficulties of finding investors, and the withdrawal and collapse of multiple proposals
- The fact the nuclear expansion programme has had to look to deployment post 2025 for reactors over 1GW

the UK Government has entirely failed to adequately or at all explain rationally its adherence to nuclear.

While the UK's sovereign right to pursue its own energy mix is not at issue of course, the UK has demonstrated a level of "prejudice" to the policy which has to raise questions about its motivations and conflicts of interest arising. This is particular concern in circumstances where a UK Minister will grant the consent to the project, and the Office of Nuclear Regulation cannot be considered to be sufficiently independent, given its senior appointments are made by Government and its funding is determined by Government. Further expansion of these issues is set out in a submission pre-dating

the Hitachi announcement made to a Joint Oireachtas Committee, provided in Appendix A, but the substance of which remains valid. In fact in the context the concern on the potential increased conflict of interest which will arise has only increased following the Hitachi announcement.

In circumstances where the UK Government stands exposed to increased costs from the project, or increased prices for power from the plant, or increased costs associated with shutdowns and operational decisions – it is clearly manifestly inappropriate that the UK Government has a role in deciding on the specification and permissions for the plant, weither directly or indirectly.

These matters are particularly material in the context of the version of the EIA Directive which applies to this project. It is noted with some serious concern, that within days of May 17th 2017 scoping steps were taken by the applicant to avoid being captured by the provision of the newly amended 2014/52/EU Directive, which is very focused on conflict of interest, and also on accidents. (The transitionary provisions are set out in Art 3 of 2014/52/EU)

While the applicant purports to meet the requirements of the new Directive, the commentary which follows in subsequent sections of this submission will set out that it does not even meet the requirements of 2011/92/EU, which is the version of the Directive which they assert applies to the SoS's decision.

Failure to assess transboundary risks arising from the existing and legacy operation consequent on the issues in delivering the new build nuclear programme.

The consequences of the UK's ongoing commitment to the expansion of its nuclear programme in the context of the vast cost over-runs and delays, referred to in earlier sections of this submission and in Appendix A in particular, brings further transboundary risks which have not been address in the application. This is cecause, there is a consequential and associated increased pressure to extend the operation of the existing legacy plants, and indeed to maintain the operation of plants even in the face of significant increase and bypass of previously established safety limits such as Hunterston B. This is a direct consequent on the commitment to plants like Wylfa B, and a direct effect of the UK's desire to maintain a window and a share for nuclear in its energy mix, and to reject alternatives, and any timely migration to them. The transboundary risks of this have not been reflected as part of the assessment here, and we submit this is a major omission in the assessment of transboundary risks.

Failure to comply with the EIA Directive and Espoo Convention.

The applicant asserts they are entitled to proceed with the application under the old version of the EIA Directive, codified 2011/92/EU. We reserve the right to consider this further and challenge this further, particularly but not limited to the implications for the project given the profile of investors.

We submit that the applicant has failed to meet the requirements of Article 5 of the EIAD in particular in respect of the information required under Annex IV. We further submit the applicant has failed to meet the requirements of the Espoo Convention Article 4(1) particularly with reference to Appendix II.

We submit that the transboundary consultation required under Art 7 of the Directive, and pursuant to the Espoo Convention Article 3 and 4 in circumstances where the UK does not dispute there are impacts on Ireland – is compromised.

We rely on the Espoo Convention's interpretation of likely significant effects in the context of nuclear power plants,– require consultation to be conducted, as it is simply a matter of fact that risks cannot be completely excluded no matter how low the probability, and that therefore when one considers the characteristics of a nuclear power plant project and the significant consequences to other parties, in the event of accident – consultation is required. We rely on the Findings[4] and Recommendations of the Espoo Implementation Committee on the Hinkley Point C project and the Ukraine/Danube decision referred to therein. We submit this underpins the proper interpretation of Article 7 of the EIA Directive, and that the obligations arising from Article 2(1) of the Directive have to be considered in that light also, and in the context of any further expansionary or additional requirements the EU sought to impose in legislating and in the making of the Directive and the clarifications thereon provided by the EU Court of Justice, (CJEU).

Of course while it is not disputed that the UK has initiated a transboundary consultation on this project – the adequacy of it has to be of issue. This is not limited to the failure by Ireland and the UK to provide for "effective" public participation which they are legally obliged to provide for. This fault we admit is in large part due to Ireland's decision to run the consultation over the Christmas period. However the confusion which arose in the minds of the public and many public authorities about the status of the consultation following the Hitachi announcement has served to make many think the consultation had become irrelevant and the project was over, particularly given the media coverage. The circumstances for this are documented in a letter prepared by ELIG for the Environmental Pillar co-ordinator and subsequent correspondence to the DHPLG following a decision to extend the consultation. Neither Ireland nor the UK took meaningful steps to inform the public otherwise. Extending the consultation and publishing notices on public authority websites were not adequate in the context, and no meaningful efforts were evident of taken to ensure the Press release issued got the necessary traction.

Quite apart from the approach to the consultation the information provided to support the consultation and by the applicant is inadequate.

[4] https://www.unece.org/fileadmin/DAM/env/documents/2019/UK/5/1820206E.pdf

Consequent on both of these issues, therefore the ability to make a lawful decision in accordance with Article 8 of the Directives has to be of issue.

This is most particularly in circumstances where the information provided on the project as part of the transboundary fails so far short of that which is necessary. We also submit that the EIAD 2011/92/EU in screening for likely significant effects also most particularly requires consideration of accidents, therefore the failure to adequately consider accidents has to be a particular issue. The inadequacies in respect of the Article 5 EIAD obligation clearly arises front and centre as an issue for the PINS assessment and the domestic audience also, and the complication for the decision of the SoS arise even regardless of the transboundary impacts.

Issues with Source Term Specification and Severe Accident Analysis

Of particular concern to us is the description of the source term for the plant and the severe accident analysis in the application[5]. We note and adopt in full the concerns of the Expert Statement submitted by the Austrian Government which raises a number of issues about the outstanding Generic Design Assessment and the estimates for the radioactive fallout resulting from an accident at the plant compared to two others. The report indicates an underestimation of a factor of 160,000 for the radioactive fallout potential from the Wylfa B plant in the event of a severe accident. We have further considered this matter, and the adequacy of the severe accident scenario in Annex I. However given the time and resource constraints pertaining we are limited in what we can outline on this at this juncture.

We submit:

- The estimates of time indicated by Horizon in their severe accident scenario to get any uncontrolled release under control are not substantiated, particularly in respect of the resilience of secondary and emergency response measures and the lack of transparency and detail in the description of such responses in the event of the Severest Accident.
- It is not clear whether post-Fukushima features of the reactor-design have only been announced or whether they have already been included for the EIA analysis of Wylfa.
- There are no documents available which justify quantitative assumptions, modelling or sensitivity analysis to argue the source term presented, even if the base scenario for the Beyond Design Base Accident (BDBA) (with core melt, Reactor Pressure Vessel (RPV) failure and containment remaining effective) is comparable with the Severe Accident – Design Extension Conditions (SA/DEC) scenarios for the other projects.
- In addition to Cs-137 other radionuclides in a severe accident source term are higher in other reactor EIA's (Xe-133 by a factor of 10, I-131 by a factor of about 0.4 million), see Annex I for further details on this comparison.

[5] **Wylfa Newydd Project** 6.4.98 ES Volume D - WNDA Development App D14-2 - Analysis of accidental releases Application Reference Number: 6.4.98 June 2018 Revision 1.0 (https://www.housing.gov.ie/sites/default/files/public-consultation/files/6.4.98_es_vol._d-_wnda_development_app_d14-2_analysis_of_accidental_releases.pdf)

- The significant difference in source term definition for Wylfa would require additional supporting and quantifying information to demonstrate how the concepts and models presented in the GDA [Generic Design Assessment] are performed. Even if extended data assumptions are available for ***normal operational conditions, the analysis is not able to*** **[explain the source term used for Design Basis Accidents] DBA … and [no source term could be found for Beyond Design Basis Accidents]** ***BDBA and severe accidents analysis …"***

- The Severe Accident scenarios used in the E|IAs for Wylfa, Hanhikivi and Dukovany all appear similar. Core inventories and leakage rates should thus be from the same order of magnitude in all three even taking into account technological differences between the different reactor types. Where differences arises consequent on different standards and approaches we have endeavoured to rationalise this but , gaps and issues remain and the fundamental discrepancy remains unexplained.
- It must also be noted that in comparing the adequacy of the estimate across the plants considered in Annex I and in the Austrian Expert Analysis – there are issues with the adequacy of the Czech and Finnish plants also:
    - 100TBq Cs-137 source term used in the Hanhikivi EIA seems to be because this is the limit set by Government Decree on the Safety of Nuclear Power Plants rather than modelling of any severe accident scenarios. (11)
    - The Czech Dukovany source term used is even lower at 30TBq of Cs-137. The EIA claims that by meeting Western European Nuclear Regulators Association (WENRA) Safety Objectives, accidents with classification of more than INES 5 are practically eliminated.

- The UK's reliance on the RPII analysis of impacts on Ireland is not realistic in circumstances where the RPII have not substantiated their assumptions particularly in respect of risk of exposure, failed to update their analysis in line with the particulars of the plants being deployed and failed to adequately execute consideration of the most severe accidents scenarios which could impact on Ireland.

    - The source term for Cs-137 for the severe accident scenario used by RPII is slightly less than the amount released by Fukushima. But it is much less than the amount released by Chernobyl, and only about one fifth of the amount used in considerations which derive their numbers from the EDF/Areva Pre-Construction Safety Report.

    - In the RPII scenario the accident is brought under control in 48 hours. At Fukushima releases were high for 4 to 6 days and at Chernobyl continued for 10 days. Failure to bring an accident under control as quickly as suggested by RPII could result in a source term much closer to the one used in the Austrian analysis or as high as Chernobyl (i.e. 53-85,000TBq rather than 10,000TBq)

- Nor does the RPII analysis take into account the possibility of a severe accident in the spent fuel storage ponds which could produce a source term 178 times its source term.

- RPII relies too heavily on accident intervention levels set by the International Atomic Energy Agency when considering the distribution of potassium iodate tablets. There could certainly be public health gains by pre-distributing them prior to any nuclear accidents with an I-131 source term similar in scale to the one envisaged in the RPII ST4 scenario.

- While the RPII report appears to have estimated routine emissions from the proposed UK nuclear programme at about the right level. However, the collective dose from just one of the proposed nuclear power stations over its 60 year life is likely to result in around 360 deaths, some of which will be in Ireland. If all of the proposed new reactors are built this could mean 6 x 360 = 2,160 deaths.

We submit that there is significant missing information in the ONR's generic design assessment in relation to the provision and demonstration of source term for normal operations. In the context the information presented on the potential effects in a severe accident cannot be considered adequate.

We note in response to GDA ACTION RO-ABWR-0006.8 Hitachi-GE says it will capture any accident source terms derived from the RI-ABWR-0001 responses as part of its response to Actions 3 and 7. This was described into a Topic Report "Management of Source Term" by 30 June 2015. However this Topic report does not appear to be available on the GDA website. So in conclusion we have to submit that there do not appear to be any documents which justify the quantitative assumptions, modelling or sensitivity analysis for the source term presented for Beyond Design Base Accident (BDBA) scenarios. In the context we cannot be clear that Hitachi-GE has carried out the required Severe Accident Analysis, and the necessary obligations of the Directive and Convention have not been met.

We submit the UK SoS cannot rely on this missing information or simply fill the gaps here in respect of these matters, as such information has not been available for consultation. In this we rely on Article 6(3)c of the the EIAD. This in summary requires public participation to be provided for on any matters which are taken into consideration in the Article 8 decision. It is clear that the SoS cannot make a decision without clarifying the basis for the source terms indicated by the applicant, particularly in circumstances where such significant discrepancies have been raised questioning the applicants data. We set out further issues in this in Annex III

We also submit there has been a failure to assess the risks associated with an accident, or terrorist activity in the fuel ponds.

We further submit the SoS reliance on the Article 37 Euratom material referred to in the application is deeply problematic from the point of view of Art 6(3)c also. The manner in which the application has partially relied on this, and the associated lack of transparency do not meet the threshold for the public participation obligations of the EIAD.

We also submit the applicant is obliged under Article 5 to provide an adequate analysis having regard to "current knowledge and methods of assessment" pursuant to Article 5(1)a EIAD.

Further gaps and issues with the Environmental Information provided by the applicant

In the context of significant issues with the climatological and flood risk and tectonic risk assessment the applicant has also clearly failed to meet those Article 5(1) a and Annex IV requirements.

In submissions made to a Joint Oireachtas Committee in January of this year on the Wylfa B project, Professor John Sweeney submitted commentary on behalf of An Taisce which indicated as follows:

> **"Inadequate consideration of long term sea level rise and wave climate changes**
> Wylfa is located at an elevation of 9-13m asl. The Highest Astronomical Tides in the region are 3.8m asl. Highly dangerous radioactive waste is to be stored on site until approximately 2170 with storage commencing 10 years after commissioning and extending for 140 years thereafter.
> A sea level rise of 0.86m by 2080 underpins the assessment. It is however virtually certain that sea level rises will continue for several centuries, with ultimate rises of up to 3m possible. The stability of the site by 2170 under increased wave action from a higher level is not considered adequately in the proposal. The assessment required joint probability analysis to be carried out regarding coastal flood and erosion risk for a lengthier period than is demonstrated in the assessment. "

> **"The extent to which the plume dispersion models employed provide an adequate vehicle for assessing potential atmospheric transport of hazardous material to Ireland.**
> Two models were used to evaluate the consequences of releases of airborne radioactive effluents from the propose facility. Both were based on Gaussian plume models. While the proposal emphasises that these are the accepted models for assessing air quality impacts, and while justification for selecting ADMS in this case is well argued, this does not eliminate the inherent weaknesses of the approach taken. Reliance on using Gaussian models for assessing long range transport of effluent is highly questionable. Long range transport of pollution and radioactivity experience confirms this. Chernobyl radiation reached Ireland by long range transport mechanisms and resulted in contamination of soils, vegetables and milk supplies. 10,000 upland sheep farms in Wales, England and Ireland were subject to restrictions for 26 years following the event.

A complex recurving trajectory for the Chernobyl plume of contamination was evident. Gaussian modelling would not have predicted, even if complex topographical and meteorological conditions were incorporated, that this would occur.
To address plume dispersal in the event of a serious accident, an over simplistic set of assumptions have made for modelling the Wylfa contamination plume.

(i) Site specific observations were not used to drive air dispersion models. Rather, interpolations from nearby locations were used. These data inputs consisted of modelled outputs from grid sizes ranging from 4 - 1.5km with output resolution of 6kms.

(ii) Only 10 years of meteorological data was employed. This does not capture the range of conditions extant at the location and omits extreme events which may be important in impact assessment. The World Meteorological Organisation recommends at least a 30-year period for characterising climate conditions at a particular site.

(iii) The nearest major international conurbation to Wylfa is listed as Dublin with a population exposure of 515,255. In fact the population of Dublin city and County is 1,345,402 with just under 2M people living in the Greater Dublin Area. On any given day the figure is also 120,000 higher than the census figures due to visitors, tourists etc.

(iv) A mixing layer depth of 1000m and a wind speed of 8m/s is assumed for plume transport to Ireland. These provide for much move favourable conditions for dispersal than could occur in an accident situation. In particular the crucial question of inversion height in relation to the height of any accidental release is not assessed adequately. Stability on land at Wylfa may also be very different from stability over a relatively cold marine surface during summer months and the extent to which the modelling exercise differentiated dispersal conditions on this basis is also not clear. Passage over a low friction surface such as the Irish Sea also inhibits dispersion. The air over the sea passage to Ireland, especially during summer, is much more likely to be stabilised and conducive to undisturbed transport of effluent. Studies which analyse the origins of polluted airmasses over south eastern Ireland confirm that effluent from industrial sources in the UK and Europe can be carried in stratified, stable airflows over a cool Irish Sea to be mixed down to the surface on reaching eastern Ireland. The LOCA scenario therefore is based on underestimated emissions and overestimated dispersion, both of which have potentially serious consequences for Ireland. “

“Inadequate Consideration of Tectonic Risk

North Wales has a significant tectonic history as one of the most earthquake-prone areas of the UK. The largest onshore earthquake of the 20th Century occurred in Gwynedd in July 1984 and measured 5.4 on the Richter scale. This event was felt throughout most of the UK and was followed by several months of aftershocks, one of which reached 4.3 on the Richter scale. A similar value was reached in an earthquake, with an epicentre in Wales, as recently as February 2018. While these are relatively minor events they indicate a potential risk to century scale nuclear waste storage that requires greater consideration on the basis of the precautionary principle. An earthquake of 6.6 in Japan in 2007 led to the closure of all seven reactors at Kshiwazaki

Kariwa. This included ABWR reactors. Subsequently 2 units were permanently closed. Earthquakes of 5.8 have been recorded historically in UK waters."

Failure to assess impacts from normal operations adequately

We also submit the application inadequately considers the impacts arsing from normal operations. The Environment Agency (EA) and Natural Resources Wales (NRW) report on Public Dose produced as part of the Generic Design Assessment of ABWR reactors calculated the collective doses from routine emissions from an ABWR would be 30 person Sv per year of discharge for the world (truncated to 500 years). (25)

The radiation protection community is usually reluctant to translate collective dose into numbers of deaths. This seems to stem from the Greenpeace campaign during the Sellafield THORP public consultation in 1993-4 when it was argued that THORP would cause 600 deaths (calculated using a 5% risk factor). But Sumner and Fairlie have stated that radiation protection should be about protecting people, not the industry from criticism. (26)

Bearing in mind that Hitachi is proposing to build 2 ABWR reactors at Wylfa B, the total collective dose would be in the region of 60 person Sv per year of discharge.6 By applying the risk factor of 10% per sievert it can be calculated that this means there will be around 6 deaths somewhere in the world for every year the station operates. Over 60 years, the total could be 360 deaths. Some of these deaths would be in Ireland.

Radionuclide Gaseous discharges	**EPR (27)**	**AP1000 (28)**	**ABWR (29)**	**RPII Generic Reactor**
Tritium	500GBq	1800GBq	2700GBq	3080GBq
Carbon-14	800GBq	606GBq	910GBq	1050GBq
Radioactive Noble Gases	350GBq	8047GBq	1980GBq	30463GBq
Radio-iodines	50MBq	210MBq		982MBq

*NB 1TBq = 1000GBq = 1,000,000MBq

Other major failures in respect to Alternatives, Radioactive Waste and Decommissioning.

We also submit the application entirely fails to adequately consider alternatives.
We also submit the application entirely fails to consider the impacts associated with dealing with radioactive waste and the decommissioning of the plant.
This is in circumstances where the information required to be provided under Article 5, with express reference to the information set out in Annex IV Item 4 – explicitly and meticulously specifies with reference to an explanatory footnote the following:

"4. A description ([1]) of the likely significant effects of the proposed project on the environment resulting from:
(a) the existence of the project;
(b) the use of natural resources;

[6] Collective Dose is the radiation dose to the whole population. Units are often given in man sieverts. We prefer to use person sieverts. See the box on 'No safe level of radiation'. Since the relationship between cancer risk and radiation dose is thought to be linear, once you know the collective dose from a given

(c) the emission of pollutants, the creation of nuisances and the elimination of waste."

Where footnote one specifies that such description must include:

> "[1]This description should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the project."

In circumstances where such major aspects of the direct effects of the operation of the plant are omitted from consideration, and the associated indirect, secondary and cumulative, and longer term negative impacts are entirely omitted from proper consideration and impact assessment – it is not tenable to consider this application compliant with the obligations of the Directive. It is not and cannot be sufficient for the SoS to adopt the same approach taken in respect of Hinkley Point C wherein he relied on a future regulatory regime, as such would be to dispense with the need for the current assessment and to render the obligations specified, redundant, superfluous and meaningless.
Particularly in the context of the UK considering the possibility of Geological Storage for radioative waste on the island of Ireland – this is a particularly egregious omission.

The Findings of the ESRI report[7] "The Potential Economic Impact of a Nuclear Accident - An Irish Case Study" on the impacts to our economy are further relied upon.

[7] https://www.esri.ie/system/files?file=media/file-uploads/2016-12/BKMNEXT313.pdf

Habitats Directive Obligations.

The application focuses on obligations arising from the EU Habitats Directive Article 6. However it fails to adequately address the obligations of Article 12, 15 and 16. We submit the application does not address the requirement for Article 16 derogation licences and that these must be provided in advance of consent. The provisions of Article 6(3) do not serve to replace or render redundant those of Article 12,15 or 16, but must be jointly considered and apply to cetaceans, together with their breeding and resting places and are not limited to Natura 2000 sites. In the context where it is acknowledge the cetaceans include those inhabiting Irish Waters, transboundary consultation on such derogation applications would be necessary. In this we rely on the logic set out by the EU Court of Justice in case c-243/15. In the course of examining the Access to Justice rights pertaining for Article 6(3) Habitats, the courts purposive approach provided most important clarification on the obligations arising not just consequent on Article 6(1)b of the Aarhus Convention, but also Article 47 of the Charter. We therefore submit that species which the EU has deemed warrant the strictest protection under Articles 12,15 and 16 could not conceivably warrant anything less and the circumstances of likely significant impact upon them has been acknowledged by the applicant. We also with to submit that it remains far from clear that the application would meet the tests and thresholds necessary for such derogations, including the obligation to exhaust alternatives.

Finally, in the context of the issues raised about the inadequacy of the transboundary risks assessments, and the lack of clarity and issues surrounding the regulatory regime, raised within this submission, it is not credible for the SoS to conclude with the requisite degree of certainty for the purposes of an Article 6(3) assessment, that adverse impacts on the integrity of Natura 2000 sites will not arise.

Annex I

Severe Accident Source Term Comparison. New build projects NPP Wylfa, Hanhikivi, Dukovany 5&6

The most significant/important radionuclides after a nuclear accident for our considerations here are likely to be Cs-137 and iodine-131 (I-131).

The Horizon Environmental Statement for Wylfa analyses a severe accident with a release of 1.86E+08 Becquerels (Bq) or 0.000186TBq caesium-137 (Cs-137) (1).

For comparison the source term from Chernobyl - the total amount of radioactivity released – was around 85,000TBq of Cs-137 and the source term for Fukushima was 12,000TBq of Cs-137. (2)[8]

Cs-137 has a half-life[9] of 30 years, whereas I-131 only has a half- life of 8 days.

I-131 distribution after an accident is of course important when looking at thyroid cancer incidence.

Austria had the second highest average I-131 deposition density, outside Belarus, Ukraine and Russia, after Chernobyl. (As ever, whether there was an increase in thyroid cancer in Austria after Chernobyl is controversial – see TORCH 2016).

On the other hand Cs-137 with its longer half-life is around for much longer and its effects and impacts on food and livestock and economies are thus very significant.

The French IRSN estimates that 80,000TBq of Cs-137 were released into the environment by the Chernobyl accident - 30 to 40% of the amount present in the damaged reactor core. (3) Cs-137 was deposited on the ground across much of Europe. In Wales, for example, 344 farms were put under restrictions, with animals' radiation levels monitored before they were allowed to be sold at market. The number of failing animals peaked in 1992, but some still recorded high levels of Cs-137 as recently as 2011. (4)

According to a report commissioned from Oda Becker by the Austrian Environment Agency Austria the Cs-137 inventory of the UK ABWR is estimated at 504,000TBq (5.04E+17 Bq). (5) (If 30% of this were released that would amount to 151,200TBq).

So the Cs-137 release suggested in the Horizon Environmental Statement is by comparison very low indeed. It is also very low when compared to the releases mentioned for severe accidents in other EIA procedures. In the EIA for the planned Dukovany NPP (Czech

[8] The Other Chernobyl Report (TORCH) uses Peta Bequerels or PBq (1E+15Bq = 1,000TBq). For convenience and clarity we convert all numbers to terabecquerels (TBq)

[9] The "half life" is one of the main characteristics of a radioactive nucleus. It is defined as the time required for the activity of a sample of this radionuclide to be divided by two. As a rule of thumb it is usually said that a radionuclide will have mostly decayed after ten half-lives.

Republic), the assumption of the maximal release of Cs-137 for a severe accident was 3.0E+13 (30TBq). (6) The EIA procedure for the Hanhikivi NPP (Finland) calculated possible transboundary effects of Cs-137 release of 1.0E+14 (100TBq). (7)

Hanhikivi NPP (Finland)

An INES 6 accident (*) with a release of not more than 100TBq Cs-137 is supposed to be the most severe accident assessed in the updated EIA report. However, this accident – which was also the most severe accident assessed in the 2008 EIA report – does not constitute a worst-case scenario. The Austrian flexRISK project estimated a source terms for this type of Russian-designed reactor at 54,460TBq Cs-137 and the Norwegian Radiation Protection Authority uses 2,800TBq Cs-137 – both of which show possible consequences on Austrian territory, while with the release of 100 TBq Cs-137 such consequences would not be expected. (see http://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0447.pdf page 7)

According to the World Nuclear Association the Czech utility (CEZ) has not yet decided which type of reactors to use for Dukovany 5&6. So these could well turn out to be Russian AES-2006 type reactors as chosen for Hanhikivi. (8) A similar reactor-type planned for Vietnam (NPP Ninh Thuan 1) used a source term of 330TBq Cs-137 and 1,700TBq for I-131. (9)

So even though the source terms used for the EIAs for Dukovany and Hanhikivi are much higher than the one used for Wylfa, they are still criticised as being unrealistically low by the Austrian Environment Agency.

Wylfa

In considering further the Horizon application:

The beyond design basis analysis considers fault and hazard initiating events that have been excluded from the design basis analysis on the basis of low frequency (<10-5/a) but whose frequency is not sufficiently low (>10-7/a) for them to be discounted completely. (section 3.2.17, p14)

(<10-5/a) – means less than once in every 100,000 years.
(>10-7/a) – means more than once in every 10 million years.

The IAEA's INES rating system defines a **serious** accident or Level 6 as:

"*An event resulting in an environmental release corresponding to a quantity of radioactivity radiologically equivalent to a release to the atmosphere of the order of thousands to tens of thousands of terabecquerels of I-131. With such a release, it is very likely that protective action such as sheltering and evacuation will be judged necessary to prevent or limit health effects on members of the public.*" (10)

The INES's serious accident and the ONR's severe accident are clearly not the same thing. ONR says a **severe** accident is defined in the ONR Safety Assessment Principles (SAPs) as "*an*

accident with offsite consequences with the potential to exceed 100mSv, or [lead] to a substantial unintended relocation of radioactive material within the facility that places a demand on the integrity of the remaining physical barriers"

ONR says "*The 100 mSv dose level was chosen so that the analysis would address any initiating fault that might be expected to lead to an evacuation away from the immediate vicinity of the site, taking into account the conservatism of the analysis*."

ONR sets a Basic Safety Level (BSL) of 100 mSv for initiating fault frequencies which might occur between once in every 10,000 years and once in every 100,000 years.

These are Design Basis Accidents (i.e. likely to happen more often than once every 100,000 years).

The SAP does, however, say:

"*Fault sequences initiated by internal and external hazards beyond the design basis should be analysed applying an appropriate combination of engineering, deterministic and probabilistic assessments*." (page57)

Paragraph 609 of the Safety Assessment Principles says:

"*…planning for how events with more severe consequences than allowed for in the design basis would be managed, and providing the plant, equipment and procedures that would be needed to control or mitigate their consequences is often reasonable. Plant states which could merit such planning include those arising following:*

(a) high consequence events of very low frequency for which the design safety measures may be ineffective; and
*(b) design basis events where, conservatively, the safety provisions are assumed to fai*l"

It goes on to say (para 611)

"*In line with wider international guidance, the SAA (Severe Accident Analysis) should form part of a demonstration that potential severe accident states have been 'practically eliminated'. To demonstrate practical elimination, the safety case should show either that it is physically impossible for the accident state to occur or that design provisions mean that the state can be considered to be extremely unlikely with a high degree of confidence*."

The Horizon Environmental statement says: "*the UK ABWR will incorporate further safety enhancements and additional resilience against severe external hazards to comply with post-Fukushima countermeasures based on learning from that event*." **However it seems clear these measures are still not presented in the document.**

Generic Design Assessment

In considering relevant document in Step 3 of the GDA, ONR stated in 2015:

There are still however a number of areas to be followed up as a comprehensive assessment is not possible until the final source terms are available, [refer to RI-ABWR-001] to develop the final models and exposure assessments." This refers to a 2015 ONR document.

More recently in Dec 2017 ONR published "*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 This states that:

> "*During the assessment of the UK ABWR submissions, ONR identified two RIs* [Regulatory Issues] *(one raised jointly by ONR and the environmental regulators relating to the need for Hitachi-GE to define the radiological source term associated with the UK ABWR during normal operations, and the other relating to the need for suitable and sufficient probabilistic safety analysis (PSA) to be conducted to support ONR's assessment of the UK ABWR design). Both were raised in 2015, and closed in 2016 and 2017 respectively. The detailed descriptions of these RIs, their resolution plans and the assessments of the responses to enable close out are published at Reference 6.*"

Reference 6 is Regulatory Issues and Resolution Plans (UK-ABWR), http://www.onr.org.uk/newreactors/uk-abwr/ri-res-plan.htm

This takes us to Generic Design Assessment – New Reactors Programme Assessment of the responses to RI-ABWR-0001 - Definition and Justification for the Radioactive Source Terms in UK ABWR during Normal Operations, ONR, 25th November 2016. http://www.onr.org.uk/new-reactors/uk-abwr/reports/ri-abwr-0001-assessment-of-responses.pdf

Basically, this demotes this Regulatory Issue to a Regulatory Observation:
Hitachi-GE Nuclear Energy, Ltd. UK ABWR GENERIC DESIGN ASSESSMENT Resolution Plan for RO-ABWR-0006 Source Terms http://www.onr.org.uk/new-reactors/uk-abwr/reports/ro-abwr-0006-plan.pdf which says:

ACTION RO-ABWR-0006.8 – Hitachi-GE are required to include any accident source terms derived from the Action 1 responses as part of their response to Actions 3 and 7.

Hitachi-GE will capture any accident source terms derived from the RI-ABWR-0001 responses as part of our response to Actions 3 and 7. This was described into a Topic Report "Management of Source Term" by 30 June 2015.

Most significantly this Topic Report doesn't seem to be available.

Pre-Construction Safety Report.

The Pre-Construction Safety Report (Chapter 26 on Beyond Design Basis Accidents is available here: http://www.hitachi-hgne-uk-abwr.co.uk/downloads/2017-12-14/UKABWR-GA91-9101-0101-26000-RevC-PB.pdf

UK ABWR Generic Design Assessment, Generic Environmental Permit (GEP): Chapter 7, Quantification of Discharges and Limits, Hitachi-GE Nuclear Energy, Ltd is available here: http://www.hitachi-hgne-uk-abwr.co.uk/downloads/2017-12-14/[E07]UKABWR-GA91-9901-0025-00001-RevG-PUB.pdf

EndNotes:

(1) Wylfa Newydd Project 6.4.98 ES Volume D - WNDA Development App D14-2 - Analysis of accidental release, Horizon, June 218 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 (See Table 4.3 page 25)
(2) TORCH 2016 The Other Report on Chernobyl An independent evaluation of the health-related effects of the Chernobyl nuclear disaster, page 12 https://www.ianfairlie.org/wp-content/uploads/2016/03/chernobyl-report-version-1.1.pdf
(3) See http://www.radioactivity.eu.com/site/pages/Chernobyl_Caesium.htm
(4) BBC 22nd March 2012 https://www.bbc.co.uk/news/uk-wales-36112372
(5) NPP Wylfa Newydd (uk) Expert Statement on the Environmental Impact Assessment by Oda Becker Environment Agency Austria, 2018 http://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0666.pdf
(6) http://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0639BFZ.pdf EIA New Dukovany NPP – Summary https://translate.google.com/translate?hl=en&sl=de&u=http://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0639BFZ.pdf
(7) NPP FENNOVOIMA (HANHIKIVI 1) Expert Statement to the EIA Program http://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0447.pdf
(8) See http://www.world-nuclear.org/information-library/country-profiles/countries-a-f/czech-republic.aspx
(9) http://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0639BFZ.pdf
(10) INES User's Manual 2008 https://www-pub.iaea.org/MTCD/Publications/PDF/INES2013web.pdf
(11) Environmental Impact Assessment Report for a Nuclear Power Plant, Fennovoima February 2014 p.42 http://www.umweltbundesamt.at/fileadmin/site/umweltthemen/umweltpolitische/ESPOOverfahren/uvp_fennovoima2014/Fennovoima_EIA_report_2014.pdf

The Wylfa Newydd nuclear power plant project Evidence to the Joint Committee on Housing, Planning & Local Government Houses of the Oireachtas

Professor Steve Thomas, Emeritus Professor of Energy Policy, University of Greenwich and Attracta Uí Bhroin, Vice Chair of An Claíomh Glas

Contents

1. Preamble

The invitation to make a submission to the Committee is most welcome and appreciated, as is the opportunity to reflect positively on its previous report on Hinkley Point C, following the hearing on May 1st 2018. It is hoped that the following considerations will be of interest and use to the Committee in its deliberations.

2. Introduction

The Wylfa Newydd project involves the construction of two Advanced Boiling Water Reactors (ABWRs), 2.9GW, supplied by Hitachi-GE on Anglesey, at the site of a 'Magnox' nuclear power station retired in 2015, less than 90 miles from Dublin and Ireland's most densely populated east coast. The current owner and developer of the site is Horizon, a wholly owned subsidiary of the Japanese reactor vendor, Hitachi. It also owns the Oldbury site in the Severn Estuary, where it also plans to build two ABWRs. This is also on the west coast of the UK, facing Ireland.

Despite the difficulties, outlined below, encountered with the Wylfa project and its nuclear programme in general, the UK government's commitment to its nuclear programme appears undiminished and, for Wylfa, the latest proposal is that the project is rescued by the UK government taking a substantial equity stake in it. It must therefore be concluded that the UK government is willing to go to extraordinary lengths to keep its nuclear policy from failing.

In light of issues outlined below, the UK government's objectivity regarding this project must be questioned and concerns raised given the extent of conflict of interests presented by its role as project developer/bankroller, power purchaser and consenting authority. This is particularly in light of its role in the various consents required for the project; the multiplicity of critical decisions regarding the adequacy of the proposals; the invariable implications for the regulatory authorities involved; the consequential tensions arising between cost and time to deliver versus safety and quality standards. These all need to be considered in the context of: the delivery of the plant; its future operation; and it's decommissioning. The core issues set out below address: issues with changes since the nuclear policy was adopted; the issues and experience of financing these projects; concerns about the strength and independence of safety regulation; and the legacy issues of waste disposal and decommissioning and the additional complexities and risks introduced consequent on Brexit, particularly the UK's withdrawal from the Euratom treaty - integral to much of the governance of nuclear matters. We submit these are all key considerations for the Committee in considering Irish interests as part of the transboundary consultation.

3. The UK nuclear power policy

The UK government's policy on nuclear power[1] was set out in its 2008 White Paper on nuclear, in which it stated the decision to build nuclear capacity would be a commercial one taken solely

[1] While the policy outlined is the UK policy, there are variations between the constituent nations. There have never been any plans for nuclear power plants in Northern Ireland. In Scotland, there are two retired Magnox plants (Hunterston A and Chapelcross) and two operating AGRs (Hunterston B and Torness). The devolved Scottish government's policy, that the Westminster government is honouring, is that there should be no more nuclear plants but it has no specific policy to impose a phase-out of the two existing plants while they are still licensable. The devolved government of Wales, site of two retired Magnoxes including Wylfa (and Trawsfynydd) and the proposed ABWR at Wylfa does not have a specific policy on nuclear power.

by private companies.[2] It also claimed that the cost of power from new nuclear power plants would be comparable to power from fossil fuel sources and, as a result, new nuclear capacity would require no public subsidies. It based these assumptions on a forecast that the construction cost of reactors of the size of Wylfa or Hinkley Point would be about £2bn (excluding finance charges). These forecasts have proved to be hopelessly inaccurate with the two Hinkley Point C reactors expected to cost about £10bn each on the same basis.[3] There is no evidence to suggest other designs of reactor such as the ABWR will be any cheaper to build and operate than the EPR design planned for Hinkley Point so it is not simply the case that the UK chose the wrong design for Hinkley.

Since 2008, far from growing by 15 per cent as the government forecast, electricity demand has fallen by 15 per cent with further reductions expected, so the need for new capacity of any type is dramatically reduced.[4] While the expected cost of nuclear plants has increased steeply since 2008, the cost of renewables has plummeted. The kWh price of new off-shore wind farms tendered in 2017, a technology not even commercially demonstrated in 2008, fell to about a third of the price offered in 2013 and not much more than half the price agreed for Hinkley Point. Rather than re-assess the policy and the scale of the nuclear programme in the light of these remarkable changes, the UK government has continually compromised from the principles set out in its 2008 White Paper. It is offering massive public subsidies including 35-year contracts to buy all the power at a guaranteed real price more than double the current wholesale electricity market price. For Wylfa, in 2018 it even agreed to take a direct equity stake in the plant of a third or more.[5]

Three consortia were created in 2009 to build nuclear plants in the UK and the government sold them sites of existing reactors to build new plants on. These consortia were Horizon (Wylfa and Oldbury), NuGen (Moorside/Sellafield) and NNBG (Hinkley Point and Sizewell). Their plans added up to 16GW of new nuclear capacity that was to be on-line by 2030 and that projection has been the basis of UK government statements on the nuclear capacity in place by then. The new reactors would be completed at about the same time as the existing nuclear capacity would be retired ensuring the nuclear share of generation would not fall. This would mean the output of existing reactors, which accounts for about 20 per cent of UK generation, would be more than replaced and would take the nuclear share up to about 40 per cent – as electricity demand falls, the nuclear share would increase even more. All three consortia were originally owned by large European utilities with Horizon set up by the two large German utilities, EON and RWE. However, since 2009, the utilities have all withdrawn apart from EDF, which controls NNBG. In 2012, RWE and EON sold Horizon to Hitachi. Subsequently, NuGen was bought by another Japanese reactor vendor, Toshiba, which then owned the US reactor vendor Westinghouse. The clear motivation for Hitachi and Toshiba was to create markets for reactors they would supply.

A fourth consortia was set up in 2015 led by the Chinese reactor vendor and utility, CGN, to build reactors of Chinese design (Hualong One) at the Bradwell site in the East of England.

[2] https://www.gov.uk/government/publications/meeting-the-energy-challenge-a-white-paper-on-nuclear-power
[3] Finance charges might add about 50% to the construction cost depending on the interest rate on finance.
[4] https://www.theguardian.com/uk-news/2017/jul/05/nuclear-is-to-wind-as-betamax-is-to-netflix-why-hinkley-point-c-is-a-turkey
[5] https://www.gov.uk/government/speeches/statement-to-parliament-on-horizon-project-at-wylfa-newydd and https://www.ft.com/content/3334a6e6-67ff-11e8-8cf3-0c230fa67aec

This project is generally seen as behind the others in terms of when its reactors will be complete, but as delays accumulate at the other sites, it may be that the Chinese offer will be fast-tracked to fill the gaps created.

In terms of their asset value, reactor vendors are relatively small companies compared to the cost of a nuclear power plant and there was never any prospect that Hitachi and Toshiba could own a significant part of the plants they built. Their plan was apparently to develop the sites then sell the plants on to investors with much larger resources, while ensuring sales of their reactors.

In 2017, the Westinghouse reactor company went bankrupt almost taking the whole of Toshiba with it and the Moorside project has effectively been abandoned with the site likely to revert to the UK government. CGN has indicated that it believes the Moorside site is attractive and it may use the Moorside site in place of, or in addition to the Bradwell site.

4. Progress with sites

It now appears highly likely that, at most, only a small fraction of the UK government's target of 16GW of new nuclear capacity will be on-line by 2030. In 2010, EDF forecast first power from Hinkley Point would be in 2017. Latest estimates are that this will not be much before 2027. All other projects are several years behind Hinkley Point. Contracts between NNBG and the UK government binding both sides to the Hinkley Point project were only signed in October 2016. Up to that point, expenditures by NNBG and the government were at their own risk and that is still the case for all the other projects. Hitachi claims to have spent about £2bn so far on the Wylfa project.[6] Construction at Hinkley Point only started in December 2018.[7] Hinkley Point is far ahead of the next plants in the queue, which were Moorside, before its abandonment, and Wylfa. Negotiations with the government have begun for Wylfa but there is no indication of when contracts are expected to be signed for it. The Sizewell, Oldbury and Bradwell projects are behind Wylfa in terms of development.

The expectation in 2008 was that the new plants would replace most of Britain's existing nuclear capacity, the seven Advanced Gas-cooled Reactors (AGRs), from 2017 onwards. However, as the expected completion dates for the new plants slips, by a decade or more, there is pressure on the safety regulator, the Office of Nuclear Regulation (ONR), to allow the AGRs to continue in service **up to two decades beyond their design life**. By 2019, the two oldest plants, Hunterston B and Hinkley Point B, will have been in service for 43 years, 18 years beyond their design life. In 2016, the ONR had approved their continued operation, in principle, to 2023. This is despite the significant concerns which have arisen around the development of keyway cracks in the graphite blocks of the Hunterston B reactor, and the evident inability of EDF to model and understand these issues fully. (see Appendix 2). This issue of cracking will inevitably arise with the other AGRs. In short, the matter of the UK's commitment to new nuclear plants is directly linked to the pressure to extend the lifetime of existing nuclear plants given the now invariable slippages in delivering the new plants. Thus any consideration of the risks associated with the new plant strategy must also include consideration of the risks

[6] https://www.thetimes.co.uk/article/hitachi-may-drop-nuclear-bombshell-rjxnvmt0j

[7] The International Atomic Energy Agency defines construction start as pouring of first structural concrete, which is when spend increases significantly. Preliminary site works started several years before but these are relatively cheap.

presented by extending these old plants, particularly from an Irish perspective given its proximity to the UK.

5. Finance

An important issue that underlies the delays and the other problems with all the UK's nuclear projects is finding investors large enough to own an asset likely to cost around £30bn. Of the large utilities in Europe, which would have the financial capability to take on these plants, all except EDF have withdrawn from nuclear investment and, for Sizewell, even a utility as large as EDF cannot afford the cost, and a new financial model is being developed that will mean EDF will not take an equity stake (see Appendix 1 for further detail on funding models). The high price agreed for power from Hinkley Point (see below) proved so unpopular that it was clear to the government that different financial arrangements that would at least give the appearance of providing a lower price of electricity would be required for subsequent projects. The government hopes the Sizewell proposals (see Appendix 1) will form the model for subsequent nuclear projects and it has said it expects the proposal for Wylfa with a large government equity stake will be a one-off.[8] However, if the Sizewell proposals are not viable, the possibility of the government using the Wylfa model for other projects cannot be discounted.

Even though Japan has a 60-year history of reactor construction in Japan, until recently Japanese vendors have not attempted to win export orders. Despite the Fukushima disaster, from 2010 onwards the Japanese government has offered strong support in export markets for the three Japanese reactor vendors, Hitachi-GE, Toshiba and Mitsubishi. However, despite Japanese government support, they have still yet to win any orders. It appeared Mitsubishi had won a large order to Turkey but this collapsed and it has no other realistic prospects. A deal brokered by the Japanese government to supply Japanese reactors (vendor not specified) to Vietnam also collapsed. Toshiba has no sales prospects and Hitachi-GE's only prospect is the Wylfa order.

The Japanese government is therefore putting its full weight behind Hitachi for Wylfa with offers of loan guarantees to facilitate financing the plants and promises of identifying Japanese investors willing to buy stakes in Wylfa. After negotiations between Hitachi and the UK government in May 2018, Greg Clark, the UK Secretary of State for Business, Energy and Industrial Strategy (BEIS), reported to Parliament on these negotiations. He told it[9]:

> '.. for this project the Government will be considering direct investment alongside Hitachi, and the Japanese Government agencies and other parties.'

Clark confirmed the UK government's commitment to its nuclear programme – 'The UK is likely to need significant new nuclear capacity in order to meet our carbon reduction commitments at least cost'. However, he made it clear that the deal for Wylfa with a substantial public equity stake was a one-off (see Appendix 1 for a brief description of the regulated asset base model):

> 'It remains the Government's objective in the longer term that new nuclear projects like other energy infrastructure should be financed by the private sector, and so alongside our

[8] https://www.gov.uk/government/speeches/statement-to-parliament-on-horizon-project-at-wylfa-newydd
[9] https://www.gov.uk/government/speeches/statement-to-parliament-on-horizon-project-at-wylfa-newydd

discussions with developers we will be reviewing the viability of a regulated asset base model as a sustainable funding model based on private finance for future projects beyond Wylfa'

There are few details in the public domain on what the make-up of the ownership package for Wylfa will be but there are strong indications that the UK government is prepared to take at least a third stake in the project. There are also reports of the UK government providing two thirds of the cost, perhaps through a mixture of its own investment and through deals it has brokered with other investors. From the Japanese side, it seems unlikely that Hitachi has the financial strength to take any more than a token stake. It appears the Japanese government is not able to take an equity stake but might be able to broker some investment perhaps through government-owned agencies or Japanese utilities. By December 2018, there was no evidence of interest by any UK or Japanese investors. Given the extent of compromises made already by the UK government, the possibility of the UK government even increasing its proposed stake to a majority if other investors cannot be found cannot be discounted. If a deal can be done, a 'Contract for Differences', and a 'strike price' as for Hinkley Point (see below) would be determined. To fulfil the government's priority of getting a price substantially lower than the Hinkley Point price, the government could offer a further subsidy, for example, paying some of the interest charges, or it could pass some of the project risk on to consumers so that the strike price would go up if costs were higher than expected. These risks would include construction cost overrun, poor reliability and high operating cost. Thus the financial considerations of the project are likely to be inevitably linked and integral to how the risks associated with the project is developed and the plant operated into the future, and thus a key consideration from an Irish perspective, particularly given the multiple hats the UK Government will be wearing on this project.

The UK will still be subject to EU state-aid legislation, as Clark acknowledged in his statement to Parliament – 'the successful conclusion of these negotiations will of course be subject to full Government, regulatory and other approvals, including but not limited to value for money, due diligence and State Aid requirements'. Given that it is clear that state-aid measures needed for Wylfa will be even more extensive than for Hinkley Point, this could be a major barrier to the project. By January 2019, it was unclear what the terms of the UK's exit from the EU would be, indeed whether it would leave at all. The extent to which Brexit and the jurisdiction of the EU on such matters will impact consideration of the legitimacy of otherwise of the state aid provided by the UK is therefore yet to be determined, and may prove to be an important factor in all such considerations.

Despite earlier reports that negotiations between Hitachi and the UK government were going well, in mid-December 2018, it was reported that the talks were deadlocked.[10] The negotiations are rather strange in character given that the buyer of the power is the UK government while on the other side of the negotiations is Hitachi, a company unlikely to have a significant equity interest in Wylfa. For Hitachi, the priority would appear to be getting any deal that allows them to sell reactors at a profit. The largest element of the body selling the power is likely to be the UK government. So, in effect, the UK government is negotiating with itself.

[10] Japan Economic Newswire 'Hitachi may freeze British nuclear project due to swelling costs' December 16, 2018.

6. Cost of power

There is no authoritative estimate of the construction cost of the Wylfa ABWRs with the press quoting a wide range of numbers. Earlier forecasts by Hitachi of construction start in 2020 are clearly now infeasible but there are also no authoritative recent estimates of when Hitachi expects Wylfa to be completed. Given that there is absolutely no evidence that reactor designs other than the EPR planned for Hinkley Point would be cheaper to build and operate and more reliable, the only ways prices could be reduced would be a) shifting risk away from the plant owner to consumers and/or taxpayers - making the project less risky to its owners would make finance cheaper and easier to obtain - or by b) increased public subsidy.

The issues of concern with how the UK government proposes to pursue Wylfa B need to be viewed in the context of the unpopular Hinkley Point deal. At the heart of the Hinkley Point deal, there is a 'contract for differences' (CfD) and a 'strike price'. In simple terms, these add up to a take-or-pay contract between the plant owners and a UK government agency to buy all the power produced (plus that which could be produced if the power cannot be used) at a fixed price that goes up with inflation for the contract duration of 35 years.

The size of the strike price received almost universal condemnation, for example from the National Audit Office, Select Committees and independent analysts. The strike price of £92.5/MWh (2012 prices) is more than double the wholesale electricity price over the period since it was agreed in 2013. It is also far above renewables prices and, for example, the most recent prices (2017) for off-shore wind power were as low as £57.5/MWh (2012 prices) with every expectation that real prices would continue to fall. On-shore wind is cheaper still. Despite this, the UK government has withdrawn incentives for renewables other than off-shore wind, with no more on-shore wind capacity allowed, subsidies for solar panels have been removed and owners of solar panels will no longer be paid for any surplus power they export to the grid. It is hard to avoid the conclusion that the government is actively discouraging renewables investment to ensure there is plenty of space in the market, even allowing for falling electricity demand, for new nuclear capacity regardless of the cost to consumers. The motivation for this extraordinary position is unclear, but may be linked to the desire to pave the way for future trade deals outside the EU post-Brexit with countries like Japan and China, and other countries interested in nuclear matters and products.

Any deal for a nuclear plant that does not involve a substantially lower strike price than given to Hinkley Point – the government has talked in terms of a price reduction of up to 20 per cent – would be politically hard to sell.

7. The Design

The ABWR is often portrayed as being a design with proven construction and operational experience.[11] This is based on the fact that four ABWRs were completed, all in Japan, with another four under construction, two in Japan and two in Taiwan. These were supplied by combinations of Hitachi, Toshiba and GE, who collaborated in the original ABWR design. However, all the operating reactors and those under construction use the original 1986 (pre-Chernobyl) design. This was updated for the US market where it was given regulatory approval

[11] For a detailed review of ABWR experience see S Thomas (2018) 'The failings of the Advanced Boiling Water Reactor (ABWR) proposed for Wylfa Nuclear Power Station' Greenpeace. https://www.greenpeace.org.uk/abwr-briefing/

in 1997. However, the 1997 design was never ordered and regulatory approval expired in 2012. By this time, the collaboration between Hitachi, GE and Toshiba had ended and Hitachi-GE (for non-US markets), GE-Hitachi (for US markets) and Toshiba were offering their own individual versions of the ABWR.

The version Hitachi-GE is offering in the UK is a further update to the 1997 US design, for example, including requirements arising from the 9/11 attack on the World Trade Centre, such as an outer shell capable of withstanding a direct impact by a passenger jet plane. Hitachi has stated that meeting the ONR's requirements had substantially increased the cost of the ABWR.[12]

The design that is to be built at Wylfa must therefore been seen as substantially different to those built or under construction. While this may bring safety improvements it also introduces unproven elements. Experience with the four operating reactors all of different specification is mixed. All were built in 4-5 years, far quicker than reactor construction in most other countries but typical of reactor construction times in Japan. However, reliability has been poor and up to the Fukushima disaster (since then the reactors have been shut down), the load factor over the 36 reactor years of experience was about 60 per cent compared to the 90 per cent Hitachi is claiming Wylfa would achieve. The load factor is the output produced as a percentage of output that would have been produced had the reactor operated uninterrupted at full power. A load factor as low as 60 per cent (the global average for reactors is more than 80 per cent) shows there have been significant equipment problems requiring the plant to be shut down while repairs are made or outages are required for various reasons. The decisions to shut down clearly has financial implications and a concern arises given the UK's conflict of interest in such decisions into the future. It is clear these future decisions will be taken in the context of a very ambitious target of 90 per cent load factor performance which is far in excess of the actual experience of 60 per cent.

Two reactors were under construction in Taiwan for more than 15 years until the project was abandoned in 2016. Part of the delay appears due to political and financing difficulties but there were also serious quality concerns. Work on the two ABWRs under construction in Japan was largely halted by the Fukushima disaster and it is not clear whether they will be completed. Despite all of this the UK remains quite extraordinarily committed to the design and the project.

8. Regulatory Issues

The ONR carries out 'Generic Design Assessments' (GDAs) for new designs. GDAs are intended to resolve all design issues before construction is allowed to start. This process lasts at least four years and approval is valid for 10 years. An approved reactor design can be built at any site subject to local siting factors. The GDA for the EPR (planned for Hinkley and Sizewell) was completed in 2012, for the AP1000 (planned for Moorside) and for the ABWR was completed in 2017. The GDA for the Hualong One was started in 2017.

For all the completed GDAs, it is clear that the rhetoric of resolving all design issues is misleading. In all three cases there are design issues outstanding which the ONR claims will only be sorted out during construction. The decision to give the ABWR approval contains a 3-

[12] Japan Economic Newswire 'Hitachi may freeze British nuclear project due to swelling costs' December 16, 2018.

page section (out of a 36 page document) entitled 'Matters Arising during GDA for Consideration at the Site Specific Stage.'

Nevertheless, the ONR must oversee construction and is required to give a series of additional consents, for example on construction start and first power generation before the plant can go into service.

The UK ONR has been formally independent of the UK government in the sense of being Statutory Non-Departmental Public Body (NDPB), rather than a department of a government ministry, since 2013. However, its funds and senior appointments are made by government so the remaining scope for government influence is clear. As with any regulatory body, 'regulatory capture' under which regulatory bodies, through constant contact with regulated companies, become over-sympathetic to those companies or is influenced by government, is a constant risk. Recent decisions by the ONR suggest its independence cannot be assumed. These include, as discussed above, allowing design issues not to be resolved until construction has started and allowing the old UK reactors to continue in service despite previous limits to ageing being exceeded (see Appendix 2). As the schedule for new nuclear plants slips, there will be pressure on the ONR to allow the existing AGRs to remain in service to 2030 or beyond.

9. Brexit and the UK's withdrawal from Euratom

Brexit and its associated uncertainties brings a whole range of complexities to a range of considerations and sectors, and this matter is no different, but perhaps aspects of it and its implications for the risks to Ireland are more overlooked.

The UK Prime Ministers letter[13] notifying the UK's decision to exit the European Union also notified its withdrawal from the Euratom treaty. The implications of this are significant for the management of nuclear matters in the UK, and indeed movements to and from the UK of nuclear material. These movements are particularly relevant given the reality that the nuclear risk arguably arises for Ireland at the 12 mile nautical limit of Ireland's territorial waters being the nearest point for foreign nuclear transports – and not simply on the UK mainland as is generally considered.

While detailing the full scope of Euratom and the implications of the UK's proposed approach to addressing the functions are beyond the scope of this short submission – the Joint Oireachtas Committee is urged to consider this as a matter of significant importance to Ireland given the implications for safety and independence of oversight on nuclear matters as the UK will effectively self-police on key nuclear matters post-Brexit. The extent to which it is **not** clear whether this has been addressed in contingency considerations in the event of a Brexit no-deal scenario is addressed further below. But first the core considerations are set out to provide context for the issues at stake.

Simplistically and generically the Euratom treaty can be considered to be establish a separate nuclear community and is concerned with amongst other things, in the context of nuclear matters:

- promoting research and disseminating technical information;
- setting uniform safety standards to protect the public and industry workers;
- facilitating research;

[13] http://data.consilium.europa.eu/doc/document/XT-20001-2017-INIT/en/pdf

- ensuring civil nuclear materials are not diverted to other uses, particularly military.

However from the point of view of issues of interest to Ireland, some of the key functions and considerations which need to be considered include:

- Ensuring appropriate and adequate separation of interests between civil and military use of nuclear materials;
- Inspection of nuclear facilities, inventories and movements.
- The independence of such oversight

To put this inspection role in context, according to a Nuclear Free Local Authorities (NFLA) briefing on this matter:[14]

> "Euratom safeguards inspection frequencies currently range from very regular (every three out of four weeks) at sites like Sellafield, to monthly inspections at enrichment plants, less frequent inspections at power stations and inspections only once every several years at selected locations with smaller inventories of material. More than 100 UK facilities or other duty holders are subject to Euratom safeguards, with some 220 inspections (about 1,000 person days of Euratom effort) during 2014. (14)
>
> A quarter of all time spent on nuclear inspections by EURATOM inspectors is spent in Britain, due to the scale of nuclear fuel fabrication and waste management facilities, such as Sellafield. Britain's plutonium stockpile is also currently overseen by EURATOM inspectors. Sellafield has enough plutonium to make about 20,000 nuclear bombs. It is the world's largest stockpile of civilian plutonium – one of the most toxic substances on the planet – accumulated from decades of reprocessing nuclear fuel from power stations not only in the UK but also Germany, France, Sweden and other countries. EURATOM has a permanent presence at Sellafield and owns the cameras, seals and testing laboratory used to monitor Sellafield."

Put simply, in light of Brexit, it is proposed that the UK's Office of Nuclear Regulation (ONR) will replace Euratom performing a number of key additional oversight and inspection roles in addition to its existing functions, to replace the significant Euratom undertakings intimated in the above.

On this new role for the ONR, NFLA has further commented in that same briefing:

> "Without EURATOM the Office for Nuclear Regulation (ONR) will need to undertake many more inspections in order to meet IAEA requirements. There must be a question-mark over whether ONR will be able to hire and train the necessary new staff especially when ONR is already currently struggling to keep up with the assessment of several new reactor designs (EPR, AP1000, ABWR and Hualong One) under the Generic Design Assessment criteria. (15)."

The NFLA briefing also highlights that:

> "By 2020 the UK will be home to around 140 tonnes of plutonium, of which around 23 tonnes is foreign owned. (17)"

[14] http://www.nuclearpolicy.info/wp/wp-content/uploads/2018/08/A291_NB178_Brexit_and_nuclear_safeguards.pdf

The interests of EU Member States with nuclear facilities, such as Germany and France, are clearly a relevant consideration for these foreign inventories, whereas Ireland, of course, has no such interests.

There is one thing clear at time of writing that nothing in relation to Brexit is clear, but a number of scenarios need to be considered:

1. A disorderly withdrawal from the EU. Despite the negative implications for the UK and the EU, this cannot be ruled out at time of writing.
2. The proposed Article 50 Withdrawal Agreement is approved, and a transition period follows. The proposed agreement contains a number of provisions specifically dealing with Euratom related considerations. While the remaining EU 27 Member States have agreed the proposed text, it is, at time of writing, unclear whether the UK parliament will do so, or even when a vote will be taken on this.
3. An extension to the withdrawal period. The EU has indicated the limited conditions under which it would agree to this, but it is unclear if the UK Parliament will agree to seek it or accept it if offered.
4. The Withdrawal by the UK of the Article 50 notification. As clarified by the EU Court of Justice on December 10th 2018,[15] this is entirely possible, providing that it is done before the notification period is concluded, and prior to the entry into force of a withdrawal agreement and that it is done in writing and unconditional. Whether this would be contingent on a further referendum in the UK and the full circumstances for this are unclear.

In each of the scenarios 1-3 above the UK will need to address key elements of the Euratom regime, the variables being the timeframe available to comply, and what is agreed/committed to. A brief analysis of these scenarios follows.

Scenario 4 "No Brexit No withdrawal"

In this scenario 4, there is no withdrawal, so the status quo is maintained. Thus it is not considered further below beyond reminding the Committee of concerns previously raised to it in the Hearing on May 1st on Hinkley Point C about the adequacy of the Euratom Article 37 submissions made by the UK and ultimately accepted. These concerns were reflected by the Committee in its subsequent submission[16] to UK authorities. The concerns noted include the failures to adequately consider the island of Ireland and to correctly assess a number of factors including various climatological and atmospheric considerations. So, in short, Euratom is arguably not a perfect oversight solution as its stands. Therefore, any weakening of its effects and operation in the context of Brexit therefore must be of concern.

Scenario 1 'no-deal'

In considering the other Brexit scenarios, the prospect of a 'no-deal' in scenario 1 above is clearly of particular concern. Notably, on the 19th of December 2018, the EU

[15] Case c-621/18 Press release: https://curia.europa.eu/jcms/upload/docs/application/pdf/2018-12/cp180191en.pdf – full Judgment opinion and prior Advocate General Opinion: http://curia.europa.eu/juris/liste.jsf?language=en&num=c-621/18&td=ALL

[16] https://data.oireachtas.ie/ie/oireachtas/committee/dail/32/joint_committee_on_housing_planning_and_local_government/reports/2018/2018-05-11_transboundary-environmental-public-consultation-hinkley-point-c-nuclear-power_en.pdf

Commission published details of contingency action plans[17] in the context of a no-deal scenario. However these do **not** reference Euratom or considerations relevant to the nuclear sector specifically, whereas they do cover matters like aviation, citizen movements etc. Nor does the contingency plan[18] published by the Irish Government – save for referencing an earlier document of the commission setting out the implications of the withdrawal from Euratom in a long table of briefings. However, in the absence any commitments from the UK, it would seem clear that its ability to operate and transport nuclear material even for medical uses would seem to be impacted Nonetheless, the nature of what might be agreed relating to Euratom in a no-deal scenario does not seem clear, or at least is not clear to those consulted for this submission within the limited time available over the Christmas break to clarify matters. This is therefore a matter the Committee may wish to pursue as a matter of urgency in order to seek clarity on the solutions present or absent relating to Euratom in a 'no-deal' scenario.

It is noted that a sectoral preparedness seminar is envisaged with the EU 27 on January 10th 2019 which may bring some clarity.

In this regard it is also noted that: in our submissions made to the Committee in May 1st 2018, various risks to Ireland from a nuclear incident were highlighted including the findings of a key 2016 ESRI report[19]. The National Risk Register[20] published by the Department of An Taoiseach in July 2018 also acknowledges this report and the risks to Ireland from a nuclear incident, and indeed even in the context of no radioactive contamination the potential still for significant economic losses arising from reputational damage to Ireland's Agri-Food and tourism sectors in particular. It also details a multiplicity of risks and sectoral considerations. However it is silent on the overlap of nuclear risks in the context of Brexit,

Scenarios 2 and 3 – Ordered withdrawal agreement and/or some elements of transition

The withdrawal from Euratom, particularly if done in line with the proposed Article 50 Withdrawal agreement (Scenarios 2 and 3 above) will involve major undertakings to put in place IT/computer systems, processes, structures and expert resources and adequate funding for the necessary subsequent operations. However there are significant concerns about the UK's ability to deliver this and indeed the adequacy of the ambition proposed by the UK to fulfil the requirements. These concerns are not limited to the issues raised in a leaked report from the ONR reported[21] on by Sky News earlier this year, where ONR is the body intended to undertake much of the Euratom functionality. The leaked report indicated "red" warnings on the risk register for key considerations including: delivery of IT/computer systems, resources, training,

[17] http://europa.eu/rapid/press-release_IP-18-6851_en.htm
[18] https://www.dfa.ie/media/dfa/eu/brexit/brexitcontingency/No-Deal-Brexit-Contingency-Action-Plan-December-18.pdf
[19] https://www.esri.ie/pubs/BKMNEXT313.pdf
[20] https://www.taoiseach.gov.ie/eng/publications/publications_2018/national_risk_assessment_2018_-_overview_of_strategic_risks_-_final.pdf
[21] https://news.sky.com/story/red-warnings-for-uks-post-brexit-nuclear-safeguards-11374097

equipment and funding. Of particular concern are the suggestions around “redefined person spec”. The Sky News article stated that:

> “The document lists seven ways that risk can be mitigated, including "redefined person spec" and that standards may be lowered to plug the skills gap, suggesting there are insufficiently trained personnel.”

While these were being considered in the context of a March 2019 withdrawal – certain of the issues including the availability of sufficiently expert resources will remain a challenge, and it is unclear if the proposed transition period will be adequate to resolve the others.

As part of the legal architecture for the UK’s solution to replace Euratom, the UK’s Nuclear Safeguards Act completed its passage through Parliament and received Royal Assent on the 26 June 2018. This is the provision under which the draft Nuclear Safeguards Regulations will operate, In the summer of 2018 the UK undertook a consultation[22] relating to aspects of its proposed alternative Euratom regime and the safeguarding measures. However, it is very clear from various proceedings[23] and related actions of the House of Lords Select Committee on the European Union- Energy and Environment Sub-Committee there is much yet undecided and unresolved including the critical issues of how the new body is to be funded and thus be implemented and effective.

The issue of funding also raises major considerations and complications in respect of potential state-aid considerations if the UK doesn’t require industry to pay, and additional burdens and potential constraints on the ambition of proposals for the new regime if the UK has to fund it, through the taxpayer or alternatively force industry to foot the bill. As highlighted previously, the extent to which the EU’s requirements on state-aid have a bearing on such decisions in the context of what transpires in relation to Brexit also has to be considered. It would seem in the context of a transition and ordered withdrawal agreement – the EU rules and constraints would apply, the implications and consequences are however unclear.

Additionally, discrepancies between the ambition indicated in the consultation document and the requirements of the proposed Article 50 Withdrawal agreement are noted and commented upon in a Nuclear Free Local Authorities, (NFLA), briefing[24] on the matter.

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[22] https://www.gov.uk/government/consultations/nuclear-safeguards-regulations

[23] Select Committee on the European Union- Energy and Environment Sub-Committee; oral evidence: The Office for Nuclear Regulation’s Brexit preparedness, Wednesday 11 July 2018, http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/eu-energy-andenvironment-subcommittee/the-office-of-nuclear-regulations-brexit-preparedness/oral/86771.html
Parliamentary Answer 10th May 2018 https://www.parliament.uk/business/publications/written-questionsanswers-statements/written-question/Commons/2018-05-08/141755/
Letter from Lord Teverson to Richard Harrington, 18th July 2018 https://www.parliament.uk/documents/lords-committees/eu-energy-environmentsubcommittee/Correspondence/Letter-from-Lord-Teverson-to-Richard-Harrington-190718.pdf

[24] http://www.nuclearpolicy.info/wp/wp-content/uploads/2018/08/A291_NB178_Brexit_and_nuclear_safeguards.pdf

> Of further and particular importance to the Joint Oireachtas Committee must be the extent to which the EU and interested member states will exercise diligence on the credibility and feasibility of the UK's delivery of its Euratom obligations under the Article 50 Withdrawal agreement (if agreed), in the first instance, and its actual delivery thereafter. Additionally the adequacy of remedies available to them to resolve any failures by the UK also needs to be considered particularly given the nature and potential implications of failures by the UK's regime. All of this remains to be seen, particularly given the extent of political and economic sensitivities pertaining But it provides an important context for the Committee's considerations of the proposals to extend the UK's nuclear operations in the context of the proposed Wylfa B plant, and the implications noted elsewhere in this document regarding the management of radioactive waste, and the operation of existing plants and the extensions to the operations of existing plants, and the independence of oversight by all concerned within the UK and within the EU.

The NFLA Briefing[25] referred to above also raises a number of other relevant concerns relating to the adequacy of the funding provisions, the pressures regarding nuclear weaponry and proliferation, and provides more detail on concerns raised in the context of a House of Lords Select Committee enquiry. The attention of the Joint Oireachtas Committee is particularly drawn to this more detailed discussion of these critical matters. The core considerations and concerns arising must be not only the practicality of delivering in within the required window of time adequate functionality and oversight necessary for the safe management of the UK's nuclear activity, but also the independence of the oversight body given the UK Government appoint key ONR resources and determine its funding, and thus the ONR's "independence" is open to question.

Finally Ireland as a non-nuclear state has very limited resources to execute sufficient independent oversight on its own behalf. Therefore the implications of losing the benefit of Euratom's expertise and resources are significant in the context of the UK's expansion plans in sites like Wylfa B and all of the consequences which flow from that, including the increase of highly radioactive waste which will be stored on-site pending the availability of a theoretical alternative solution, an issue which is expanded upon below.

8. Legacy issues

The seminal and much quoted 1976 UK Royal Commission on Environmental Pollution, Nuclear Power and the Environment[26], (commonly known as the Flowers Report) concluded:

'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 [in a Geological Disposal Facility or GDF] of long-lived, highly radioactive waste [High-Level Waste or HLW] for the indefinite future.'

[25] http://www.nuclearpolicy.info/wp/wp-content/uploads/2018/08/A291_NB178_Brexit_and_nuclear_safeguards.pdf

[26] Royal Commission on Environmental Pollution (1976) 'Nuclear power and the environment' Cmnd 6618, HMSO, London. https://webarchive.nationalarchives.gov.uk/20110322144120/http://www.rcep.org.uk/reports/06-nuclear/1976-06nuclear.pdf

No GDF for HLW is in operation anywhere in the world. It is a hotly disputed contention whether there can be sufficient confidence that the integrity of a GDF can be established over the period of hundreds of thousands of years that the material in it will need to be isolated. If decision-makers cannot be convinced of this and GDFs cannot be sited, the material will have to be stored effectively indefinitely in surface stores. This might be at the reactor sites or at a central facility such as Sellafield

Despite this, and despite several failed attempts to identify sites for GDFs, in terms of identifying deep GDF sites, the UK appears little if any further on than it was when the Flowers Report was published. In December 2018, the UK government launched another new attempt to identify GDF sites.[27] There is little reason to have any confidence that this new attempt will be any more successful than its predecessors. The government says identifying sites will take at least 15-20 years; then a pilot facility will have to be built; then this pilot plant will have to be observed for several years to determine whether the geology at the depths required is really suitable; then the actual facility will have to be built. This process cannot be completed in less than 50 years so, at best, a UK GDF might be in operation by 2075. The large volume of existing waste which is in temporary packaging, would necessarily have priority in being placed in the GDF so waste from new plants such as Wylfa Newydd could not be disposed, at the earliest, before the 22nd century and would have to be stored in carefully monitored surface stores, probably at the reactor sites until then.

Reactor decommissioning is not a well-proven process worldwide for large commercial reactors with decades of service, with only a handful of reactors near the desired endpoint of releasing the site for unrestricted use. The process of decommissioning the UK's old reactors appears little more advanced than HLW disposal. The first of 11 nuclear plants (seven of which, including Wylfa are on the west coast of Britain) of the original design, the Magnox, was closed in 1987 with the last in 2015. Despite this, all that has been done at the sites is to remove the fuel and send it to Sellafield and for some plants, the uncontaminated buildings have been demolished and the remaining heavily contaminated buildings sealed pending cutting up and disposing of the waste including some dangerous Intermediate-Level Waste (ILW). No site for ILW waste disposal has been identified and it is decades from being completed. The most challenging and expensive phase of decommissioning, cutting up and disposing of the material from the reactor vessels, is not expected to start before 2075 and will take at least five years for each plant, thirty years in total. Until that point, as for HLW, the security of the sites, for example from inundation from the sea, will have to be carefully monitored. The credibility of plans to deal with such eventualities is unclear and must be viewed sceptically however surely in the context of the issues with the basic operations, and the potential for the UK economy to suffer severe shocks following Brexit with consequential pressures on expenditure.

No time-line exists for the decommissioning of the seven second generation plants (AGRs), four of which are on west coast sites, and for the Sizewell B PWR but it is likely these will only be decommissioned once the Magnox sites have been fully cleaned up.

A particular concern is funding for decommissioning. Since 1979, electricity consumers' money has been earmarked to pay for this so 'the polluter will pay'. These funds have been

27 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/766643/Implementing_Geological_Disposal_-_Working_with_Communities.pdf

continually re-allocated, and effectively lost to their purpose, since then. For example, in 1990 the 11 years of contributions made up to that point were appropriated by the UK Treasury and by 2019 the funds available were minimal compared to the liability – in excess of £100bn to clean up all the UK's civil nuclear sites. Decommissioning for existing plants will therefore be paid for by future taxpayers at the time decommissioning takes place and funding for this will have to compete with all the other calls on public money such as health and education. The existing sites will therefore be a potential hazard for a century to come and, even then, there will be a risk that insufficient funds will be available to do the job properly.

The government has tried to produce more secure methods of funding so this situation does not recur but it remains to be seen whether funds that are adequate and secure over the century or more they will have to exist for can be guaranteed.

9. Conclusions

All the evidence from the time the UK began to try to promote new nuclear capacity more than a decade ago is that the UK government is willing to entertain an extraordinary range of options from massive public guarantees to public ownership to keep the programme from collapsing. Escalating costs of nuclear, sharply falling costs for renewables and falling electricity demand have not appeared to diminish its enthusiasm for nuclear in any way. It would therefore be unwise to see the problems currently being experienced with Wylfa in putting together a financial package as likely to kill the project. Evidence of the UK government's unwillingness to reconsider its nuclear programme was prepared to put together a complex package for Wylfa including a large public stake, that it claims will be a one-off, not the model for future deals. However, if the model proposed for Sizewell does not prove viable, the possibility of the Wylfa model being used for other projects cannot be discounted. This position puts the government in a conflict of interest, which it has not acknowledged as both owner of the plant generating the power, the buyer of the power and also the safety regulator of the plant. Over the six decades or more the plant is expected to operate there must be a risk that safety will be compromised in order to ensure that plant remains in service and profitable. The government's objective of getting an apparently lower kWh price than was agreed for Hinkley Point for Wylfa and the other nuclear projects can only be achieved by shifting even more of the project risk – construction cost escalation, poor reliability, high operating costs – away from the plant owners to the public either as taxpayers or as electricity consumers. If this happens, a comparatively low expected power cost could prove to be an illusion

From a technology point of view, the ABWR may have a less problematic record than the EPR or the AP1000, but in the form proposed for Wylfa, it is essentially unproven and the construction and operating record of the only version that has been built (from 30 years ago) is far from convincing.

Ageing of the UK's existing nuclear capacity including significant safety issues (see Appendix 2) may well mean some of it should be retired much sooner than expected. Other UK nuclear projects, such as Moorside, have failed or are failing so the government may feel it cannot afford to let Wylfa collapse if it is to retain its nuclear expansion policy.

The legacy of the UK's existing programme is of major tasks still decades away from being addressed. These require as yet unproven technology such as decommissioning old reactors and siting facilities such as disposal facilities for high-level and intermediate-level that will be

bitterly contested. Until these tasks are completed, probably at least a century away, existing facilities, especially those on Britain's west coast, represent potential hazards to the Republic of Ireland. And until the technologies required are demonstrated, new reactors would add to this risk.

Lord Flowers' recommendation of 40 years ago, that: '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' continues to be ignored.

The UK appears to be on the cusp of entering a period of significant unknowns in leaving the EU. Many experts including the Bank of England have estimated significant economic impacts – varying with whichever scenario eventually transpires and the extent of agreement or crash-out, and the extent of closeness or distance maintained with the EU. In times of crisis – corners have been cut even in the context of matters of such serious consequence as nuclear power – as is clearly evident in the context of the experience in Sellafield in the following extract from the Guardian[28]. It details the evidence of the late John Large, expert nuclear consultant. Large gave evidence to the House of Commons environment committee investigation into nuclear safety in 1986. The article indicates the spent fuel ponds were abandoned after they were overwhelmed with spent fuel during the 1974 miner's strike when Britain was put on a three-day working week by prime minister Edward Heath. Large is quoted as follows:

> "In order the 'keep the lights on', the UK's fleet of nuclear power stations were run at full tilt, producing high volumes of spent fuel that the Sellafield reprocessing facilities were unable to keep up with. During the three-day week they powered up the Magnox reactors to maximum, and so much fuel was coming into Sellafield that it overwhelmed the line, and stayed in the pool too long,"
>
> "The magnesium fuel rod coverings corroded due to the acidity in the ponds, and began to degrade and expose the nuclear fuel itself to the water, so they just lost control of the reprocessing line at a time when the ponds were crammed with intensely radioactive nuclear fuel,"

It would be remiss in the context to rule out the extent of uncertainties and pressures which will arise to compound the issues already set out in the above, and which present only a limited set of considerations relevant to the committee's considerations on the potential and actual transboundary risks.

Ireland is situated in such close proximity to the proposed site for Wylfa Newydd that such considerations cannot be ignored, particularly in the broader context of the issues raised in this submission, including the conflict of interests extant for the UK, and in particular the UK's withdrawal from Euratom and the implications for its future self-policing.

[28] https://www.theguardian.com/environment/2014/oct/29/sellafield-nuclear-radioactive-risk-storage-ponds-fears

Appendix 1 The Regulated Asset Base Model

As it became clear that no single investor, not even EDF, was willing and able to take on an investment on the scale, about £30bn, of a two-unit nuclear power station, the government and developers began to consider other options.

EDF suggested using the model, the Regulated Asset Base model (RAB) developed for the Thames Tideway system, commonly known as the super sewer. Clark's June statement makes it clear that the RAB model is the government's preferred option for projects **after** Wylfa. The Thames Tideway scheme was expected to cost £4bn+, large by water industry standards but small by nuclear power plant standards. Under this model, the asset would be owned by a large number of investors, such as investment funds, venture capital funds etc and they would be guaranteed a specified rate of return on their investment until the asset had been amortised. Effectively, this meant that the asset would be regulated in the same way as any other monopoly network asset, except it would be owned by a consortium of investors, not by the utility itself.

If this model was applied to a nuclear power plant, there would be major differences. In effect, the Tideway scheme owners would be paid just for it to continue to be there. For a nuclear power plant, there are additional risks partly because the plant produces saleable output. The main risk however would be the risk of construction cost overrunning. While water projects are not immune from cost overruns, the scale of overruns is much less. Given experience elsewhere where nuclear construction costs frequently end up several times the forecast cost, this would be a huge risk and one no investor would be willing to take. So the likelihood is that consumers would take the risk with the cost overrun added into the RAB and therefore the price they pay for power. There would also be the risk that reliability would be poorer than expected so there would be less output to sell and operating costs would be higher. Again, it seems likely that the only way such a package could be sold to investors would be if those risks were passed on to consumers.

So when the deal was done before construction, there would an indicative cost of power that would apply if the costs and performance were as forecast but this would be adjusted up if and when costs were found to overrun and would vary from year to year according to operating costs and reliability.

It is hard to believe that placing these risks entirely on consumers would be politically acceptable – effectively consumers would be signing a blank cheque. Nevertheless, if those risks were removed from the plant owners, the forecast price of power, if not the outturn price of power would be substantially lower than the Hinkley Point price, fulfilling the government's priority of getting a deal for nuclear plants beyond Hinkley Point that would be substantially cheaper.

Appendix 2 The UK's existing nuclear capacity

The UK had eight nuclear power stations in operation in 2018 (about 8GW), seven of which (each comprises a pair of identical reactors) use a UK design, the Advanced Gas-cooled Reactor (AGR) not built elsewhere, while the other is a PWR, a design widely used throughout the world. All are owned by EDF. The PWR, completed in 1995, is expected to remain in operation until at least 2045. Two of the AGRs (Hinkley Point B and Hunterston) went on line in 1976 with the others in the late 80s. All are now beyond their design life and permission for their continued operation is given by the Office of Nuclear Regulation (ONR) which reviews the plant at every major maintenance shut-down (typically every other year) but in much greater depth every 10 years in the Periodic Safety Review (PSR) which is mandatory in the European Union. EDF plans to keep the two oldest plants on-line until at least 2023 and the most recent PSR for Hinkley Point and Hunterston, in 2016 appeared to give tacit approval to this plan. It plans to keep the newer AGRs in operation until at least nearly 2030, subject to the PSR results due for all five plants in 2018/19. By the time these are retired, EDF hopes Hinkley Point C and perhaps Wylfa will be in service replacing most of the AGR output.

The life-limiting component in AGRs is the graphite moderator (this controls the nuclear reaction) which is in the form of about 3000 'blocks' which also have a structural function. These bricks are subject to cracking, erosion and distortion, all of which have safety implications and if the plants go beyond the regulator's limits on these factors, the plant should be closed permanently as the graphite cannot be replaced. If the cracking is too extensive the reactor could be subject to a serious accident involving large scale radioactivity release.

A particular issue has arisen with one of the reactors at Hunterston where the number of 'keyway' cracks detected, cracks that penetrate the whole of a graphite block, escalated from a handful in 2016 when the regulator completed its PSR, to 39 in May 2018 and more than 350 by November 2018, the limit imposed by the ONR.[29] It has not been determined whether the plant will have to close or whether the ONR will accede to EDF's request to increase the limit. It would be surprising if the other reactor at Hunterston and the reactors at the twin plant at Hinkley, did not suffer from the same problem. The other AGRs use somewhat different designs but the problems of cracking, erosion and distortion of graphite blocks exists at these other plants and it is evident from experience at Hunterston that ageing of graphite is not well understood and the AGRs may well not be able to operate as long as EDF hopes. It is unclear whether the five later AGRs will meet regulatory requirements up till their expected retirement in about 2030

From the government point of view the expectation that new nuclear capacity would replace existing nuclear capacity when it is retired is looking increasingly unlikely. Most new capacity cannot be completed before 2030 and existing capacity may well be retired earlier than planned, and other may be extended well beyond the original operational timescales introducing uncertain risks The government will therefore be looking to accelerate some projects and try to ensure plans do not collapse and may also seek to extend other existing plants.

[29] https://theferret.scot/350-cracks-hunterston-nuclear-reactor/ and https://www.bbc.co.uk/news/uk-scotland-glasgow-west-46290475

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Irish Government Housing & Local Government Department
Wylfa B transboundary EIA response
Emailed via transboundaryeia@housing.gov.ie

22nd January 2019

NFLA Submission to Irish Government transboundary environmental impact assessment of the proposed Wylfa B new nuclear development

Dear Nuclear Policy Section of the Housing & Local Government Department,

I attach with this letter the submission of the Nuclear Free Local Authorities (NFLA) All Ireland Forum to the Irish Government's transboundary environmental impact assessment for the Wylfa B site in Anglesey, Wales. The Forum is based in Newry, and has members across the island of Ireland. This response has been prepared on its behalf by the UK & Ireland NFLA Secretariat based in Manchester.

For your information, the NFLA is a local authority group made up of Councils from England, Scotland, Wales, Northern Ireland and the Republic of Ireland. It raises legitimate concerns and issues over all aspects of nuclear policy in order to assist local government in meeting its commitment to sustainable development, energy policy development, environmental protection and public safety. Further details on its remit can be found at its website http://www.nuclearpolicy.info or by contacting the NFLA Secretariat using the details at the top of this letter. NFLA is content for its submission to be made public.

NFLA is submitting this response in the awareness that last week Hitachi called a halt to the Wylfa B development. While it looks at present unlikely that the development may now go ahead, the fact that the company has not made such a categorical decision keeps the validity of this consultation. The NFLA submission goes into much detail as to why the reactor should not be developed.

1. Core summary of NFLA All Ireland Forum response to the consultation

The core concerns the NFLA has with the transboundary impacts to Ireland of the proposed Wylfa B nuclear reactor include:

- The type of nuclear reactor being proposed for Wylfa B – the Advance Boiling Water Reactor (ABWRs) - have high gaseous emissions which are far more important than liquid emissions in terms of radiation doses to local people.

- Bearing in mind that Hitachi is proposing to build 2 ABWR reactors at Wylfa, it can be calculated around 6 deaths will occur somewhere in the world for every year the station operates.

- Over 60 years – the expected operating life for an ABWR - the total could be as much as 360 deaths.

- Wylfa B would produce extremely high levels of radioactive spent fuel. In the year 2200 its spent fuel arisings would amount to ***80% of the radioactivity contained in all existing legacy wastes from the UK's nuclear power industry.***

- The requirement for 'Best Available Techniques' (and clean technology) for producing electricity should rule out building new electricity generating stations which produce such highly dangerous wastes. Especially as less expensive, quicker and safer alternatives are available which don't produce such wastes.

- Energy efficient improvements could reduce the energy consumed in UK households each year equivalent to the output of six nuclear power stations the size of Wylfa B.

- Offshore wind and solar are now both able to generate electricity more cheaply than nuclear power. If the UK had continued renewable expansion at the same rate as between 2010 and 2015 it could have achieved an all-renewable UK electricity supply by 2025.

- In addition, a report from ESRI suggests, in the worst-case scenario, ***the economic cost of a nuclear accident impacting on Ireland could be as high as €161 billion.***

- An additional recent submission by NFLA / KIMO to the OSPAR Commission outlines that a full proposed UK new nuclear programme will only compound these issues and threatens the OSPAR Treaty regulations of 'close to zero' discharges into the Irish Sea by 2020 and beyond.

- Sea level rises exacerbate by climate change put at risk in the medium to longer term the Wylfa B coastal site.

2. Introduction

After significant pressure from Irish environmental groups including the NFLA All Ireland Forum, and a judgement from the Espoo and Aarhus Convention Committees, the UK Government has offered the opportunity to non-UK residents, governments and groups in Europe to make submissions and review the environmental impact report and the accompanying documents for possible cross-border environmental impacts. The NFLA All Ireland Forum welcomes this procedure being undertaken by the Irish Government through the Planning Sections of Irish Councils so as to allow Irish views on the transboundary impacts of a nuclear reactor development the other side of the Irish Sea to it.

This submission provides information that the NFLA has submitted to previous UK Government environmental consultation on Wylfa B, to the current National Planning Inspectorate inquiry into a Development Control Order for the proposed Wylfa B site, and to a joint response submitted by NFLA and KIMO International to the OSPAR Radiation Substances Committee.

3. Gaseous Discharges from an ABWR built at Wylfa

According to the UK Environment Agency's ABWR Assessment Report on gaseous radioactive waste disposal and limits published in 2017 (1) it is expected that each year the proposed ABWR-type reactors would emit to air 2700 gigabecquerels1 (GBq) of tritium; 910GBq of carbon-14; and 9180GBq of radioactive noble gases. These are large amounts of radioactivity when compared with the French EPR proposed for Hinkley Point C. The table below compares gaseous emissions from ABWR with the AP1000 (which was originally proposed for Moorside near Sellafield) and EPR reactor types.

Radionuclide	**EPR** (2)	**AP1000** (3)	**ABWRs** (4)	**Range for 1000 MWe station** (5)
Tritium	500GBq	1800GBq	2700GBq	100 – 3600GBq
Carbon-14	800GBq	606GBq	910GBq	40 – 530GBq
Radioactive Noble Gases	350GBq	8047GBq	1980GBq	100 – 10,000GBq

Table 1: Predicted gases discharges for a single reactor of each type.

The UK Committee on Medical Aspects of Radiation in the Environment (COMARE) recommended that as: "…*part of a new generation of plants, it might be expected that discharges would be lower than existing facilities, rather than 'within the range of historic discharges' which seems to be the criterion being applied by EA*." (6)

This begs the question: if EPRs can reduce tritium emissions to the atmosphere to 500GBq per reactor why can't ABWRs being planned for the Wylfa site?

4. Radiation Risks

In the assessment of radiation risks to local people, aerial emissions from nuclear reactors are more important than liquid discharges for two reasons. First, the key parameter in estimating radiation doses to local people from radioactive isotopes is their concentration in environmental materials. Contrary to popular perceptions, air emissions result in much higher environmental concentrations than sea discharges, because water is much more effective than air at diluting contaminants. This is not to accept that dilution is the solution to pollution: it isn't. It merely reflects the fact of current (ill-advised) methods of disposing nuclear wastes. (7)

Second, individual and collective doses from aerial emissions are much larger than from sea discharges. People living near Nuclear Power Plants (NPPs) receive doses from eating contaminated food, drinking contaminated water, breathing contaminated air, and skin absorption (especially of tritiated water vapour).

For example, the contamination of local foods occurs by air emissions - particularly tritium and carbon-14 emissions. The only exception is contaminated sea foods. But these concentrations are very low. People who elect to live near discharge sites can largely avoid eating contaminated sea foods but, they cannot avoid breathing contaminated air from aerial emissions. It is for these reasons that NPP operators go to considerable lengths to divert radioactive releases away from aerial emissions towards sea discharges. The tritium discharges to sea for example from the AP1000 type of reactor are almost 20 times larger than tritium air emissions. With the ABWR this situation is revered with tritium emissions to the atmosphere thirteen times larger than tritium emissions to the sea.

It is also worth noting that COMARE has highlighted the recent report of the Advisory Group on Ionising Radiation (AGIR) (November 2007) which suggests that current dose estimates for tritiated water are ***too low***. (8)

5. Tritium

The largest aerial emissions are of tritium in the form of tritiated water vapour, i.e. radioactive water. In recent years, many official reports have discussed the hazards of tritium - the radioactive form of hydrogen. In the past, this isotope had been regarded as being only "weakly" radiotoxic: this view is now changing among governments and international agencies concerned with radiation exposures. For example, recent reports have been published by radiation safety agencies in the UK, Canada and France. (9) These reports draw attention to the hazardous properties of tritium including its extremely rapid distribution in the environment, its heterogeneous distribution within tissues, its ability to bind with organic molecules resulting in higher doses, and its high biological effectiveness compared with gamma radiation.

Over 60 epidemiological studies world-wide have examined cancer incidences in children near nuclear power plants (NPPs): ***most of them indicate leukemia increases***. These include the 2008 KiKK study commissioned by the German Government which found relative risks (RR) of 1.6 in total cancers and 2.2 in leukemias among infants living within 5 km of all German NPPs. The KiKK study has retriggered the debate as to the cause(s) of these increased cancers.

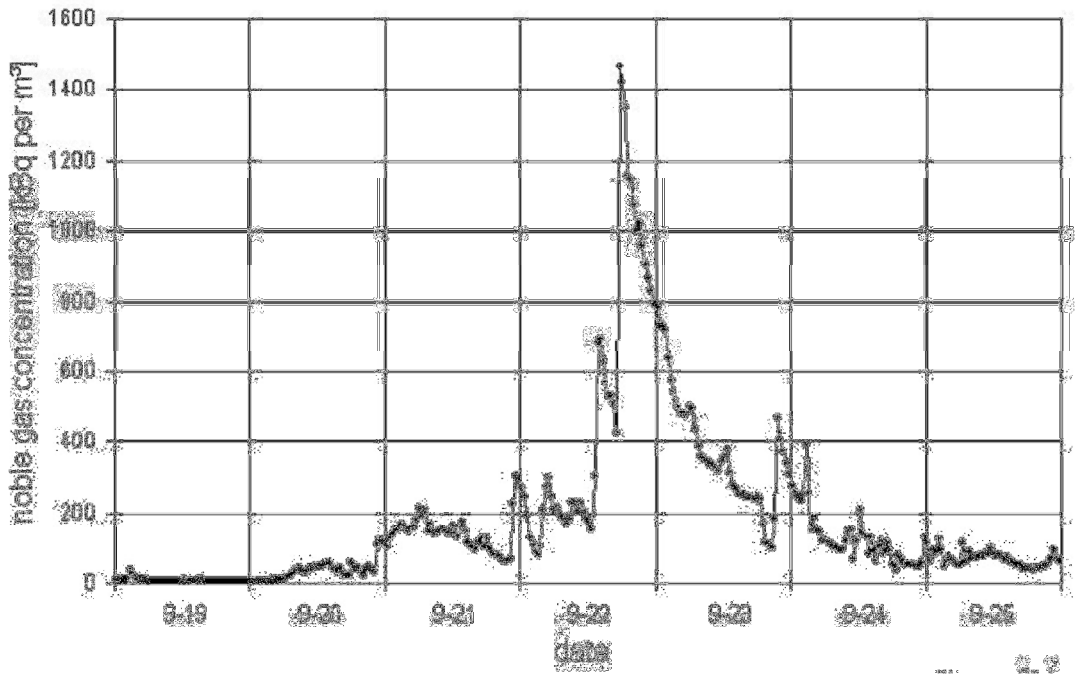
Although several studies in the late 1980s and early 1990s revealed increased incidences of childhood leukemia near UK nuclear facilities, official estimated doses from released nuclides suggest these would have been too low by 2 to 3 orders of magnitude to explain the increased leukemias.

A suggested hypothesis is that the increased cancers arise from radiation exposures to pregnant women near NPPs. However any theory has to account for the >10,000 fold discrepancy between official dose estimates from NPP emissions and observed increased risks. An explanation may be that doses from spikes in NPP radionuclide emissions are significantly larger than those estimated by official models which are diluted through the use of annual averages. In addition, risks to embryos/fetuses are greater than those to adults, and haematopoietic tissues (stem cells that create other blood cells) appear more radiosensitive in embryos/fetuses than in newborn babies. The product of possible increased doses and possible increased risks per dose may provide an explanation. (10)

The evidence for radionuclide spikes during refuelling was revealed for the first time in November 2011. Published data from the Gundremmingen NPP in Southern Germany showed that very large spikes of radioactive noble gases were released during refuelling than were emitted during normal power operation throughout the rest of the year. (See graph below). According to the International Physicians for the Prevention of Nuclear War (IPPNW) in Germany, the normal emission concentration during the rest of the year is about 3kBq/m3 but during inspection/refuelling episodes this concentration increased to ~700kBq/m3 with a peak of 1,470kBq/m3. Nuclide emissions during the period of refuelling were about 65% of total annual releases. Noble gas concentrations can be used as a proxy for other gaseous emissions, including tritium, C-14 and iodine releases. (11)

The table below provides this information:

Graph 1. Noble gas concentrations from Gundremmingen C. 1/2 hourly values. Sept 19 to 25



In order to refuel, the pressure vessels of all nuclear reactors are opened up about once a year. This releases large volumes of radioactive gases and vapours, including noble gases, tritium, carbon-14 and iodine-131, to the environment. Until now, these nuclide releases had been published only as annual data throughout the world. After repeated requests by the SPD-Green Party Government in Bavaria, half-hourly data were made available for scientific evaluation for the first time. Brief exposures to high concentrations are more

hazardous to residents near NPPs than chronic exposures to low concentrations. Exposures to high concentrations result in higher internal doses, so these nuclide spikes during re-fuelling could go a long way to explaining the increased incidences of child leukaemias near NPPs shown by the KiKK findings.

6. Liquid Discharges

Radionuclide	EPR (12)	AP1000 (13)	ABWRs (14)	Range for 1000 MWe station
Tritium	52,000GBq	33,400GBq	200GBq	2,000 – 30,000Gbq
Carbon-14	23GBq	3.3GBq		3-45GBq
Iodine radionuclides	7MBq	15MBq	0.035MBq	10-30MBq
Other radionuclides	0.6GBq	2.7GBq	2.3MBq*	<1-15GBq

Table Two: Predicted liquid discharges for a single reactor of each type.

*This is Fe-55. According to the Environment Agency the aqueous discharge activity is dominated by tritium (H-3), which is not abated and constitutes over 99.99% of the activity in the aqueous discharges. The second largest contributor of activity to the discharges is iron-55 (Fe-55), which only constitutes 0.0012% of the activity discharged.

With regard to the UK's proposed new reactor programme concern has been expressed about the UK's lack of compliance with its obligations under the OSPAR Convention on the Protection of the Marine Environment of the North East Atlantic. (15)

Under the treaty the UK Government is committed to:
"...*progressive and substantial reductions of discharges, emissions and losses of radioactive substances, with the ultimate aim of [achieving] concentrations in the environment near background values for naturally occurring radioactive substances and close to zero for artificial radioactive substances*." [by 2020].

The application of "*best available techniques and best environmental practice, including, where appropriate, clean technology*" is one of the Guiding Principles of the OSPAR Strategy with regard to radioactive substances. (16)

"Clean Technology" should not, in the view of many environmental commentators, involve end-of-pipe filters to remove pollution from discharges to the environment – it should be a technique which produces no pollution to begin with. The requirement for 'Best Available Techniques' (and clean technology) for producing electricity should rule out the possibility of building new electricity generating stations which produce highly dangerous wastes when alternative ways of generating electricity are available which don't produce such wastes.

The EA's Final Assessment Report on Aqueous Waste, published in 2017, makes no mention of the OSPAR requirement for progressive and substantial reductions in discharges of radioactive substances and achieving close to zero concentrations in the environment for artificial radioactive substances by 2020.

7. Critical Group Doses

The NFLA notes that the UK environmental regulators the Environment Agency (EA) and Natural Resources Wales (NRW) have assessed that the total impact of radioactive discharges (including gaseous discharges) from a single ABRW reactor to the most exposed person to be around 14 - 24μSv y^{-1}. The contribution from aqueous discharges is less than 1 μSv y^{-1} illustrating the point made earlier that aerial emissions are more important than liquid discharges. The critical group dose from aerial emissions is dominated by carbon-14.

These numbers compare with the radiological dose limits to members of the public of 1,000μSv y^{-1} with dose from any single new source not to exceed 300μSv y^{-1}. The former

Health Protection Agency (now Public Health England) had advised the UK Government to select a constraint value of less than 150 μSv (0.15mSv) per year for members of the public for new nuclear power stations. (17)

The UK Strategy for Radioactive Discharges 2001-2020 included an aim to progressively reduce human exposure to ionising radiation arising from radioactive discharges, so that a representative member of a critical group of the general public will be exposed to an estimated mean dose of no more than 20μSv y^{-1} from liquid radioactive discharges to the marine environment made from 2020 onwards. (18) The 20μSv y^{-1} figure was subsequently dropped from the 2009 updated strategy without explanation, but it still aims for "*progressive reductions in human exposures to ionising radiation resulting from radioactive discharges*." (19)

Given that the Wylfa B proposal is to build two ABWR reactors, each potentially giving a critical group dose of 24μSv y^{-1}, the 20 μSv y-1 figure could be breached albeit from a combination of liquid and gaseous discharges.

8. Collective Doses

In 1991, the International Commission on Radiological Protection (ICRP) adopted a linear, no-threshold model for radiation's effects. Thus no dose of radiation, no matter how small is without some added level of risk. Collective dose is an important measure of the total exposure of a population over time from a given release of radionuclides and it is an indicator of total detriment to health. The collective dose is, to a first approximation, the average individual dose in an exposed population multiplied by the size of the population. Collective dose represents an attempt to quantify the radiological impact of radioactive discharges to populations larger than the critical group. Collective doses are measured in person-sieverts (person Sv).

Collective doses are sometimes calculated for UK or European populations, but for radionuclides which have long half-lives and become globally dispersed, including tritium, carbon-14, krypton-85 and iodine-129, it is internationally accepted practice to calculate their global collective doses. Calculating the global collective dose can also be seen as morally important when one considers the fact that no-one outside the UK is receiving a countervailing benefit from discharges.

As with critical group doses, estimates of the risks associated with a particular collective dose are fraught with uncertainties and unknowns. The behaviour of radionuclides in the global environment must be predicted over long time-scales and the computer models used to do so are unlikely to be validated by comparison with sufficient data. Future human behaviour and the behaviour of each radionuclide in the human body must also be predicted and estimation of the dose-risk factor in itself involves a large number of assumptions and several models all with uncertainties attached which have to be multiplied together.

Such risks from collective doses are underestimates as they do not include detrimental human health effects other than fatal cancers (e.g. skin cancers) and genetic effects.

Of course the above dose/risk estimates in this report neglect detriment to ecosystems, organisms and species.

It is sometimes argued that collective doses should be truncated to 500 years, because after that the uncertainty becomes too great. However, just because there is uncertainty does not seem to be a good enough reason to assign a zero risk.

To convert from collective doses to fatal cancers, the ICRP's absolute fatal cancer risk of 10% per Sv can be used, although some analysts apply a dose and dose rate reduction factor (DDREF) which reduces the number of estimated fatal cancers in Europe by a factor of 2, and in the US by 1.5. However, as pointed out by Beyea (2012) many epidemiology

studies offer little support for the use of such a factor, certainly for solid cancers (Little et al, 2008). Also, the recent WHO (2013) report on risks from Fukushima recommends that a DDREF should not be used for longer term exposures. (20)

The EA and NRW report that its independent assessment calculated collective doses to be 30 person Sv per year of discharge for the world (truncated to 500 years). (21)

The radiation protection community is usually reluctant to translate collective dose into numbers of deaths. This seems to stem from the Greenpeace campaign during the THORP public consultation in 1993-4 when it was argued that THORP would cause 600 deaths (calculated using a 5% risk factor). But Sumner and Fairlie have stated that radiation protection should be about protecting people, not the industry from criticism. (22) Bearing in mind that Hitachi is proposing to build 2 ABWR reactors at Wylfa B, the total collective dose would be in the region of 60 person Sv per year of discharge. By applying the risk factor of 10% per sievert it can be calculated that this means there will be around 6 deaths somewhere in the world for every year the station operates. Over 60 years, the total could be 360 deaths.

9. Uncertainties

There are many uncertainties in current estimates of radiation doses and risks and larger uncertainties exist with internal radiation. These arise mainly from the many steps used to derive doses, and partly from lack of statistical precision in deriving risks from epidemiology studies. The size of these uncertainties has been estimated by a number of expert dosimetrists: for some nuclides these are very large. A report by the Committee Examining Radiation Risks of Internal Emitters (CERRIE) recommended that uncertainties should be acknowledged and dealt with by the government. Its parent committee, the Committee on Medical Aspects of Radiation in the Environment COMARE, backed these findings. (23)

A 2001 Consultation Paper from the UK Department for Environment Food and Rural Affairs summed up the view which prevailed at the time:

"*The unnecessary introduction of radioactivity into the environment is undesirable, even at levels where the doses to both humans and non-human species are low, and on the basis of current knowledge are unlikely to cause harm*" (24)

10. Radioactive Waste Volume

The nuclear industry and the 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. (25)

Volume is not the correct 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 Wylfa Newydd is expected to use will be much more radioactive than the spent fuel produced by existing reactors like Heysham 1 and 2. So rather than using volume as a yardstick, the Bq amounts of radioactivity in the waste, (which in turn affects how much space will be required in a GDF), is a much more appropriate way of measuring the impact of nuclear waste from new reactors.

According to Radioactive Waste Management (RWM) 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.

For the NFLA, it would be interesting to see how much the mooted Wylfa B reactors would add to this pile. This can be estimated from the Radioactive Waste Management Ltd Derived Inventory 2013. This calculated that the waste inventory in 2200 after a 16GW

programme of new reactors would be around 27,300,000 TBq – an extra 22,530,000TBq or 1,408,125TBq for every GW of new nuclear capacity. If we multiply this by Wylfa Bs proposed 2.7GW of capacity we get 3,801,938TBq. ***This is about 80% of the radioactivity in existing nuclear wastes.*** (26)

The UK Government expects spent fuel from the proposed new generation of reactors to be stored not reprocessed. In fact the Thermal Oxide Reprocessing Plant (THORP) at Sellafield which reprocesses the spent fuel from Heysham closed in November 2018, and there are no plans to replace it. Instead spent fuel is expected to be emplaced between 200 and 1000 metres underground in a Geological Disposal Facility (GDF) –(27) a site for which has still to be found. A GDF is not expected to be ready to receive such wastes until around 2045. The UK and Welsh Governments have initiated a process to seek 'volunteer' communities to consider hosting such a facility – this is the seventh attempt by UK authorities over the past 40 years to do this, and great uncertainty still exists as to whether the eight attempt will be successful.

Waste from new reactors like Wylfa B is not expected to be emplaced in the GDF until after all the government's existing waste has been emplaced which is expected to take around 90 years – around 2130. This means that spent fuel could remain on the site for at least the next 100 years. The other factor which needs to be taken into account is that Wylfa Newydd s 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. So assuming Wylfa Newydd comes on stream around 2030, although spent fuel might start to be emplaced in 2130, as the reactors are expected to have a life of 60 years, there may be some spent fuel still stored on Anglesey up until about 2190.

11. Safer, sustainable renewable energy alternatives to Wylfa B

Clearly there are cleaner ways to generate electricity available which do not discharge radioactive wastes into our atmosphere and seas. These should be used in preference to building Wylfa B. The evidence is stacking up to show that, in the words of Professor Keith Barnham, author of '*The Burning Answer: A user's guide to the solar revolution*' the UK "…*doesn't need a new generation of expensive nuclear reactors or a dash for shale gas to keep the lights on. An all-renewable electricity supply can provide energy security*." (28)

The Environmental Impact Assessment for Wylfa B should compare the potential impact of building two new ABWR reactors in Anglesey, Wales, with improving energy efficiency or supplying energy from alternative sources such as renewable energy. Horizon Nuclear's Environment Statement does not do that.

NFLA notes that, according to the UK Energy Research Centre (UKERC), energy efficient improvements to home heating, insulation, lighting and appliances could reduce the energy consumed in UK households each year the equivalent to the output of six nuclear power stations the size of Hinkley Point C saving consumers £270 off the average household energy bill of £1,100. (29) In fact, when the UK government first endorsed Hinkley Point C, (HPC) it was projecting an increase in electricity consumption of 15% by now, whereas in practice the UK is consuming 15% less than a decade ago. In other words Government projections were out by 30%, and the need for new nuclear therefore lessens. (30)

The price of £57.50 per megawatt hour unveiled recently for two giant wind projects, off the coast of the UK is almost half the level expected to be paid for HPC - £92.50/MWh at 2012 prices (which by now will be around £100/MWh). What is more the offshore wind payments only continue for 15 years compared with nuclear payments which continue for 35 years.

NFLA also note that, according to the *Daily Telegraph,* Britain could theoretically produce up to 595GW from offshore wind at competitive cost, an order of magnitude more than Britain's entire power needs, even at peak times in the dead of winter (53GW). Some excess power could be sold to Europe through interconnectors, and some could be turned into hydrogen through electrolysis and used to replace fossil gas. (31)

Solar power, once so costly it only made economic sense in spaceships, is becoming so cheap that it will push coal and even natural-gas plants out of business faster than previously forecast according to the Bloomberg New Energy Finance (BNEF) outlook. (32) According to the 100% renewable utility, Good Energy, the wholesale price of electricity in the UK is falling, mainly due to the rise in solar photovoltaics (PV) and wind power. (33) Emeritus Professor Keith Barnham says if renewable expansion had continued at the same rate it did between 2010 and 2015 we could have achieved an all-renewable UK electricity supply by 2025.Why cull such popular and successful industries, apart from the political imperative to develop new nuclear?

The UK has more than 32GW of renewable power, 10 times the power the Hinkley Point C nuclear plant may achieve in 2030. Hinkley's power is not only almost irrelevant; its inflexible nature will make it redundant. Once operating, a nuclear reactor should run with constant output, 24/7, month to month, but power that complements wind and PV has to vary in less than one hour. What the UK needs (like Ireland) is flexible, not continuous baseload power generation to back up wind and PV power. (34)

Clearly, the electricity which HPC is expected to generate could be replaced by energy efficiency measures and renewable energy systems more cheaply, more quickly and without radioactive discharges to the environment or the generation of radioactive waste. The risk that the UK, Irish and European public will be subjected to by the construction of HPC can, therefore, no longer be justified.

12. Additional observations

NFLA would like to note a number of additional observations, which add relevant concerns.

ESRI report – The Potential Economic Impact of a Nuclear Accident: an Irish Case Study

This 2016 report was commissioned by ESRI for the Irish Environmental Protection Agency to consider what the economic impacts could be from a UK or French based nuclear accident sending a radiation cloud over parts of the island of Ireland. (35) The report looked at a range of scenarios from one where no radioactive contamination occurs, to others with minor, significant or high on-land contamination. NFLA encourages the UK Government to study this report and respond directly to its totality as part of this consultation process.

'Headline' issues noted from the report include:

- In the worst-case scenario, a nuclear disaster in North West Europe (originating from the UK or France in particular) could create total economic damage to the Irish economy of **€161 billion.**
- Irish agricultural production would grind to a halt, with the tourism industry and exports also incurring substantial damage.
- Even the most benign scenario considered by ESRI, where no radioactive contamination occurs, could still see a total loss estimated at €4 billion, due to the reputational damage this could have on Ireland.
- By comparison, the total value of corporation tax collected in the first nine months of 2016 (when the report was published) was €4.16 billion.
- ESRI also acknowledge that their analysis ***underestimates*** the true extent of such an incident to its cost to the economy.
- For example, in addition, health risks from high levels of radioactive contamination, could put a significant strain on the health service, requiring additional resources to be found.
- The total cost of a low-level radioactive contamination scenario, which requires the imposition of food controls to reassure the public and restrictions food imports to Ireland, would be €18 billion.
- The impact on tourism would also be significant, with long-term reputational damage resulting in an economic cost of €80 billion.

- In the absolute worst-case scenario in the ESRI study, not only would exports be decimated but the need to import much of the country's food would lead to far higher domestic costs. There could also be significant emigration.

NFLA / KIMO submission to the OSPAR Radiation Substances Committee -
In early 2018, NFLA was commissioned by KIMO International, to consider the potential impacts of the entire proposed UK new nuclear programme, which at that time included Hinkley Point, Wylfa, Sellafield Moorside, Sizewell, Bradwell, Oldbury, Heysham and Hartlepool. (36)
This table summarises the levels of planning electricity such a programme could generate:

Proposed Nuclear Station	Technology Proposed	Developer	Construction start expected	Commercial operation forecast
Hinkley Point C (Somerset)	2 x 1600MW EPRs	EDF 66.5% CGN 33.5%	First concrete 2019	End of 2025 with risk of 15 month delay (11)
Wylfa Newydd (Anglesey)	2 x 1350MW ABWRs	Horizon Nuclear Power - wholly owned subsidiary of Hitachi, Ltd.	2020	First electricity mid-2020s - 2025-2028 (12)
Moorside (Cumbria)	3 x 1150MW AP1000s (but could be replaced by 2 x 1400MW APR1400)	NuGen (currently owned by Toshiba – but hoping to sell to KEPCO) (13)	No date – but a 4-5year Generic design Assessment process required for APR1400, so ~2023-4	Not by 2025 – no new date
Sizewell C (Suffolk)	2 x 1600MW EPRs	EDF 80% CGN 20% (14)	2021	2031 (15)
Oldbury B (Gloucestershire)	2 x 1350MW ABWRs	Horizon Nuclear Power - wholly owned subsidiary of Hitachi, Ltd.	Late 2020s at the earliest. (16)	Mid to late 2030s?
Bradwell B (Essex)	2 x 1000MW UK HPR1000	CGN 66.5% EDF 33.5% (17)	No defined timeline; began GDA process in Jan 2017	

The NFLA / KIMO submission also considered the potential levels of gaseous and aqueous discharges from such a programme.

Given that there are four EPRs proposed, three AP1000s and four ABWRs from Table 1 above we can derive the total gaseous discharges from the proposed new nuclear programme noted in Table 3.

Table 3: Predicted gaseous discharges from notional UK new reactor programme

Radionuclide	4 x EPRs	3 x AP1000s	4 x ABWRs	Total
Tritium	2,000GBq	5,400GBq	10,800GBq	18,200GBq
Carbon-14	3,200GBq	1,818GBq	3,640GBq	8,658GBq
Radioactive Noble Gases	1,400GBq	24,141GBq	7,920GBq	33,461GBq
Radio-iodines	200MBq	630MBq		830MBq

Similarly from Table 2 we can derive the following liquid discharges shown in table 4.

Table 4: Predicted liquid discharges from notional UK new reactor programme

Radionuclide	4 x EPRs	3 x AP1000	4 x ABWRs	Total
Tritium	208,000GBq	100,200GBq	800GBq	309,000GBq
Carbon-14	92GBq	9.9GBq		101.9GBq
Iodine radionuclide	28MBq	45MBq	0.14MBq	73.14MBq
Other radionuclides	2.4GBq	8.1GBq	9.2MBq	10.5GBq

The report goes into detail about these issues and it concludes:

- Gaseous and liquid emissions from the UK's proposed new reactor programme could mean up to 23 theoretical deaths somewhere in the world for every year all of the reactors operate. Since they are each expected to operate for 60 years the total number of theoretical deaths could be 1380.
- The new reactors would produce extremely high levels of radioactive spent fuel. In the year 2200 spent fuel arisings would amount to almost five times the radioactivity contained in all existing legacy wastes from the UK's nuclear power industry.
- The requirement for 'Best Available Techniques' (and clean technology) for producing electricity should rule out building new electricity generating stations which produce such highly dangerous wastes. Especially as less expensive, quicker and safer alternatives are available which don't produce such wastes.

These two additional reports adds much to the concerns of the NFLA All Ireland Forum that the transboundary impacts of Hinkley Point C and the wider UK new nuclear programme could be significant and severe.

13. Sea Level Rise

In 2007, a report for Greenpeace by the Middlesex Flood Hazard Research Centre took as the basis for its worse-case scenario the collapse of the West Antarctic Ice Sheet (WAIS), which would trigger an abrupt and extreme rise in sea level, estimated at 5-6m. The report pointed out that there are widely divergent opinions on the likelihood of this extreme sea-level rise but one view is that WAIS collapse could begin in the 21st century. (37)

In 2012 an assessment, carried out by the Department of Environment, Food and Rural Affairs, of the risk of flooding and storm surges for the UK's nuclear sites did not show a high risk of flooding and erosion by 2080 at Wylfa. (38) Nevertheless, it might be expected that Horizon Nuclear would at least mention that it has looked into the risks to the site of sea level rise, when there is little evidence that it has.

The 2012 assessment was before the increasing volume of melting of the Greenland ice cap was properly understood and when most experts thought there was no net melting in the Antarctic. Now estimates of sea level rise in the next 50 years have gone up from less than 30cm to more than a metre, well within the operating lifespan of Wylfa B – let alone the period before final decommissioning of the reactors, and the period when spent nuclear fuel is likely to be stored on site.

Some researchers say sea levels could rise by six metres or more even if the 2 degree target of the Paris accord is met. Sustained warming of one to two degrees in the past has been accompanied by substantial reductions of the Greenland and Antarctic ice sheets and sea level rises of at least six metres – several metres higher than what current climate models predict could occur by 2100. (39)

NFLA note that one group of researchers believe we could soon cross a threshold leading to boiling hot temperatures and towering seas in the centuries to come. Even if countries succeed in meeting their CO_2 targets, we could still lurch on to this "irreversible pathway".

The climate might stabilise with 4-5 degrees C of warming above the pre-industrial age. Thanks to the melting of ice sheets, the seas could be 10-60 metres higher than now. (40)

Such issues are of real and great concern for a coastal site like the proposed Wylfa project.

14. Conclusions

ABWRs have high gaseous emissions which are far more important than liquid emissions in terms of radiation doses to local people. Bearing in mind that Hitachi is proposing to build 2 ABWR reactors at Wylfa we can calculate around 6 deaths will occur somewhere in the world for every year the station operates. Over 60 years the total would be 360 deaths.

Wylfa Newydd would produce extremely high levels of radioactive spent fuel. In the year 2200 its spent fuel arisings would amount to 80% of the radioactivity contained in all existing legacy wastes from the UK's nuclear power industry.

The requirement for 'Best Available Techniques' (and clean technology) for producing electricity should rule out building new electricity generating stations which produce such highly dangerous wastes. Especially as less expensive, quicker and safer alternatives are available which don't produce such wastes.

Other concerns, like the economic damage to Ireland of a nuclear accident, and the real concern over sea level rises also suggest this proposed development should not go ahead.

There are cheaper, waste free sustainable renewable energy alternatives, which coupled with energy efficiency and energy storage schemes, are much more quicker to develop with none of the environmental externalities that new nuclear facilities would inevitable create.

If you have any queries with this submission please contact me on s.morris4@manchester.gov.uk or 00 44 161 234 3244.

Yours sincerely,

Sean Morris
NFLA Secretary

Sent on behalf of the NFLA All Ireland Forum and NFLA Steering Committee

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(35) Irish Economic and Social Research Institute, October 2016, The Potential Economic Impact of a Nuclear Accident - An Irish Case Study'.http://www.dccae.gov.ie/news-and-media/Lists/Publications%20Documents/The%20potential%20economic%20impact%20of%20a%20nuclear%20accident%20-%20An%20Irish%20Case%20Study%20ESRI.pdf
(36) NFLA / KIMO International submission to the OSPAR Radiation Substances Committee on the environmental and discharge risks of a UK new nuclear programme, January 2018 http://www.nuclearpolicy.info/wp/wp-content/uploads/2018/02/NFLA_New_Nuclear_Monitor_No51.pdf
(37) The impacts of climate change on nuclear power station sites, Greenpeace 2007 https://www.nuclearconsult.com/docs/information/climate/ClimatechangeGP.pdf
(38) Guardian 7th March 2012 https://www.theguardian.com/environment/2012/mar/07/uk-nuclearrisk-flooding [The unpublished Government Analysis is available here https://www.scribd.com/document/84289220/Nuclear-sites]
(39) Guardian 6th July 2018 https://www.theguardian.com/environment/2018/jul/06/globaltemperature-rises-could-be-double-those-predicted-by-climate-modelling
(40) BBC 6th Aug 2018 https://www.bbc.co.uk/news/science-environment-45084144

SAFE PRACTICE
Technical Engineering Services

Reactor Hall,
21 Richmond Estate,
Blackrock, Cork, T12 H6P7

Cork City Council
Planning Department,
Cork City Council,
City Hall,
Anglesea Street,
Cork T12 T997

19th December 2018

Re. **Transboundary environmental public consultation – Wylfa Newydd Nuclear Power Plant**

Dear Sir or Madam,

Further to the Transboundary Environmental Public Consultation Notice as printed in the Irish Examiner, page 11 on 22nd November 2018; I wish to make the following observations and request you consult with the Minister for Housing, Planning and Local Government in this regard. Please confirm receipt and advise of actions.

As a retired Engineering Design Technician and Chartered Safety Consultant with experience in the design of Nuclear facilities at Windscale, Sellafield, Heysham, Torness and Sizewell, I wish to record my concern regarding the scale of the proposed development at Wylfa Newydd Nuclear Power Plant, Anglesey, North Wales.

The Planning Notice refers to documentation available for viewing on the website at:
https://infrastructure.planninginspectorate.gov.uk/projects/wales/wylfa-newydd-nuclear-power-station/

There is insufficient time to fully assess the volume of submitted documentation, representations and other information published on the website. A brief review of some of the drawings published, indicates this new facility will no doubt have a massive impact on the environment, both locally and globally.

Whilst I am not opposed to Nuclear Power, I question the need for this facility. If it is to replace an existing Nuclear Power Station, such as the one at Sellafield, with a safer, well planned modern facility, then I can understand the proposal for this development. However, if it is to supplement the existing Nuclear Stations in the U.K. then I question the need for this facility as it raises the question, "Does the U.K. need more power?".

The new facility, if approved, will significantly expand the area of the existing power station and impact negatively on the surrounding environment. Acres of agricultural lands and areas natural beauty will be swallowed by this development and no longer be available for the enjoyment of the public, locals or visitors.

My review of this application was conducted over a few days and even with my experience in reading technical documents and drawings, it is easy to understand how most people would be overwhelmed with the amount of technical information presented. I focused on a few areas of special interest and attempted to seek out details of Reactor Buildings and other facilities. This information appears to be understandably limited.

In order to better comprehend the magnitude of this proposed development, I created a set of drawings using Google Maps to indicate the area of the proposed development relative to the existing facility. I also created drawings to illustrate the site area overlaid directly onto maps of Cork and Dublin. The purpose of this exercise

is to enable the general public to better understand the magnitude of the proposal. The proposed new facility (approx 444 hectares), is more than 12.5 times the area of the existing plant (approx 35 hectares).

These drawings are enclosed and listed at the end of this letter of my submission and observations.

The drawings submitted by Horizon Nuclear, available on the UK Planning Inspectorate website, are extensive but also very limited in detail. A brief review of the drawings was all that could be afforded. In addition to the proposed Nuclear Power Station this revealed proposed accommodation for almost 4000 people in multi-storey buildings. These layouts of these buildings appears to be in the style of basic hotel rooms.

The twenty-four accommodation buildings vary between four to seven storey high varying in height from 17.5m to 28.0m high. These buildings are situated on the coastal headland looking out to sea and represent a total eyesore of the area. In addition to the accommodation, car Parking for almost 2000 vehicles is also planned.

Accommodation Summary:

Type A - 13 No 4 Storey Buildings
Ground Floor 30 Rooms; + 3 Upper Floor each with 33 Rooms (3x33) = 99 Rooms
Total Accommodation Blocks Type A = (30+99)x13 = 1677 bedrooms

Type B - 3 No 5 Storey Buildings
Ground Floor 30 Rooms; + 4 Upper Floor each with 33 Rooms (4x33) = 132 Rooms
Total Accommodation Blocks Type A = (30+132)x3 = 486 bedrooms

Type C - 5 No 6 Storey Buildings
Ground Floor 30 Rooms; + 5 Upper Floor each with 33 Rooms (5x33) = 165 Rooms
Total Accommodation Blocks Type A = (30+165)x3 = 975 bedrooms

Type D - 3 No 7 Storey Buildings
Ground Floor 30 Rooms; + 6 Upper Floor each with 33 Rooms (6x33) = 198 Rooms
Total Accommodation Blocks Type A = (30+198)x3 = 684 bedrooms

Total Accommodation on Site = 1677 + 486 + 975 + 684 = 3822 bedrooms

Car Parking:

Area 1 325 spaces
Area 2 235 spaces
Area 3 160 spaces
Area 4 631 spaces
Area 5 503 spaces

Total Car Parking 1854 spaces

The 2011 Census figure published by the Office for National Statistics (UK), states the population of Anglesey as 69,700. The proposed development would increase the population of Anglesey by almost 6%. I question if the infrastructure and amenities on the island of Anglesey are robust enough to sustain this population boom. Access to the island is limited by railway and two road bridges, traffic management - especially at weekends and at times when ferries arrive into Holyhead Port will no doubt create further problems which I hope have been addressed in this submission.

The Horizon Nuclear drawings show outline proposals for the two Nuclear Reactors. These appear to resemble some of the previous facilities on which I worked. I was unable to review any details for the Reactor Buildings and assume these have been withheld for security classification reasons. The vulnerability of the Reactor Buildings to terrorist attack has always been a concern. The projects I previously worked on were designed to resist such attack but still had weakness. I am not a liberty to discuss these weaknesses in this submission. The integrity of the structures, if the planning application is approved, must be entrusted to a team of independent, security classified and approved Nuclear Design Engineers.

The submission from Austria appears to comprehensively address many of the environmental and scientific aspects of the proposed development. This submission illustrates potential contamination of the Austrian territory following a severe accident and release of radioactive material into the environment.

Austria is approximately 1,500 km. from the proposed Nuclear Power Plant at Wylfa. Ireland is less than 120 km away, ten time closer to this proposed Nuclear Power Plant. In my opinion, a similar study needs to be carried out with respect of the potential fall out to Ireland in such a situation and a full environmental impact report submitted. The preparation of such an impact study is beyond my level of expertise and remains with the Government of Ireland.

The Austrian submission requests an explanation regarding the consequences of Brexit on the whole project. This is an important question, especially when taken in conjunction with the need to provide safe repository for spent fuel - a facility the UK does not have. Further clarification with regard to how this spent fuel will be transported through the EU States post Brexit, is also requested.

It is more than thirty years since the disaster at Chernobyl and the effects are still being felt. The children from that area arriving to Ireland for Christmas now in December 2018 are a stark reminder that a major nuclear disaster lasts for decades not days.

I strongly recommend the services of Independent Environmental Consultants and Nuclear Assessment Engineers are employed as a matter of urgency to produce a full review of the complete Planning Application for the proposed Wylfa Newydd Nuclear Plant and the impact on Ireland.

Yours faithfully,

[redacted]

T.J. Blanchard. CMIOSH
Chartered Safety Practitioner

Enclosures:
Copy of Public Notice as published in the Irish Examiner, 22nd November 2018

Drg. No.	Title
W1812 PD0Z0-WAM-DWG-001 Rev 1	Site Location Map
W1812 PD0Z0-WAM-DWG-002 Rev 1	Extent of Existing and Proposed Development site Boundaries
W1812 PD0Z0-WAM-DWG-003 Rev 1	Comparison of Development Area with Cork City, Ireland
W1812 PD0Z0-WAM-DWG-004 Rev 1	Comparison of Development Area with Dublin City, Ireland
W1812 PD0Z0-WAM-DWG-005 Rev 1	Impact of Accident Fallout on Austria and Relative Proximity of Ireland

Transboundary Environmental Public Consultation

Planning Application for proposed Wylfa Newydd Nuclear Power Plant, Anglesey, North Wales, United Kingdom

In accordance with the provisions of the 1991 United Nations Convention on environmental impact in a transboundary context (the Espoo Convention) and the EU Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the EIA Directive), the Minister for Housing, Planning and Local Government has received notice from the UK's Planning Inspectorate (PINS) in relation to the development consent application (planning application) by Horizon Nuclear Power for the proposed Wylfa Newydd Nuclear Power Plant, in Anglesey, North Wales, United Kingdom. The proposed development principally comprises a proposed new nuclear electricity generating station on the north coast of Anglesey, North Wales with a projected electrical output of approximately 3.1 gigwatts. The proposed development would also include permanent and temporary works in the marine environment; off-site power station facilities, including a control centre, laboratory and emergency equipment garage; and associated off-site development comprising a worker accommodation campus, temporary park and ride facility, construction logistics centre and highway improvements.

The proposed development is subject to an environmental impact assessment procedure and the UK's PINS has identified that the proposed development has potential transboundary effects on the environment in Ireland. Accordingly, the UK's PINS has invited Ireland to undertake a transboundary consultation in respect of environmental information relating to the proposed development. The UK's PINS is currently examining the development consent application for the proposed development. The UK's PINS will submit a report on the application, including a recommendation to grant or refuse development consent, to the UK's Secretary of State for Business Energy and Industrial Strategy, who will make the decision on whether to grant or refuse development consent.

A member of the public may make a written submission or observations in relation to the potential transboundary environmental effects of the project, by sending them to his or her local planning authority, to be received **by close of business on Friday 25 January 2019** at the latest. Submissions or observations should **not** be made to the Department of Housing, Planning and Local Government.

Contact details for each planning authority are set out in the public consultation notice, which is available to view in the public consultation section of the website of the Department of Housing, Planning and Local Government at www.housing.gov.ie, together with the correspondence from the UK's PINS, digital copies of extracts from the applicant's Environmental Statement; associated documents and links provided by the UK's PINS to the full Environmental Statement and all other documentation relating to the development consent application for the proposed development.

The public consultation notice is also available to view in the office of the Planning Section of each planning authority nationwide during office hours together with a printed copy of the correspondence from the UK's PINS inviting Ireland to undertake a transboundary consultation under the Espoo Convention and the EIA Directive; extracts from the applicant's Environmental Statement and associated documents that appear to be most relevant for the purpose of the consultation. A copy of these documents is available for inspection, or purchase at a fee not exceeding the reasonable cost of making a copy, during office hours at the office of each planning authority nationwide.

All documentation related to the development consent application for the proposed development, including additional or amending documentation accepted at the discretion of the UK's PINS, is also available to view on the website of the UK's PINs, at: https://infrastructure.planninginspectorate.gov.uk/projects/wales/wylfa-newydd-nuclear-power-station/

In the interests of transparency, it should be noted that, following consultation with the Minister for Housing, Planning and Local Government, each planning authority will forward to the UK's PINS all submissions or observations it receives through this public consultation, and may also forward a summary of the submissions or observations. Submissions or observations received or a summary of same will be published on the website of the UK's PINS, and may be published on the website of the planning authority concerned. The Department for Housing, Planning and Local Government will not publish any submissions or observations or a summary of same.

An Roinn Tithíochta, Pleanála agus Rialtais Áitiúil
Department of Housing, Planning and Local Government

NOTE

This drawing has been prepared for information purposes to enable the magnitude of this development to be appreciated by the general public.

This drawing has been prepared from the submission by the Federal Ministry republic of Austria

Rev.	Date	Purpose	by
1	19.12.2018	For Information purposes only	TB

Project: TRANSBOUNDARY ENVIRONMENTAL PUBLIC CONSULTATION - WYLFA NEWYDD NUCLEAR POWER PLANT

Title: IMPACT OF ACCIDENT FALLOUT ON AUSTRIA AND RELATIVE PROXIMITY OF IRELAND

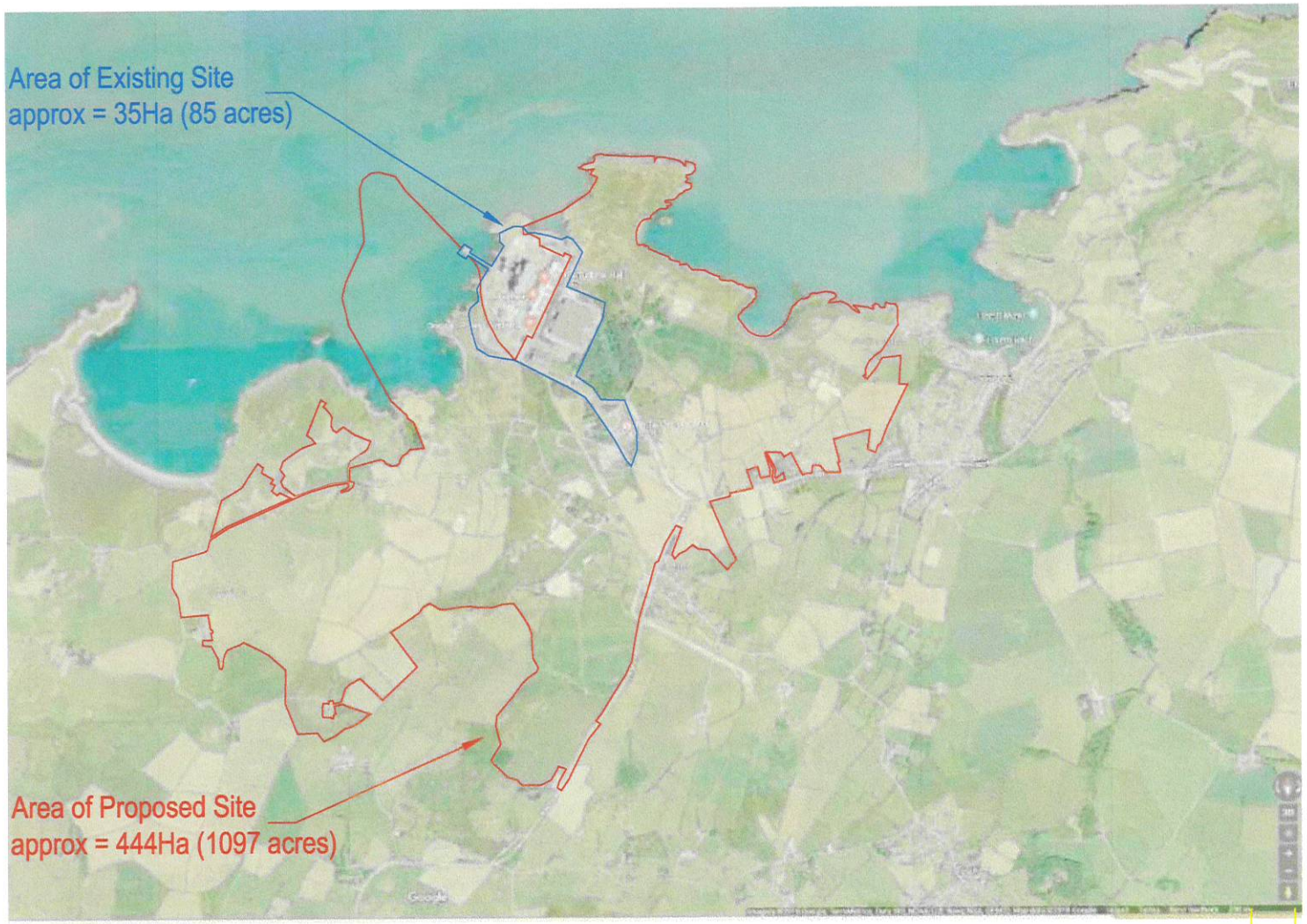
Client: PRIVATE SUBMISSION

SAFE PRACTICE
Technical Engineering Services

Reactor Hall,
21 Richmond Estate,
Blackrock, Cork, T12 H6P7

Scales (A1)	As Indicated	Drawn	Tim. Blanchard	17.12.2018
Checked	RS	Approved	BG	17.12.2018

Project. No. Drg. No.	Rev.
W1812 PDOZO-WAM-DWG-001	1



Approximate Site Boundary Overlaid on Google Maps Image of Wylfa, Anglesey, North Wales

(Site Boundary approximate only from information on Horizon Drg. No. WN0902-HZDCO-MSP-DRG-00008 Rev. 1.0)

Scale: (approx) 200 m

NOTE

This drawing has been prepared for information purposes to enable the magnitude of this development to be appreciated by the general public.

This drawing has been prepared from the site boundary information as shown on Horizon Nuclear Power Drg. No WN0902-HZDCO-MSP-DRG-0008 Rev. 1.0

The site boundary indicated on this drawing is approximate and for illustrative purposes only.

LEGEND

——— indicates assumed Existing Site Boundary (Magnox Nuclear Power Station and Wylfa Visitor Centre)

——— indicates Proposed Site Boundary for Horizon Wylfa Newydd Nuclear Power Station Facility

Rev.	Date	Purpose	by
1	19.12.2018	For Information purposes only	TB

Project: TRANSBOUNDARY ENVIRONMENTAL PUBLIC CONSULTATION - WYLFA NEWYDD NUCLEAR POWER PLANT

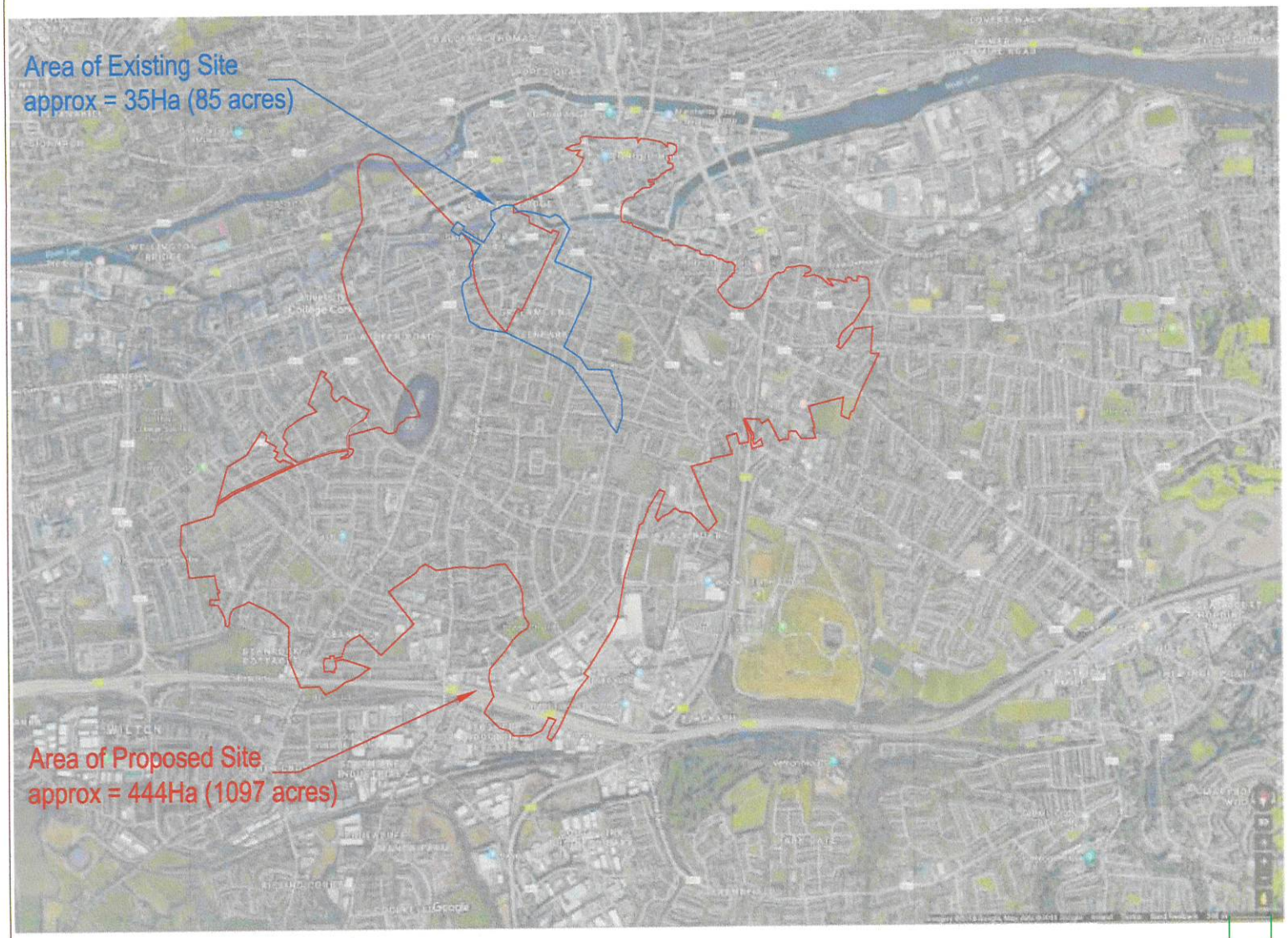
Title: PLAN SHOWING EXISTING SITE BOUNDARY AND EXTENT OF PROPOSED DEVELOPMENT

Client: PRIVATE SUBMISSION

SAFE PRACTICE
Technical Engineering Services
Reactor Hall,
21 Richmond Estate,
Blackrock, Cork, T12 H6P7

Scales (A1)	As Indicated	Drawn	Tim. Blanchard	17.12.2018
Checked	RS	Approved	BG	17.12.2018

Project. No.	Drg. No.	Rev.
W1812	PDOZO-WAM-DWG-002	1



Approximate Site Boundary Overlaid on Google Maps
Image of Cork City, Ireland to illustrate the magnitude of the Development

Site Boundary approximate only from information on Horizon Drg. No. WN0902-HZDCO-MSP-DRG-00008 Rev. 1.0)

Scale: (approx) 200 m

NOTE

This drawing has been prepared for information purposes to enable the magnitude of this development to be appreciated by the general public.

This drawing has been prepared from the site boundary information as shown on Horizon Nuclear Power Drg. No WN0902-HZDCO-MSP-DRG-0008 Rev. 1.0

The site boundary indicated on this drawing is approximate and for illustrative purposes only.

LEGEND

——— indicates assumed Existing Site Boundary (Magnox Nuclear Power Station and Wylfa Visitor Centre)

——— indicates Proposed Site Boundary for Horizon Wylfa Newydd Nuclear Power Station Facility

Rev.	Date	Purpose	by
1	19.12.2018	For Information purposes only	TB

Project: TRANSBOUNDARY ENVIRONMENTAL PUBLIC CONSULTATION - WYLFA NEWYDD NUCLEAR POWER PLANT

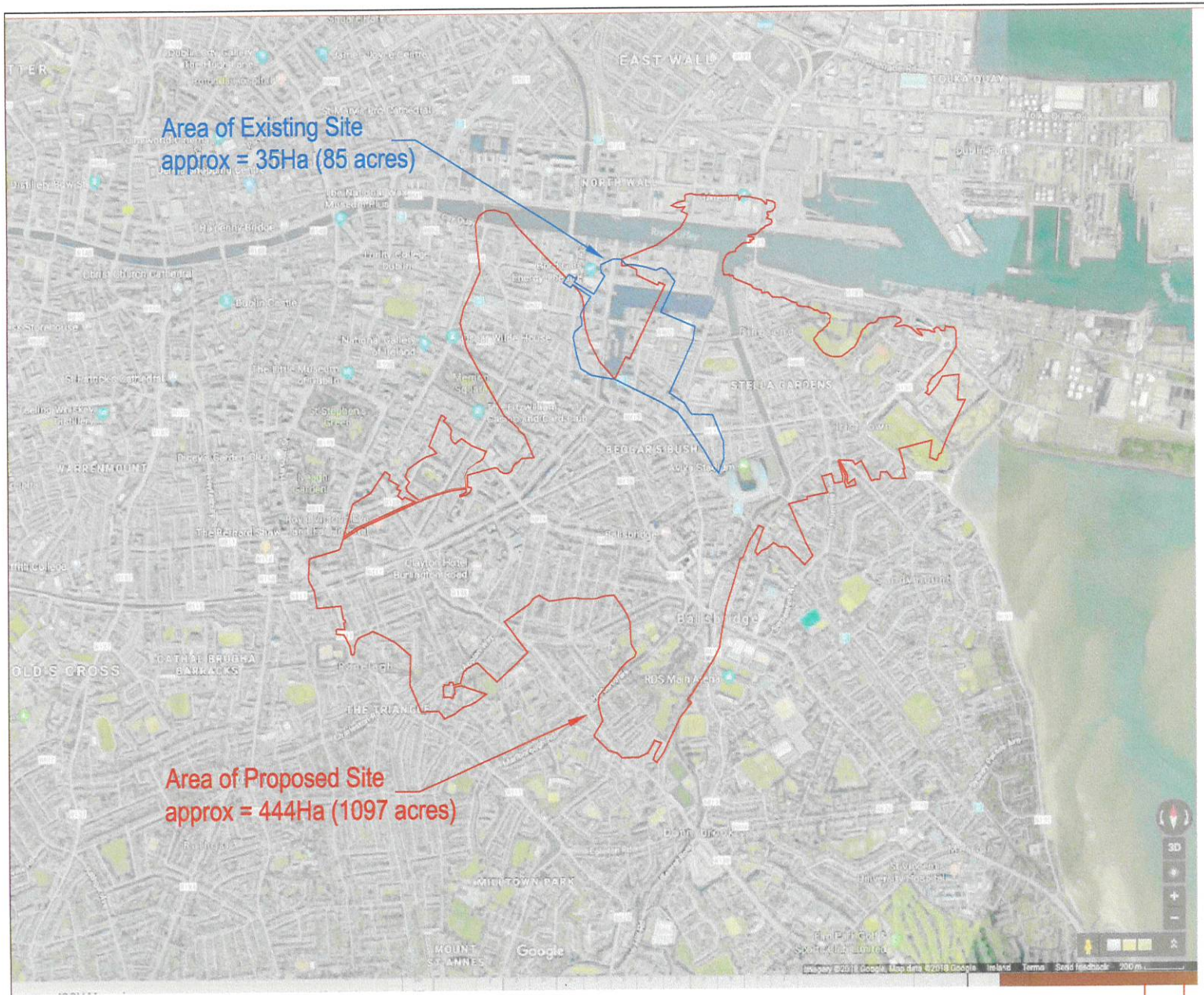
Title: COMPARISON OF DEVELOPMENT AREA WITH CORK CITY, IRELAND

Client: PRIVATE SUBMISSION

SAFE PRACTICE
Technical Engineering Services
Reactor Hall,
21 Richmond Estate,
Blackrock, Cork, T12 H6P7

Scales (A1)	As Indicated	Drawn	Tim. Blanchard	17.12.2018
Checked	RS	Approved	BG	17.12.2018

Project. No. Drg. No.	Rev.
W1812 PDOZO-WAM-DWG-003	1



Scale: (approx) 200 m

Approximate Site Boundary Overlaid on Google Maps
Image of Dublin City, Ireland to illustrate the magnitude of the Development

Site Boundary approximate only from information on Horizon Drg. No. WN0902-HZDCO-MSP-DRG-00008 Rev. 1.0)

NOTE

This drawing has been prepared for information purposes to enable the magnitude of this development to be appreciated by the general public.

This drawing has been prepared from the site boundary information as shown on Horizon Nuclear Power Drg. No WN0902-HZDCO-MSP-DRG-0008 Rev. 1.0

The site boundary indicated on this drawing is approximate and for illustrative purposes only.

LEGEND

——— indicates assumed Existing Site Boundary (Magnox Nuclear Power Station and Wylfa Visitor Centre)

——— indicates Proposed Site Boundary for Horizon Wylfa Newydd Nuclear Power Station Facility

Rev.	Date	Purpose	by
1	19.12.2018	For Information purposes only	TB

Project: TRANSBOUNDARY ENVIRONMENTAL PUBLIC CONSULTATION - WYLFA NEWYDD NUCLEAR POWER PLANT

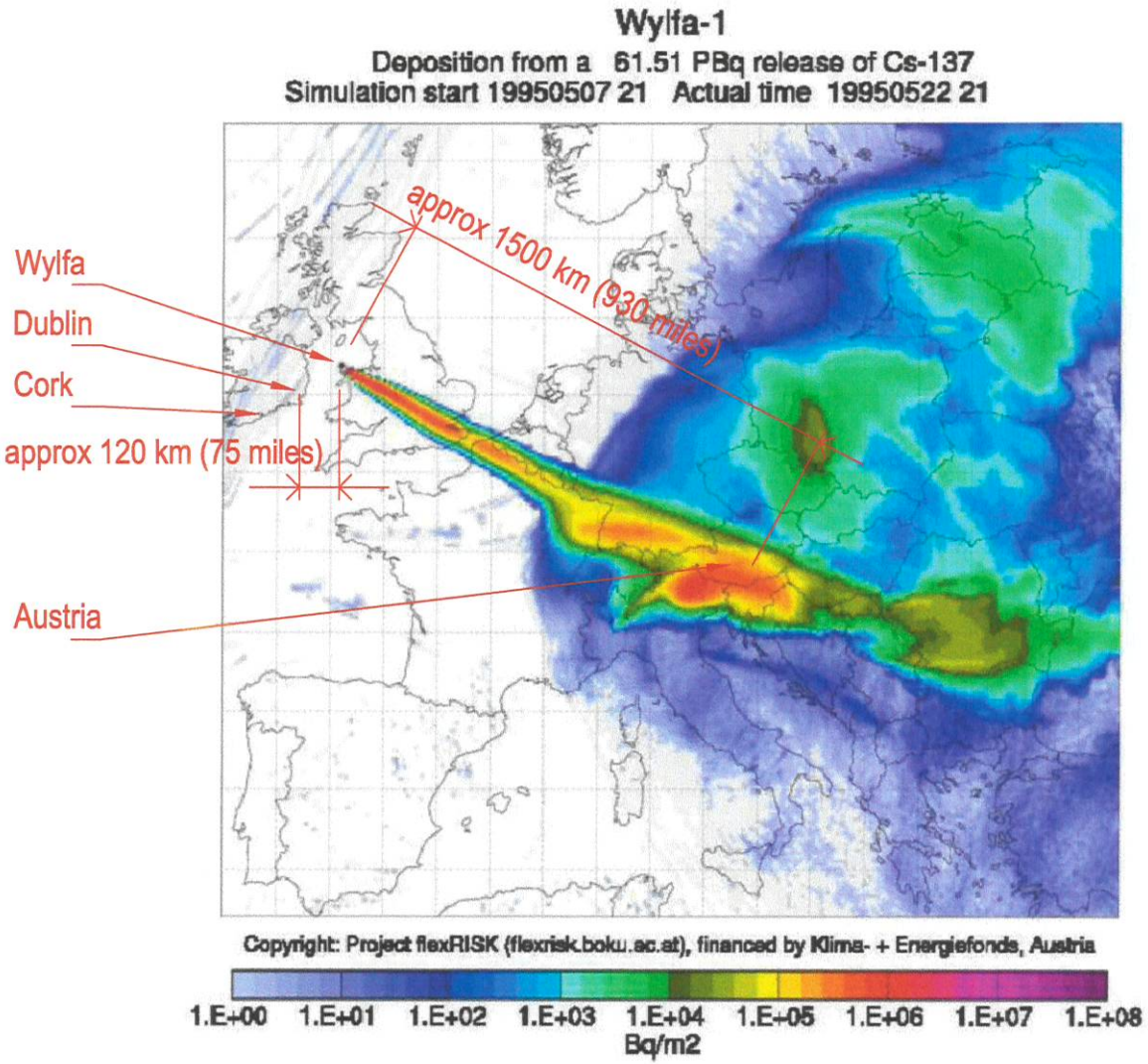
Title: COMPARISON OF DEVELOPMENT AREA WITH DUBLIN CITY, IRELAND

Client: PRIVATE SUBMISSION

SAFE PRACTICE
Technical Engineering Services
Reactor Hall,
21 Richmond Estate,
Blackrock, Cork, T12 H6P7

Scales (A1)	As Indicated	Drawn	Tim. Blanchard	17.12.2018
Checked	RS	Approved	BG	17.12.2018

Project. No. Drg. No.: W1812 PDOZO-WAM-DWG-004 | Rev.: 1



Extracted from submission from the Federal Ministry Republic of Austria
Ref. BMNT-UW.1.4.2/0112-1/1/2018

NOTE

This drawing has been prepared for information purposes to enable the magnitude of this development to be appreciated by the general public.

This drawing has been prepared from the submission by the Federal Ministry republic of Austria

Rev.	Date	Purpose	by
1	19.12.2018	For Information purposes only	TB

Project: TRANSBOUNDARY ENVIRONMENTAL PUBLIC CONSULTATION - WYLFA NEWYDD NUCLEAR POWER PLANT

Title: SITE LOCATION MAP

Client: PRIVATE SUBMISSION

SAFE PRACTICE
Technical Engineering Services
Reactor Hall,
21 Richmond Estate,
Blackrock, Cork, T12 H6P7

Scales (A1)	As Indicated	Drawn	Tim. Blanchard	17.12.2018
Checked	RS	Approved	BG	17.12.2018

Project. No. Drg. No.	Rev.
W1812 PDOZO-WAM-DWG-005	1

[redacted]

Planning Department
Cork County Council
Floor 3 – Tower
County Hall
Cork
T12 R2NC

Date: 7th January, 2019.

Transboundary Environmental Public Consultation
Wylfa Newydd Nuclear Power Plant

Dear Sir,

I am deeply concerned that there has been no adequate assessment of the transboundary environmental impact on the people of Ireland of an unplanned release of radioactive emissions from the proposed nuclear power facility at Wylfa Newydd arising from catastrophic mechanical failure of spent fuel storage containment.

It is the long-established view of the Irish people that the risks associated with nuclear-fuelled electricity generation are too great to justify its deployment, and this view is enshrined in Irish law by the Government in Section 18(1) of the Irish Electricity Regulation Act 23 of 1999.

This Act requires that: "*The Minister shall specify by order the criteria in accordance with which an application for an authorisation may be determined by the Commission*". Section 18(2)(c) of the Act specifies that the criteria specified by the Minister under subsection (1) may relate to "*the nature of the primary source of energy to be used by a generating station*" and Section 18(6) stipulates that "*An order under this section shall not provide for the use of nuclear fission for the generation of electricity*".

The Irish concern with respect to the safety of such nuclear-fuelled plant is further reaffirmed in paragraph 166 of the white paper "Ireland's Transition to a Low Carbon Energy Future 2015-2030" which states: "*Nuclear energy currently provides a significant proportion of the low carbon electricity consumed in the EU. However, Ireland is one of a small number of EU countries that does not have nuclear power in its domestic electricity generation mix. Nuclear power generation in Ireland is currently prohibited by legislation*".

Annex [C] references these concerns by stating "*Following the accident in Fukushima in March 2011, stress tests were carried out on existing EU nuclear power plants to ensure they could withstand severe natural disasters. Some states are continuing their nuclear programmes (for example, the UK's Hinkley Point C plans), while others are phasing out theirs. Ireland has maintained its stance that nuclear installations should meet the highest international standards*".

This submission is made in the context of this national and public concern over the safety of nuclear-fuelled electricity generation plants, and in particular the safety of on-site spent fuel storage, which whilst prohibited by law within the Irish State, has the potential to seriously impact on the lives of Irish people in the event of radioactive release from a neighbouring jurisdiction.

Whilst recognising that each member state of the European Union has the right to determine the structure and composition of its energy supply itself, I am very concerned about the plans of the United Kingdom to continue to expand its use of nuclear energy, and thus declare my vigorous opposition to the new construction project at the Wylfa Newydd site and the plans which have been presented in respect of it.

This is because I do not see the use of nuclear energy as a way of coping with the challenges posed by the energy supply of the future. Nuclear energy has been and will continue to be an uncontrollable high-risk technology. When incidents occur they are associated with widespread environmental hazards of an unforeseeable nature and dire consequences for human health.

The fact that these pernicious impacts on man and the environment extend far beyond the national and state borders of the country of origin concerned has been demonstrated quite clearly by the devastating reactor accidents at Chernobyl and Fukushima. In particular, the Chernobyl reactor accident of 1986 showed how radioactive substances can travel great distances by the air/wind pathway and end up being distributed over vast areas.

Section 3.4.2 of the ES Volume D - WNDA Development App D14-1 - Radioactive waste (PINS Reference Number: EN010007) states that the 2016 UK Radioactive Waste Inventory [RD17] describes spent fuel as follows: "*Nuclear fuel that is being or has been used to power nuclear reactors is referred to as 'irradiated'. When it has reached the end of its life and is no longer capable of efficient fission, it is known as 'spent fuel'. Spent fuel still contains large amounts of uranium (and some plutonium), which can be separated out by reprocessing and used to make new fuel*".

Section 3.4.3 continues "*In the absence of a commercially available reprocessing facility, UK policy is for spent fuel to be stored pending disposal to a future national GDF. Horizon's strategy is to store the spent fuel on-site until the GDF is made available*".

In other words, there is no current means for dealing with spent fuel from a nuclear-fuelled power plant in the United Kingdom, and this dangerous material will be stored on the site of a commercial facility until some future date when the UK Government figures out what to do with it!

Given the short distance from the eastern Irish seaboard to the power station site at Wylfa Newydd, radioactive air masses could under certain weather conditions cross the Irish sea in only a few hours if there were a similar incident, leading to major contamination to population centres like Dundalk, Dublin, Arklow and Wexford, giving rise to enormous environmental and economic damage.

The continued deployment or, indeed, expansion of the nuclear energy technology network is irresponsible, if not for any other reason, then because so far no permanent final repository exists for highly radioactive waste worldwide, so that many subsequent generations, quite apart from having their health jeopardised, will be burdened with immense economic disposal risks.

Against the backdrop of these fundamental concerns, and that of the other misgivings set out in detail below, I request the UK Government to revise the decision to construct a new nuclear energy plant at the Wylfa Newydd site. I also have concerns regarding the documentation of the impacts of the project on the environment, as the UK Advanced Boiling Water Reactor (UK ABWR) reactor type is still in the development phase.

The documentation that has been made available (see for example 8.1 of the Planning Statement, p. 7) states that the reactor type to be deployed will be a UK Advanced Boiling Water Reactor (UK ABWR) made by Hitachi-GE Nuclear Energy Ltd. As published in the press, the Office for Nuclear Regulation (ONR) approved the generic design of the new reactor type on 17th December 2017. This reactor type, cited for the construction at the Wylfa Newydd site, is currently in its final planning phase. However, it has not been possible to find any more precise information about the detailed design of the pressurised-water reactor for the site in the documentation that has been published.

Furthermore, the documentation only contains a rudimentary description of the basic technical details of the new nuclear power plant. For example, the power station units to be erected are quoted as being Generation III+ boiling-water reactors with a service life of at least 60 years. Their overall electrical net power output is said to be up to 3100 MWe. This electrical net power is to be generated by two UK ABWR power station units, each with an electrical net power output of up to 1600 MW.

To this day, no Generation III+ nuclear power station units in the power output class quoted are in use. At present, only the EPR TM reactors are in this output range, with an electrical net power output of up to 1600 MW. The experience gained so far with the EPR™ reactors at the sites under construction in Flamanville and Olkiluoto bears witness to major construction delays and prodigious cost increases.

At the moment it is not apparent how such a Generation III+ nuclear power station unit can be 'affordable in economic terms'. It is also unclear how a service life of at least 60 years can be guaranteed, since no information about operational experience of any kind with such a reactor type is available.

It should also be noted that there is no reactor type worldwide which has actually achieved such a service life.

Neither was it possible to find any detailed assessment of an accident or its impact on the environment in the documentation. After the events of 11th March 2011 in Fukushima, the assumption that the radiation from the planned nuclear power station Wylfa Newydd in normal operation and in the case of incidents and design basis accidents would not constitute a hazard, and would at worst only cause problems locally in the case of an accident, cannot be upheld.

The disasters in the former USSR and Japan have shown quite clearly that the forecasts quoting odds for the occurrence of major accidents at a maximum of one event in ten million years were wrong.

Section 3.3.155 of the Environmental Statement Non-Technical Summary (PINS Reference Number: EN010007) states that: "*Control of radioactive sources would be achieved through a combination of stringent management and supervision of the use of the sources to ensure all legal requirements are met*".

Section 3.3.156 of the NTS continues: "*Mitigation of potential risks during operation would include the high specification design of the nuclear plant, safety procedures in the day to day operation of the nuclear plant, management of potentially radioactive discharges and appropriate planning for the transport and disposal of radioactive waste*".

Despite the fact that there is no assessment of potential transboundary impacts, the environmental effects are then described in Section 3.3.158 by the single paragraph "*Radiological effects during construction, operation and decommissioning have been assessed as negligible and are therefore not significant*".

It is this single aspect, namely radiological, which is of concern as the proposed nuclear facility is just 50km from the east coast of Ireland; a region from which the east wind frequently blows. Any airborne release of radioactive material has a high probability of being carried over into Irish population centres.

In the real world, events that may not be considered likely do occur. When we get in our car to drive to work, we do not consider that a traffic accident is likely. This does not mean that we do not take out road traffic insurance as a safeguard against an event that we consider unlikely, but which may come to pass.

The magnitude of the impact of an unplanned release of radioactive emissions is many orders higher than that of an individual motorist, and it is a reasonable expectation that any person or organisation planning such a hazardous installation would exercise particular care to avoid adversely affecting their closest neighbour.

It is widely accepted that spent nuclear fuel and waste requires well-designed storage for periods ranging up to a million years to minimize releases of the contained radioactivity into the environment. The highly enriched uranium (HEU) contained in the spent fuel and waste is not only a highly toxic hazard, but also a potential target for terrorist activity.

There does not appear to be any commitment in the Environmental Statement and associated documentation that the UK Ministry of Defence (MOD) will be permanently deployed on-site for the entire storage period to prevent malicious attacks by bad actors that have the potential to release a radioactive cloud from catastrophic damage to spent fuel wet storage containment.

In the event of such an "unforeseen" event on the spent fuel cooling ponds at Wylfa Newydd, the eastern seaboard of Ireland would bear the brunt of released radioactive material if the prevailing wind was from the east as is typical with the Siberian anti cyclone (colloquially known as the Beast from the East).

There is little assurance in the Environmental Statement for people living on the east coast of Ireland (or for that matter, anywhere in Ireland) that either Horizon Nuclear Power or the UK Government has taken adequate steps to protect our families from the consequences of a possible catastrophic event with respect to spent fuel containment.

As such, I respectfully request the Secretary of State to call a halt to the construction of an unsafe nuclear power station until the issue of off-site long term spent fuel and waste storage has been resolved by the UK Government to the satisfaction of its neighbours, including the Government of the Republic of Ireland.

Yours sincerely,

[redacted]

Nigel de Haas

Dear Sir/Madam,

I am writing to express my concern and objection to the proposed nuclear power plant at Anglesey North Wales. Given the proximity of the proposed site to the island of Ireland I am very concerned regarding the health implications this may have on Irish citizens should any serious incidents occur. The consequences of Hiroshima and Fukashima are a grave reminder of the safety risks such plants represent. I note that north wales is a very seismically active area which puts any proposed plant at high risk of damage from earthquake activity which could have devastating consequences.

I am also very concerned about the effect this plant would have on the shared marine environment which is already subject to severe stress and pollution.

I hope my concerns and those of others will be taken into account.

Kind regards,

[redacted]

Sent from Yahoo Mail on Android

Moneylea
Dunmanway
Co. Cork

Planning Department
Cork County Council
Floor 3 – Tower
County Hall
Cork
T12 R2NC

Date: 25th January, 2019.

Transboundary Environmental Public Consultation Wylfa Newydd Nuclear Power Plant

Dear Sir,

I am deeply concerned that there has been no adequate assessment of the transboundary environmental impact on the people of Ireland of an unplanned release of radioactive emissions from the proposed nuclear power facility at Wylfa Newydd arising from catastrophic mechanical failure of spent fuel storage containment.

It is the long-established view of the Irish people that the risks associated with nuclear-fuelled electricity generation are too great to justify its deployment, and this view is enshrined in Irish law by the Government in Section 18(1) of the Irish Electricity Regulation Act 23 of 1999.

This Act requires that: "*The Minister shall specify by order the criteria in accordance with which an application for an authorisation may be determined by the Commission*". Section 18(2)(c) of the Act specifies that the criteria specified by the Minister under subsection (1) may relate to "*the nature of the primary source of energy to be used by a generating station*" and Section 18(6) stipulates that "*An order under this section shall not provide for the use of nuclear fission for the generation of electricity*".

The Irish concern with respect to the safety of such nuclear-fuelled plant is further reaffirmed in paragraph 166 of the white paper "Ireland's Transition to a Low Carbon Energy Future 2015-2030" which states: "*Nuclear energy currently provides a significant proportion of the low carbon electricity consumed in the EU. However, Ireland is one of a small number of EU countries that does not have nuclear power in its domestic electricity generation mix. Nuclear power generation in Ireland is currently prohibited by legislation*".

Annex [C] references these concerns by stating "*Following the accident in Fukushima in March 2011, stress tests were carried out on existing EU nuclear power plants to ensure they could withstand severe natural disasters. Some states are continuing their nuclear programmes (for example, the UK's Hinkley Point C plans), while others are phasing out theirs. Ireland has maintained its stance that nuclear installations should meet the highest international standards*".

This submission is made in the context of this national and public concern over the safety of nuclear-fuelled electricity generation plants, and in particular the safety of on-site spent fuel storage, which whilst prohibited by law within the Irish State, has the potential to seriously impact on the lives of Irish people in the event of radioactive release from a neighbouring jurisdiction.

Whilst recognising that each member state of the European Union has the right to determine the structure and composition of its energy supply itself, I am very concerned about the plans of the United Kingdom to continue to expand its use of nuclear energy, and thus declare my vigorous opposition to the new construction project at the Wylfa Newydd site and the plans which have been presented in respect of it.

This is because I do not see the use of nuclear energy as a way of coping with the challenges posed by the energy supply of the future. Nuclear energy has been and will continue to be an uncontrollable high-risk technology. When incidents occur they are associated with widespread environmental hazards of an unforeseeable nature and dire consequences for human health.

The fact that these pernicious impacts on man and the environment extend far beyond the national and state borders of the country of origin concerned has been demonstrated quite clearly by the devastating reactor accidents at Chernobyl and Fukushima. In particular, the Chernobyl reactor accident of 1986 showed how radioactive substances can travel great distances by the air/wind pathway and end up being distributed over vast areas.

Section 3.4.2 of the ES Volume D - WNDA Development App D14-1 - Radioactive waste (PINS Reference Number: EN010007) states that the 2016 UK Radioactive Waste Inventory [RD17] describes spent fuel as follows: "*Nuclear fuel that is being or has been used to power nuclear reactors is referred to as 'irradiated'. When it has reached the end of its life and is no longer capable of efficient fission, it is known as 'spent fuel'. Spent fuel still contains large amounts of uranium (and some plutonium), which can be separated out by reprocessing and used to make new fuel*".

Section 3.4.3 continues "*In the absence of a commercially available reprocessing facility, UK policy is for spent fuel to be stored pending disposal to a future national GDF. Horizon's strategy is to store the spent fuel on-site until the GDF is made available*".

In other words, there is no current means for dealing with spent fuel from a nuclear-fuelled power plant in the United Kingdom, and this dangerous material will be stored on the site of a commercial facility until some future date when the UK Government figures out what to do with it!

Given the short distance from the eastern Irish seaboard to the power station site at Wylfa Newydd, radioactive air masses could under certain weather conditions cross the Irish sea in only a few hours if there were a similar incident, leading to major contamination to population centres like Dundalk, Dublin, Arklow and Wexford, giving rise to enormous environmental and economic damage.

The continued deployment or, indeed, expansion of the nuclear energy technology network is irresponsible, if not for any other reason, then because so far no permanent final repository exists for highly radioactive waste worldwide, so that many subsequent generations, quite apart from having their health jeopardised, will be burdened with immense economic disposal risks.

Against the backdrop of these fundamental concerns, and that of the other misgivings set out in detail below, I request the UK Government to revise the decision to construct a new nuclear energy plant at the Wylfa Newydd site. I also have concerns regarding the documentation of the impacts of the project on the environment, as the UK Advanced Boiling Water Reactor (UK ABWR) reactor type is still in the development phase.

The documentation that has been made available (see for example 8.1 of the Planning Statement, p. 7) states that the reactor type to be deployed will be a UK Advanced Boiling Water Reactor (UK ABWR) made by Hitachi-GE Nuclear Energy Ltd. As published in the press, the Office for Nuclear Regulation (ONR) approved the generic design of the new reactor type on 17th December 2017.

This reactor type, cited for the construction at the Wylfa Newydd site, is currently in its final planning phase. However, it has not been possible to find any more precise information about the detailed design of the pressurised-water reactor for the site in the documentation that has been published.

Furthermore, the documentation only contains a rudimentary description of the basic technical details of the new nuclear power plant. For example, the power station units to be erected are quoted as being Generation Ill+ boiling-water reactors with a service life of at least 60 years. Their overall electrical net power output is said to be up to 3100 MWe. This electrical net power is to be generated by two UK ABWR power station units, each with an electrical net power output of up to 1600 MW.

To this day, no Generation Ill+ nuclear power station units in the power output class quoted are in use. At present, only the EPR TM reactors are in this output range, with an electrical net power output of up to 1600 MW. The experience gained so far with the EPR™ reactors at the sites under construction in Flamanville and Olkiluoto bears witness to major construction delays and prodigious cost increases.

At the moment it is not apparent how such a Generation Ill+ nuclear power station unit can be 'affordable in economic terms'. lt is also unclear how a service life of at least 60 years can be guaranteed, since no information about operational experience of any kind with such a reactor type is available.

lt should also be noted that there is no reactor type worldwide which has actually achieved such a service life.

Neither was it possible to find any detailed assessment of an accident or its impact on the environment in the documentation. After the events of 11th March 2011 in Fukushima, the assumption that the radiation from the planned nuclear power station Wylfa Newydd in normal operation and in the case of incidents and design basis accidents would not constitute a hazard, and would at worst only cause problems locally in the case of an accident, cannot be upheld.

The disasters in the former USSR and Japan have shown quite clearly that the forecasts quoting odds for the occurrence of major accidents at a maximum of one event in ten million years were wrong. Section 3.3.155 of the Environmental Statement Non-Technical Summary (PINS Reference Number: EN010007) states that:

"*Control of radioactive sources would be achieved through a combination of stringent management and supervision of the use of the sources to ensure all legal requirements are met*".

Section 3.3.156 of the NTS continues: "*Mitigation of potential risks during operation would include the high specification design of the nuclear plant, safety procedures in the day to day operation of the nuclear plant, management of potentially radioactive discharges and appropriate planning for the transport and disposal of radioactive waste*".

Despite the fact that there is no assessment of potential transboundary impacts, the environmental effects are then described in Section 3.3.158 by the single paragraph "*Radiological effects during construction, operation and decommissioning have been assessed as negligible and are therefore not significant*".

It is this single aspect, namely radiological, which is of concern as the proposed nuclear facility is just 50km from the east coast of Ireland; a region from which the east wind frequently blows. Any airborne release of radioactive material has a high probability of being carried over into Irish population centres.

In the real world, events that may not be considered likely do occur. When we get in our car to drive to work, we do not consider that a traffic accident is likely. This does not mean that we do not take out road traffic insurance as a safeguard against an event that we consider unlikely, but which may come to pass.

The magnitude of the impact of an unplanned release of radioactive emissions is many orders higher than that of an individual motorist, and it is a reasonable expectation that any person or organisation planning such a hazardous installation would exercise particular care to avoid adversely affecting their closest neighbour.

It is widely accepted that spent nuclear fuel and waste requires well-designed storage for periods ranging up to a million years to minimize releases of the contained radioactivity into the environment. The highly enriched uranium (HEU) contained in the spent fuel and waste is not only a highly toxic hazard, but also a potential target for terrorist activity.

There does not appear to be any commitment in the Environmental Statement and associated documentation that the UK Ministry of Defence (MOD) will be permanently deployed on-site for the entire storage period to prevent malicious attacks by bad actors that have the potential to release a radioactive cloud from catastrophic damage to spent fuel wet storage containment.

In the event of such an "unforeseen" event on the spent fuel cooling ponds at Wylfa Newydd, the eastern seaboard of Ireland would bear the brunt of released radioactive material if the prevailing wind was from the east as is typical with the Siberian anti cyclone (colloquially known as the Beast from the East).

There is little assurance in the Environmental Statement for people living on the east coast of Ireland (or for that matter, anywhere in Ireland) that either Horizon Nuclear Power or the UK Government has taken adequate steps to protect our families from the consequences of a possible catastrophic event with respect to spent fuel containment.

As such, I respectfully request the Secretary of State to call a halt to the construction of an unsafe nuclear power station until the issue of off-site long term spent fuel and waste storage has been resolved by the UK Government to the satisfaction of its neighbours, including the Government of the Republic of Ireland.

Yours sincerely,

_____

Daphne Babington

Transboundary Environmental Public Consultation
on the Wylfa Newydd Nuclear Power Plant in the UK

List of submissions received by Cork County Council

ITEM NO.	DATE RECEIVED	NAME AND ADDRESS
1	*08.01.2019 (By Post)*	*Nigel de Haas, Inchincurka, Dunmanway, Co. Cork P47 H308*
2	*08.01.2019 (By Email)*	*Grace Hunt, Roseville, Kilmichael West, Fountainstown, Co. Cork*
3	*27.01.2019 (By Email)*	*Daphne Babington, Moneylea, Dunmanway, Co. Cork*
4	*15.02.2019 (By Email)*	*Attracta Uí Bhroin, Environmental Law Implementation Group Facilitator at the IEN*

SUMMARY OF NFLA SUBMISSION ON WYLFA NEWYDD NPP PROPOSAL

Core summary of NFLA All Ireland Forum response to the consultation
The core concerns the NFLA has with the transboundary impacts to Ireland of the proposed Wylfa B nuclear reactor include:

1. The type of nuclear reactor being proposed for Wylfa B – the Advance Boiling Water Reactor (ABWRs) - have high gaseous emissions that are far more important than liquid emissions in terms of radiation doses to local people.

2. Bearing in mind that Hitachi is proposing to build 2 ABWR reactors at Wylfa, it can be calculated around 6 deaths will occur somewhere in the world for every year the station operates.

3. Over 60 years – the expected operating life for an ABWR - the total could be as much as 360 deaths.

4. Wylfa B would produce extremely high levels of radioactive spent fuel. In the year 2200 its spent fuel arisings would amount to ***80% of the radioactivity contained in all existing legacy wastes from the UK's nuclear power industry.***

5. The requirement for 'Best Available Techniques' (and clean technology) for producing electricity should rule out building new electricity generating stations which produce such highly dangerous wastes. Especially as less expensive, quicker and safer alternatives are available, that don't produce such wastes.

6. Energy efficient improvements could reduce the energy consumed in UK households each year equivalent to the output of six nuclear power stations the size of Wylfa B.

7. Offshore wind and solar are now both able to generate electricity more cheaply than nuclear power. If the UK had continued renewable expansion at the same rate as between 2010 and 2015, it could have achieved an all-renewable UK electricity supply by 2025.

8. In addition, a report from ESRI suggests, in the worst-case scenario, ***the economic cost of a nuclear accident impacting on Ireland could be as high as €161 billion.***

9. An additional recent submission by NFLA / KIMO to the OSPAR Commission outlines that a full proposed UK new nuclear programme will only compound these issues and threatens the OSPAR Treaty regulations of 'close to zero' discharges into the Irish Sea by 2020 and beyond.

10. Sea level rises exacerbate by climate change put at risk in the medium to longer term the Wylfa B coastal site.

Irish Aviation Authority
The Times Building
11–12 D'Olier Street
Dublin 2, D02 T449,
Ireland

Údarás Eitlíochta na hÉireann
Foirgneamh na hAmanna
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Baile Átha Cliath 2, D02 T449,
Éire

T: +353 1 671 8655
F: +353 1 679 2934
www.iaa.ie

Date 06th December 2018

Ms. Avril Feeney,
Planning and Property Development Department
Block 4, Floor 3,
Civic Offices,
Wood Quay,
Dublin 8.

***Development*: Transboundary Environmental Public Consultation – Wylfa Newydd Nuclear Power Plant**

Dear Avril

I refer to the above-proposed development details, of which were forwarded to the Irish Aviation Authority.

I wish to advise that we have no observations on this application.

Yours sincerely

[redacted]

Deirdre Forrest
Corporate Affairs

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Ms. Avril Feeney
Planning & Property Development Department
Dublin City Council
Block 4, Floor 3
Civic Offices
Wood Quay
Dublin 8

Dáta | Date	Ár dTag | Our Ref.	Bhur dTag | Your Ref.
10 December 2018	**TII18-103930**	

Re: Transboundary Environmental Public Consultation – Wylfa Newydd Nuclear Power Plant

Dear Ms. Feeney,

I wish to acknowledge receipt of your referral of 22 November 2018 regarding the above public consultation, and advise that TII has no specific observations to make in this regard.

Yours sincerely,

[redacted]

Natasha Crudden
Regulatory & Administration Unit

Bonneagar Iompair Éireann
Ionad Gnó Gheata na Páirce
Sráid Gheata na Páirce
Baile Átha Cliath 8
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(6)

Sharon Beatty

From: Property Management [redacted]
Sent: 25 January 2019 15:50
To: wylfanewydd consultation
Cc: Jason Kearney; Tadhg O'Doherty; Olive.Mulhall; Joanna Farrell
Subject: Transboundary Environmental Public Consultation

For attention of -
Ms. Avril Feeney
Planning & Property Development Department
Dublin City Council

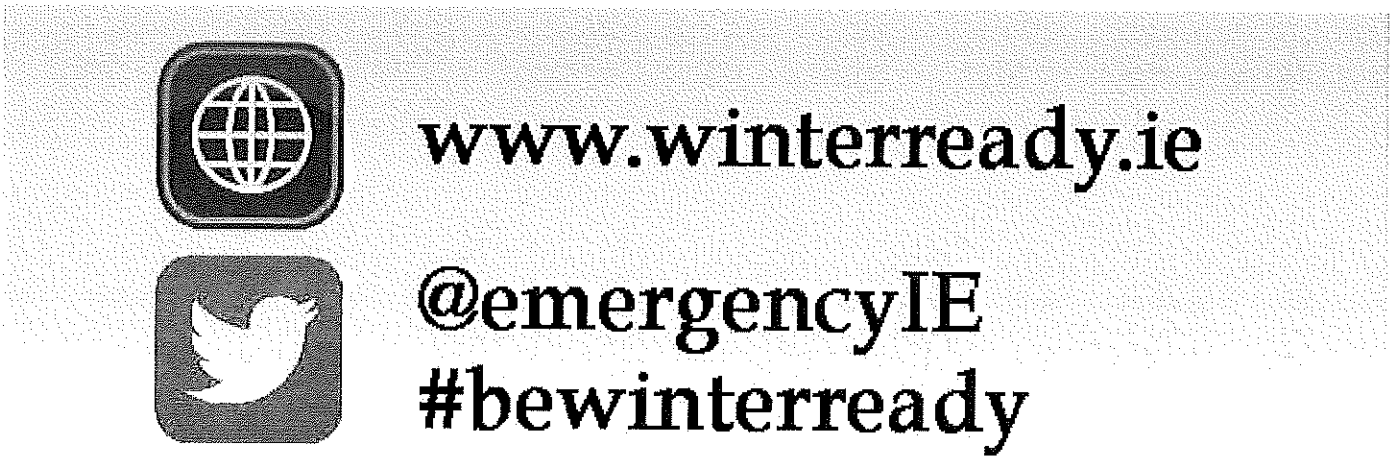
25 January 2019

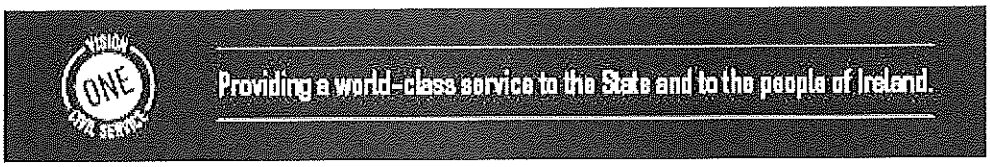
The email message below in relation to the planning application for proposed Wylfa Newydd nuclear power plant – Anglesey, North Wales, UK, refers

The Department of Defence, in collaboration with the Defence Forces and the National Emergency Co-ordination Centre requests consideration of the following observation:

"This proposed development, the associated environmental impact assessments and any associated or potential transboundary effects on the environment identified would have to be taken account of with regard to Ireland's National Risk Assessment process and specifically when reviewing the likelihood and impacts that such a development may have on assessing risks for Ireland regarding Nuclear Incidents(Abroad)."

J. Farrell
Property Management Branch
Department of Defence
Station Road
Newbridge
Co. Kildare





An Taisce
The National Trust for Ireland

Dublin City Council,
Planning Section,
Civic Office,
Wood Quay,
Dublin 8,
D08 RF3F
08.01.19

Sent electronically to:
planning@dublincity.ie

08.01.19

Re: Transboundary environmental public consultation – Wylfa Newydd Nuclear Power Plant

Dear Sir/Madam,

This submission is a response to a request from the Department of Housing, Planning and Local Government pursuant to EU Directive 2011/92/EU.

"*Under the terms of EU Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the EIA Directive) and the 1991 United Nations Convention on environmental impact in a transboundary context (the Espoo Convention), Member States are required to engage in transboundary public consultation in respect of projects likely to have significant effects on the environment of neighbouring States as part of the environmental impact assessment of a proposed development. For this purpose, the Member State in whose territory the project is intended to be carried out shall send to the affected State, no later than when informing its own public, a description of the project and any available information on its possible transboundary impact*."

Wylfa Newydd Nuclear Power Plant, Anglesey is a project to construct a 2,700 MW nuclear power station with two advanced boiling water reactors (ABWR) on the island of Anglesey in North Wales. The plants is being developed in the UK by Hitachi-GE Nuclear Energy, Ltd using a 100% owned subsidiary, Horizon Nuclear Power.

The public notice on the Department of Housing, Planning and Local Government's website requires submissions to be made to the Planning Section in the planning authority for the area, in this case, Dublin City Council by close of business on Friday 25 January 2019.

Yours faithfully,

Ian Lumley,

Advocacy Office
An Taisce – The National Trust for Ireland

Background

An Taisce's concerns in this matter do not stem from a pro or anti position regarding nuclear power. Their concerns centre solely on the extent to which transboundary impacts on Ireland have been adequately considered in the application. Potential transboundary impacts on Ireland are particularly relevant due to the proximity of the nuclear power station (118km) to the 40% of the Irish population residing in the Greater Dublin Region.

An Taisce welcomes this opportunity for consultation, particularly since post Brexit the UK will not be a member of the European civil nuclear regulator Euratom. We wish to focus our comments principally on the potential for accidental release of large quantities of radioactive isotopes and potential impacts on Ireland associated with such high magnitude-low frequency incidents.

Although extremely unlikely, we do not consider it appropriate to dismiss transboundary safety concerns as non-significant. We consider the accident risk calculations of 1:1M flawed on several grounds, demonstrably so based on recent nuclear accidents, and not capable of providing a level of comfort for the Irish population appropriate to the potential impacts which an accident at Wylfa would impose upon them.

We note that Hitachi have had two serious safety breaches in developing nuclear power stations, one of which resulted in a $2.7M fine in the US.Hitachi also supplied one of the reactors at Fukishima, though this was not operational during the tsunami. During the construction of this unit a deformation in the reactor pressure vessel was incorrectly handled.

The Economic and Social Research Institute is Ireland's independent source for evidence-based policymaking. In a report in 2016 it conservatively estimated the economic impact of a serious nuclear event anywhere in north western Europe close to Ireland as being in the region of €161B with catastrophic effects on agriculture lasting decades.

An Taisce wishes to structure its submission around the following topics:

1. An inadequate estimation of need and alternatives
2. Inadequate consideration of long term sea level rise
3. Underestimation of potential radioactive release for a worst case accident
4. The extent to which the plume dispersion models employed provide an adequate vehicle for assessing potential atmospheric transport of hazardous material to Ireland
5. Inadequate Consideration of Tectonic Risk

1. An inadequate estimation of need and alternatives

A recent report by Carbon Brief indicated that UK electricity demand is continuing to fall and in 2018 reached levels not seen since 1994. This reflects increased energy efficiency in appliances and by consumers and also structural changes in the UK economy. Despite the addition of 8M extra consumers over the quarter of a century concerned, electricity consumption has continued to decline. The absolute reduction is equivalent to the output of almost 3 Wylfa-type stations. The justification for Wylfa is not addressed in this context. Neither are the alternative options, principally that of renewable electricity generation which now accounts for 33% of UK electricity generation.

2. Inadequate consideration of long term sea level rise and wave climate changes

Wylfa is located at an elevation of 9-13m asl. The Highest Astronomical Tides in the region are 3.8m asl. Highly dangerous radioactive waste is to be stored on site until approximately 2170 with storage commencing 10 years after commissioning and extending for 140 years thereafter.

A sea level rise of 0.86m by 2080 underpins the assessment. It is however virtually certain that sea level rises will continue for several centuries, with ultimate rises of up to 3m possible. The stability of the site by 2170 under increased wave action from a higher level is not considered adequately in the proposal. The assessment required joint probability analysis to be carried out regarding coastal flood and erosion risk for a lengthier period than is demonstrated in the assessment.

3. Underestimation of potential radioactive release for a worst case accident

We draw your attention to the Austrian submission which questions the emission figures used for calculation of impacts in a core melt accident The assumed release of Caesium-137 in the EIA is 186 MegaBq (MBq). For a comparable situation in an EIA for a proposed nuclear power station in the Czech Republic the corresponding figure is 30 TeraBq (TBq), a factor 160,000 times higher.

The potential for an accident at Wylfa to contaminate the whole of Austria and much of continental Europe is evident in modelling carried out by the Austrian authorities. The crucial significance of this for a much more proximal location such as Ireland is obvious.

Furthermore, it is the outputs of the dispersion model based on this underestimate which is used to drive the impact models for the receptors such as human, and agricultural vulnerabilities in Ireland. The degree of confidence that can be placed in these downstream impacts is accordingly questionable.

It must be stressed that a fresh easterly breeze of 18 knots would deliver radioactive Caesium to Dublin in 6 hours in the event of a core meltdown. No possibility of evacuation would exist.

4. The extent to which the plume dispersion models employed provide an adequate vehicle for assessing potential atmospheric transport of hazardous material to Ireland.

Two models were used to evaluate the consequences of releases of airborne radioactive effluents from the propose facility. Both were based on Gaussian plume models. While the proposal emphasises that these are the accepted models for assessing air quality impacts, and while justification for selecting ADMS in this case is well argued, this does not eliminate the inherent weaknesses of the approach taken. Reliance on using Gaussian models for assessing long range transport of effluent is highly questionable. Long range transport of pollution and radioactivity experience confirms this. Chernobyl radiation reached Ireland by long range transport mechanisms and resulted in contamination of soils, vegetables and milk supplies. 10,000 upland sheep farms in Wales, England and Ireland were subject to restrictions for 26 years following the event. A complex recurving trajectory for the Chernobyl plume of contamination was evident. Gaussian modelling would not have predicted, even if complex topographical and meteorological conditions were incorporated, that this would occur.

To address plume dispersal in the event of a serious accident, an over simplistic set of assumptions have made for modelling the Wylfa contamination plume.

(i) Site specific observations were not used to drive air dispersion models. Rather, interpolations from nearby locations were used. These data inputs consisted of modelled outputs from grid sizes ranging from 4 - 1.5km with output resolution of 6kms.

(ii) Only 10 years of meteorological data was employed. This does not capture the range of conditions extant at the location and omits extreme events which may be important in impact assessment. The World Meteorological Organisation recommends at least a 30-year period for characterising climate conditions at a particular site.

(iii) The nearest major international conurbation to Wylfa is listed as Dublin with a population exposure of 515,255. In fact the population of Dublin city and County is 1,345,402 with just under 2M people living in the Greater Dublin Area. On any given day the figure is also 120,000 higher than the census figures due to visitors, tourists etc.

(iv) A mixing layer depth of 1000m and a wind speed of 8m/s is assumed for plume transport to Ireland. These provide for much move favourable conditions for dispersal than could occur in an accident situation. In particular the crucial question of inversion height in relation to the height of any accidental release is not assessed adequately. Stability on land at Wylfa may also be very different from stability over a relatively cold marine surface during summer months and the extent to which the modelling exercise differentiated dispersal conditions on this basis is also not clear. Passage over a low friction surface such as the Irish Sea also inhibits dispersion. The air over the sea passage to Ireland, especially during summer, is much more likely to be stabilised and conducive to undisturbed transport of effluent. Studies which analyse the origins of polluted airmasses over south eastern Ireland confirm that effluent from industrial sources in the UK and Europe can be carried in stratified, stable airflows over a cool Irish Sea to be mixed down to the surface on reaching eastern Ireland. The LOCA scenario therefore is based on underestimated emissions and overestimated dispersion, both of which have potentially serious consequences for Ireland.

5. Inadequate Consideration of Tectonic Risk

North Wales has a significant tectonic history as one of the most earthquake-prone areas of the UK. The largest onshore earthquake of the 20th Century occurred in Gwynedd in July 1984 and measured 5.4 on the Richter scale. This event was felt throughout most of the UK and was followed by several months of aftershocks, one of which reached 4.3 on the Richter scale. A similar value was reached in an earthquake, with an epicentre in Wales, as recently as February 2018. While these are relatively minor events they indicate a potential risk to century scale nuclear waste storage that requires greater consideration on the basis of the precautionary principle. An earthquake of 6.6 in Japan in 2007 led to the closure of all seven reactors at Kshiwazaki Kariwa. This included ABWR reactors. Subsequently 2 units were permanently closed. Earthquakes of 5.8 have been recorded historically in UK waters.

Summary

The environmental assessment provided contains several aspects which do not provide sufficient assurance that worst case scenarios for the plant have been adequately considered. These relate to the adequacy of the data on which risk assessment was based, the flooding potential and the validity of the dispersal models used to simulate long range transport of radioactive effluent. Using model output to drive further model output to drive further model output is a feature of this EIA and such procedures result in a cascade of uncertainty. More than any other in the family of planned new nuclear power stations, Wylfa poses the most immediate threat to Ireland in the event of a malfunction and should subjected to a higher degree of Irish governmental and public scrutiny than is demonstrated in this lengthy application.

Sharon Beatty

From: [redacted]
Sent: 23 January 2019 11:08
To: wylfanewydd consultation
Subject: "Transboundary environmental public consultation – Wylfa Newydd Nuclear Power Plant"

Dear Responsible

My research is based in sustainability and the SDGs and I am concerned about many impacts of the proposed development including transboundary impacts.

I have read much of the documentation but:

1. There is no or at least scant reference to the SDGs and their targets and indicators as defined by the United Nations and Europe.

2. SDG 17 is based in such cross boundary impacts – why does the documentation ignore it, its targets and indicators, why does it not discuss the impact of this plant on the SDG indicators and targets.

3. There are many SDGs which are impacted by transboundary aqueous and gaseous emissions impacting inter alia land and ocean related SDG indicators and targets, these are ignored.

4. The storage impacts of the development appear to be computer modelled and the later are only as good as their thought-architecture and their assumptions and constants. Despite this the assumptions are not made explicit – so we do not know how well these models mimmick real world conditions. These should be made explicit - as no development, not least a nuclear plant, should be sanctioned without knowing and understanding all the assumptions involved.

5. No real-world experience supports this modelling – experience of actual storage projects with recording over significant time horizons needs to be used, recording which includes impacts on all life forms, such evidence does not exist. The precautionary principle defines that in this case the development should not go ahead.

6. These points stand for the within boundary impacts too, and this surely places huge doubt on the lack of safety for UK citizens of the planning process. A planning process should demand thorough detail on all assumptions and reasons for these which impacts its citizens and other species.

Slán go fóill

Dr Vincent Carragher,

[redacted]

Ecovillage Research Paper

Research Projects

Research Projects

Article

Article

(7)

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

Submission on
Transboundary environmental public consultation – Wylfa Newydd Nuclear Power Plant

HSE Public Health Medicine
Environment and Health Group, Ireland

25th January 2019

Submission Summary

Irish stakeholders have valid concerns that should be addressed adequately, accurately and transparently towards development of better trust and understanding, in accordance with the Aarhus Convention, the Sendai Framework and transboundary environmental justice.

While the probability of a nuclear accident may be considered to be extremely small, *"remote risk is not the same as no risk at all"*[7]. How risks are perceived is important to consider in providing information on risks, prevention, protection, emergency planning and response and so on.

The preparedness and capacity of Ireland to respond to a transboundary disaster incident should be taken into account and early warning and dispersion modeling systems should maximize the protection of the Irish population.

Members of the public perceive radiation risk and nuclear power plant accidents as high dread risks *(Takebayashi et al, 2017)*

Licensed operations

While radiation exposure may increase risk of radiation cancers in those living close to nuclear power plants[1], as long as construction and facility operations are carried out safely, the health risk to people in Ireland from a nuclear power plant at Wylfa Newydd, Angelsey is likely to be negligible compared to exposure to background radiation, because of distance.

Disasters at Nuclear Power Plants

However, disastrous incidents have occurred at nuclear power plants such as happened in Chernobyl 28th April 1986 and Fukushima 11th March 2011. Fukushima is about 12,000 km distant and the additional radiation risk to public health in Ireland was considered insignificant[2], however, Chernobyl is about 3000 km distant from Ireland, and some cancer risk was estimated[3].

It is clear that a disastrous incident near Angelsey could result in considerable risks to public health in Ireland, given that measurable radiological effects in the environment were detected in Ireland after Chernobyl and Fukushima, and Angelsey is much closer geographically.

Disaster Risk Reduction

The Sendai Framework[4] makes a recommendation to "*invest in, develop, maintain and strengthen people-centred multi-hazard, multisectoral forecasting and early warning systems.*" This is particularly important given the uncertain but apparently increased disaster risks from climate change, and the need to mainstream climate change adaptation actions for all sectors. Early warning systems to inform Irish authorities should be in place.

Risk perception

Apart from measurable physical public health risk, risk perception is an important issue in relation to nuclear power plant accidents and incidents.

"*Members of the public perceive radiation risk and nuclear power plant accidents as high dread risks*"[5]. As nuclear power plant accidents are high dread risks, this may increase the perception of risk by members of the Irish population from a nuclear power plant accident. While there may be a mismatch between actual risk and perceived risk, it is paternalistic to decide about what level of risk is acceptable to someone else, without engaging with them.

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[1] Kim et al. Reanalysis of Epidemiological Investigation of Cancer Risk among People Residing near Nuclear Power Plants in South Korea. Accessible at: https://www.ncbi.nlm.nih.gov/m/pubmed/29522487/

[2] RPII. Assessment of the Impact on Ireland of the 2011 Fukushima Nuclear Accident. Accessible at: https://www.epa.ie/pubs/reports/radiation/RPII_Fukushima_Report_11.pdf

[3] RPII Report on the Chernobyl Effect on Ireland. Accessible at: http://www.epa.ie/pubs/reports/radiation/RPII_Report_Chernobyl_Effect_Ireland.pdf

[4] UN. Sendai Framework for Disaster Risk Reduction 2015 – 2030. Accessible at: https://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf

[5] Takebayashi Y, Lyamzina Y, Suzuki Y and Murakami M. Risk perception and anxiety regarding radiation after the 2011 Fukushima nuclear power plant accident: a systematic qualitative review. International Journal of Environmental Research and Public Health. 2017, 14, 1306. Accessible at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5707945/pdf/ijerph-14-01306.pdf

Irish population as a legitimate stakeholder

The Aarhus Convention requires public authorities to make arrangements "*to enable the **public affected** and environmental non-governmental organisations to comment on, for example, proposals for projects affecting the environment, or plans and programmes relating to the environment, these comments to be taken into due account in decision-making, and information to be provided on the final decisions and the reasons for it ("public participation in environmental decision-making")*"[6]

While the chance of the Irish public health being affected by Wylfa Newydd Nuclear Power Plant is small, it is not zero. In relation to the Sendai Framework, it is essential that the population of Ireland is considered a legitimate stakeholder in relation to nuclear hazards in the development and implementation of such "*people-centred policies*" in the UK, as the public health risk from a nuclear incident would extend beyond the jurisdiction of the UK. Services such as dispersion modelling need to take consideration of health risks to the public in Ireland too.

Addressing risk perception

It should also be noted that while the UK population may perceive benefits which contribute to the balance between benefits and risk acceptance[7, 8] there is no perceived benefit for people in Ireland.

The Aarhus Convention requires authorities to disseminate environmental information to the public, and this should include the Irish public. Accurate risk information needs to be given by trusted sources[5], so transparent and effective communications need to be apparent.

Conclusion

While the probability of a nuclear accident may be considered to be extremely small, *"remote risk is not the same as no risk at all"*[7]. How risks are perceived is important to consider in providing information on risks, prevention, protection, emergency planning and response and so on. The preparedness and capacity of Ireland to respond to a transboundary disaster incident should also be taken into account. Irish stakeholders have valid concerns that should be addressed adequately, accurately and transparently towards development of better trust and understanding, in accordance with the Aarhus Convention, the Sendai Framework and transboundary environmental justice.

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[6] Aarhus Convention. Accessible at: http://ec.europa.eu/environment/aarhus/

[7] Health and Safety Executive. Tolerability of risk from nuclear power stations. Accessible at: http://www.onr.org.uk/documents/tolerability.pdf

[8] Visschers VH, Siegrist M. How a nuclear power plant accident influences acceptance of nuclear power: results of a longitudinal study before and after the Fukushima disaster. Accessible at: https://www.ncbi.nlm.nih.gov/pubmed/22762151

8

An Roinn Cultúir,
Oidhreachta agus Gaeltachta
Department of Culture,
Heritage and the Gaeltacht

Our Ref: **G Pre00149/2017**
(Please quote in all related correspondence)

15 February 2019

Ms. Avril Feeney
Planning & Property Development Department
Dublin City Council
Block 4
Floor 3
Civic Offices
Wood Quay
Dublin 8

Via email: wylfanewydd.consultation@dublincity.ie

Re: Transboundary environmental public consultation – Wylfa Newydd Nuclear Power Plant

A chara

On behalf of the Department of Culture, Heritage and the Gaeltacht, I refer to correspondence received in connection with the above.

Outlined below are heritage-related observations/recommendations of the Department under the stated heading(s).

Nature Conservation

The Department, as the statutory authority with responsibility for nature conservation in Ireland, welcomes the opportunity to make observations in relation to the proposed Wylfa Newydd Nuclear Power Plant, Anglesey, North Wales, UK. The outcomes of the first and second transboundary screenings undertaken by the UK Planning Inspectorate are noted. In particular, the conclusions reached by the applicant in relation to Natura 2000 sites under the jurisdiction of Ireland in the Shadow Habitats Regulations Assessment Report are noted. The Department has no observations to make at this time and notes that the competent authority will undertake an appropriate assessment as required by Article 6(3) of the Habitats Directive in due course. The Department welcomes the opportunity for further input as the project develops.

You are requested to send further communications to this Department's Development Applications Unit (DAU) at **manager.dau@chg.gov.ie** (team monitored); if this is not possible, correspondence may alternatively be sent to:

The Manager
Development Applications Unit (DAU)
Department of Culture, Heritage and the Gaeltacht
Newtown Road
Wexford
Y35 AP90

Is mise, le meas

[redacted]

Joanne Lyons
Development Applications Unit

Sharon Beatty

From: Property Management [redacted]
Sent: 18 December 2018 09:39
To: wylfanewydd consultation
Cc: Olive.Mulhall
Subject: Transboundary environmental public consultation - Wylfa Newydd Nuclear Power Plant

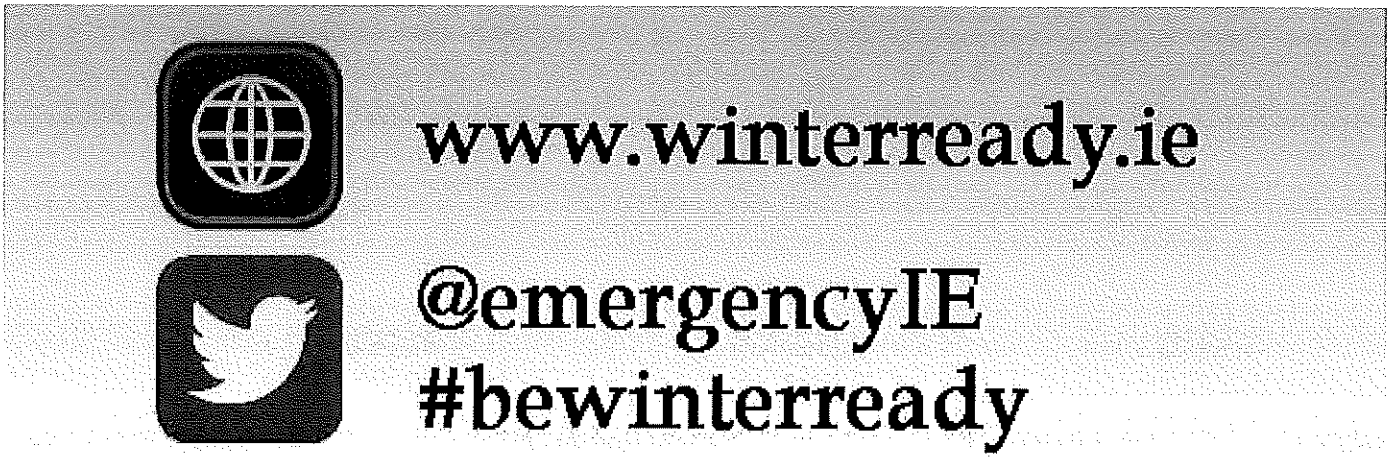
Dear Ms Feeney,

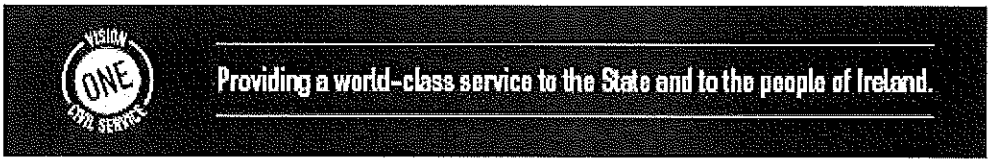
We forwarded the Planning Application Wylfa Newydd Nuclear Power Plant to the Air Corps and they have confirmed that they have no observations
on this development.

Kind Regards,

Joe Behan

[redacted]





Summary of Submissions Received
Transboundary Environmental Public Consultation 2019

Submission Number	Submission Received From	Summary of Submission
1.	Irish Aviation Authority	No Observations on this application.
2.	Transport Infrastructure Ireland	No Observations on this application.
3.	Air Corps/Department of Defence	No Observations on this application.
4.	An Taisce	1. An inadequate estimation of need and alternatives. 2. Inadequate consideration of long term sea level rise and wave climate changes. 3. Underestimation of potential radioactive release for a worst case accident. 4. The extent to which the plume dispersion models employed provide an adequate vehicle for assessing potential atmospheric transport of hazardous material to Ireland. 5. Inadequate consideration of tectonic risk.
5.	Dr Vincent Carragher	SDG's - impacts of the proposed development including transboundary impacts.
6.	Department of Defence in collaboration with the Defence Forces and the National Emergency Co-ordination Centre	"This proposed development, the associated environmental assessments and nay associated or potential transboundary effects on the effects on the environment identified would have to be taken account of with regard to Ireland's National Risk Assessment process and specifically when reviewing the likelihood and impacts that such a development may have on accessing risks for Ireland regarding Nuclear Incidents (Abroad)".
7.	HSE	States "remote risk is not the same as no risk at all". The preparedness and capacity of Ireland to respond to a transboundary disaster incident should be taken into account and early warning and dispersion modelling systems should maximize the protection of the Irish population. Other points raised:-

		1. Early warning and dispersion modelling systems should maximize the protection of the Irish population. 2. Licensed Operations 3. Disasters at Nuclear Power Plans 4. Disaster Risk Reduction 5. Risk Perception 6. Irish Population as a legitimate stakeholder 7. Addressing risk perception
8.	Department of Culture, Heritage and the Gaeltacht	Nature Conservation 1. No Observations at this time and notes that the competent authority will undertake an appropriate assessment as required by Article 6(3) of the Habitats Directive in due course. Welcomes the opportunity for further input as the project develops.
9.	Environmental Law Implementation Group at the Irish Environmental Network	Already summarise by other Local Authorities.

Summary of Submissions Received
Transboundary Environmental Public Consultation 2019

Dear Sir/Madame,

I would like to make a very brief submission as set out below on the above matter, and wish to adopt in full the submission from the ELIG Facilitator at the IEN submitted to you earlier today.

I would be most grateful for an acknowledgement of receipt of this submission at your earliest convenience.

I would further addendum to the ELIG at the IEN submission in respect of the the Article 37 Euratom submission made by the UK, (OFFICIAL Wylfa Article 37 Submission October 2017 Page 232 of 281) it states the following: (emphasis added)

"7.1.1 Radiation (Emergency Preparedness & Public Information) Regulations

801. The Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPIR) are the main set of UK regulations regulating the emergency arrangements at NPPs. REPPIR implements the articles on intervention in cases of radiation (radiological) emergency in the BSSD, except where they apply to transport by road, rail, air, sea or inland waterway. REPPIR also partly implements Council Directive 89/618/Euratom on informing the general public about health protection measures to be applied and steps to be taken in the event of a radiation emergency.

802. REPPIR establishes a framework of emergency preparedness measures to ensure that members of the public are:

• Properly informed and prepared, in advance, about what to do in the unlikely event of a radiation emergency occurring, and,

• Provided with information if a radiation emergency actually occurs.

803. A "radiation emergency" is an event that is likely to result in a member of the public being exposed to ionising radiation arising from that event in excess of certain doses including, for example, an effective dose of 5 mSv during the year immediately following the emergency.

804. **REPPIR does not prescribe the actions that an NPP operator must take in an emergency but it does require adequate on and off-site emergency plans be written to deal with reasonably foreseeable radiation emergencies.** Response plans for radiation emergencies are expected to fit within the broader resilience plans at national and local levels to give a robust command and control structure for all potential emergencies. REPPIR also requires operators to carry out assessments to identify the hazards and evaluate the risks from the work with ionising radiation. This forms the Hazard Identification and Risk Evaluation (HIRE) report"

In the context of the proximity of Ireland's east coast to the proposed Wylfa B plant, this discretion on the operator on the emergency response plan is of extreme concern. **It must be highlighted that a fresh easterly breeze of just 19 knots will bring radioactive fallout to**

Ireland's east coast and most densely populated centres around Dublin in less than 4 hours. However depending on weather condition in passing further over Ireland, radioactive contamination may actually be worse in counties like Galway if there is rainfall which brings the radioactivity out of the atmosphere and into the land and water sources.

The issues set out in the ELIG submission on the inadequacy of the atmospheric modelling in the application in assessing the possible transport of radioactive fallout to Ireland are therefore of critical concern, as are the concerns about the seeming major under-estimation of fallout which could arise, and the lack of transparency and access to source materials for the figures indicated.

Accidents by their very nature are accidental, and we and the UK are obliged to prepare for the worst.

Finally I would thank the Council for facilitating this consultation and consideration of our remarks.

Yours sincerely

J Byrne in a personal capacity and as Chair of An Claíomh Glas

Submission from the Environmental Protection Agency (Ireland) to the Transboundary Environmental Public Consultation on Wylfa Newydd Nuclear Power Plant

The Environmental Protection Agency (EPA) is at the front line of environmental protection and policing in Ireland. We ensure that Ireland's environment is protected, and we monitor changes in environmental trends to detect early warning signs of neglect or deterioration. We are also responsible for ensuring that the people of Ireland are protected from the harmful effects of radiation. Our vision is to have a clean, healthy and well protected environment supporting a sustainable society and economy.

One of EPA's statutory roles is to monitor developments abroad relating to nuclear installations and radiological safety generally, and keep the Government informed of their implications for Ireland. In 2010, the Radiological Protection Institute of Ireland[1], given its statutory advisory role to the Irish Government, was asked to carry out an assessment of the potential radiological impacts on Ireland from the programme of new nuclear power plants in the UK.

A comprehensive assessment study was developed to consider the radiological impacts of all aspects of the nuclear fuel cycle, in particular, from discharges to air and sea from the eight proposed sites (both planned discharges and potential severe accident scenarios). The assessment was carried out by RPII staff with support from atmospheric and marine modelling experts from the US (NOAA), NUIG and Met Éireann. The study design and findings were subject to ongoing review by an international peer review group.

The report of the 3-year assessment was published in 2013. The findings of this report show that severe radiological effects in Ireland are unlikely as a result of building new nuclear plants in the UK, but a socio-economic impact will be seen in the event of a severe accident which results in the contamination of the Irish environment. The executive summary of this study is included in this submission and the full report is available on:
http://www.epa.ie/pubs/reports/radiation/RPII_Proposed_Nuc_Power_Plants_UK_13.pdf

With regards to the Wylfa Newydd site, the key points from the assessment are outlined below:

Impact from day to day operations: The operation of the proposed nuclear power plant at Wylfa Newydd would result in authorised discharges of radioactivity to the air and sea. The radioactivity discharged would be transported and dispersed in the environment by normal environmental processes (such as sea currents, air mixing, etc). Environmental prediction models, combined with 21 years of historical meteorological data to allow for varying weather patterns and averaged Irish Sea currents, were used to calculate the transfer of radioactivity

[1] On August 1st 2014, the Radiological Protection Institute of Ireland (RPII) merged with the Environmental Protection Agency (EPA), with the transfer of all RPII staff and functions to EPA.

to Ireland via the air or sea. Detailed assessments were then carried out to determine the possible ways that people living in Ireland could be exposed to the radioactivity.

The resulting radiation doses estimated for the Wylfa Newydd nuclear power plant were 90,000 times lower than the annual radiation dose limit for a member of the public. It was therefore concluded in the RPII report that the routine discharges from the proposed nuclear power plant would be of no radiological significance for people living in Ireland.

Other aspects of the UK's proposed programme were also reviewed including: the process for selecting the sites; plans for fabrication of the nuclear fuel to be used; UK arrangements for radioactive and nuclear waste; and other activities associated with the proposed nuclear power plants. While there may be radioactive discharges associated with some of these activities; they would be less than those associated with the routine operation of the nuclear power plants themselves and thus would be of no radiological significance to people in Ireland.

Potential severe nuclear accidents: Five potential accident scenarios were also assessed. All involved severe nuclear accident scenarios and the corresponding potential radioactive releases to the environment. The probabilities of the severe accidents occurring ranged from 1 in 50,000 to 1 in 33 million per year. The data were used to model the impact of each of the five scenarios at a reference location on the east coast of Ireland (Dublin) over timescales ranging from 48 hours to one year after a release.

Apart from the amount of radioactivity released, weather was found to be the most significant factor in estimating the impact on Ireland. Ninety per cent of the time, during the 48 hours after a potential accident scenario, radioactivity was not transported by wind over Dublin. On those occasions when the wind was blowing the radioactivity directly towards Ireland, the predicted levels of radioactive contamination and radiation doses to people varied significantly depending on rainfall levels and on the amount of radioactivity released in the particular accident scenario.

The potential radiological impact on Ireland was found to be higher for the lower probability accidents. At one end of the scale where the chance of an accident was 1 in 50,000 per year, the impact on Ireland was predicted to be relatively small. The radioactivity levels would not be high enough to warrant short-term measures in the immediate aftermath of the accident, but food controls and/or temporary agricultural protective actions would be required for a period of days to weeks following the accident.

On the other end of the scale where the chance of an accident was 1 in 33 million per year, the impact on Ireland was predicted to be greatest. Short-term measures, such as sheltering, may be warranted in the immediate aftermath of the accident to reduce exposure of the

population and so mitigate long-term health effects. Food and agricultural produce would be heavily contaminated and food controls and protective actions would be required for many years to reduce radiation doses from consumption of contaminated food. The timely introduction of appropriate agricultural management actions and food controls would substantially reduce the radiation dose. While these controls have been shown to be very effective in controlling radioactivity levels in foods for sale, and hence radiation doses to people, they do have significant socio-economic implications and costs. These effects could last for months or years following an accident, depending on the severity of the accident.

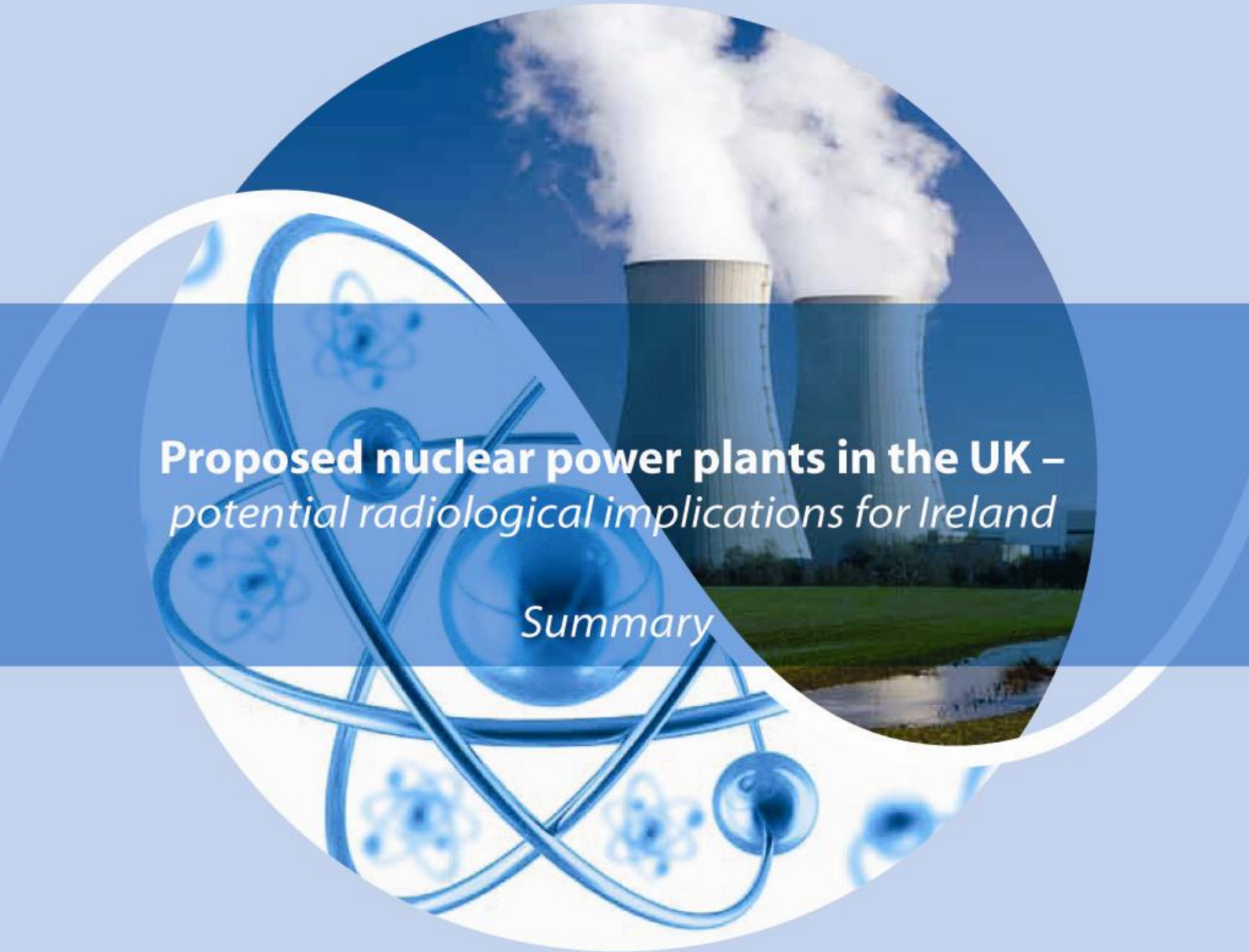
To consider these socio-economic implications and costs, the Government subsequently commissioned the Economic and Social Research Institute (ESRI) to carry out a study of the potential economic costs and losses of a severe nuclear accident. The ESRI study estimated costs and losses directly attributable to an accident, as well as any losses associated with reputational damage that might arise if Ireland was widely perceived to be within the geographical zone affected by an accident, e.g. in export markets. In particular, the analysis considered direct and reputational impacts on tourism, agriculture and food, allowing not just for the immediate effects but also the longer-run reputational effects. In addition to estimating direct impacts and reputational losses in the agriculture, food and tourism sectors the analysis also estimated second round or indirect impacts to the wider economy.

The ESRI study[2] estimated costs to Ireland of a severe nuclear accident in NW Europe (such as at Wylfa Newydd) to be between €4 and 161 billion, depending the scale (extent and duration) of the contamination in Ireland.

Non-routine discharges to the Irish Sea: A study of discharges to the Irish Sea found that for a large release of radioactivity equivalent in size to that after the Fukushima accident, the resulting radiation dose to people in Ireland who eat very large quantities of fish and shellfish, would be less than the annual radiation dose limit for the public. Given the cautious assumptions underlying the assessment, it is concluded that, beyond enhanced monitoring of the marine environment, no protective actions would be required in Ireland. However, again, there could be significant socio-economic impacts due to loss of markets for Irish fish and shellfish products.

Dr C. McMahon
Programme Manager, Environmental Protection Agency
25th January 2019

[2] https://www.dccae.gov.ie/en-ie/news-and-media/publications/Documents/17/The%20potential%20economic%20impact%20of%20a%20nuclear%20accident%20-%20An%20Irish%20Case%20Study%20ESRI.pdf



Proposed nuclear power plants in the UK –
potential radiological implications for Ireland

Summary

Radiological Protection Institute of Ireland
An Institiúid Éireannach um Chosaint Raideolaíoch

Summary

The UK Government has identified up to eight locations for the construction of new nuclear power plants by 2025; five of these locations are on the Irish Sea coast. The Radiological Protection Institute of Ireland (RPII) was requested by the Minister for the Environment, Community and Local Government to undertake an assessment of the potential radiological impacts on Ireland from this New Build Programme. This report presents the findings of the potential impacts on Ireland of both the anticipated routine radioactive discharges and of a range of postulated nuclear accident scenarios.

The principal findings are:

- Given the prevailing wind direction in Ireland, radioactive contamination in the air, either from routine operation of the proposed nuclear power plants or accidental releases, will most often be transported away from Ireland.
- The routine operation of the proposed nuclear power plants will have no measurable radiological impact on Ireland or the Irish marine environment.
- The severe accident scenarios assessed ranged in their estimated frequency of occurrence from 1 in 50,000 to 1 in 33 million per year. The assessment used a weather pattern that maximised the transfer of radioactivity to Ireland. For the severe accident scenarios assessed, food controls or agricultural protective measures would generally be required in Ireland to reduce exposure of the population so as to mitigate potential long-term health effects. In the accident scenario with an estimated 1 in 33 million chance of occurring, short-term measures such as staying indoors would also be advised as a precautionary measure. In general, the accidents with higher potential impact on Ireland are the ones least likely to occur.
- Regardless of the radiological impact, any accident at the proposed nuclear power plants leading to an increase of radioactivity levels in Ireland would have a socio-economic impact on Ireland.
- A major accidental release of radioactivity to the Irish Sea would not require any food controls or protective actions in Ireland.
- There is a continuing need for the maintenance of emergency plans in Ireland to deal with the consequences of a nuclear accident abroad.

Routine releases

As these nuclear power plants have not been built yet, it was necessary to make a number of assumptions regarding the type of reactors and the number of reactors to be developed. Upper bound assumptions were used in the assessment as to the amount of radioactivity that could be released per year during routine operation.

Environmental prediction models, combined with 21 years of historical meteorological data to allow for varying weather patterns, were used to calculate the transfer of radioactivity to Ireland via the air or sea. Detailed assessments were then carried out to determine all the possible ways that people living in Ireland could be exposed to the radioactivity.

The resulting radiation doses calculated were 10,000 times lower than the annual radiation dose limit for a member of the public. It was therefore concluded that the routine discharges from the proposed nuclear power plants will be of no radiological significance for people living in Ireland.

Severe accidents

Five potential accident scenarios were assessed. All involved severe nuclear accident scenarios and the corresponding potential radioactive releases to the environment. The probabilities of the severe accidents occurring ranged from 1 in 50,000 to 1 in 33 million per year. The data were used to model the impact of each of the five scenarios at a reference location on the east coast of Ireland (Dublin) over timescales ranging from 48 hours to one year after a release. The scenarios and their consequences are summarised in the table below.

Apart from the amount of radioactivity released, weather was found to be the most significant factor in estimating the impact on Ireland. Ninety per cent of the time, during the 48 hours after a potential accident scenario, radioactivity was not transported by wind over Dublin. On those occasions when the wind was blowing the radioactivity directly towards Ireland, the predicted levels of radioactive contamination and radiation doses to people varied significantly depending on rainfall levels and on the amount of radioactivity released in the particular accident scenario.

The potential radiological impact on Ireland was found to be higher for the lower probability accidents. At one end of the scale where the chance of an accident was 1 in 50,000, the impact on Ireland was predicted to be relatively small. The radioactivity levels would not be high enough to warrant short-term measures in the immediate aftermath of the accident, but food controls and/or temporary agricultural protective actions would be required for a period of days to weeks following the accident.

On the other end of the scale where the chance of an accident was 1 in 33 million per year, the impact on Ireland was predicted to be greatest. Short-term measures, such as sheltering, would be warranted in the immediate aftermath of the accident to reduce exposure of the population and so mitigate long-term health effects. Food and agricultural produce would be heavily contaminated and food controls and protective actions would be required for many years to reduce radiation doses from consumption of contaminated food.

The timely introduction of appropriate agricultural management actions and food controls would substantially reduce the radiation dose. While these controls have been shown to be very effective in controlling radioactivity levels in foods for sale, and hence radiation doses to people, they do have significant socio-economic implications and costs. These effects could last for months or years following an accident, depending on the severity of the accident.

Discharges to the Irish Sea

A study of discharges to the Irish Sea found that for a large release of radioactivity equivalent in size to that after the Fukushima accident, the resulting radiation dose to people in Ireland who eat very large quantities of fish and shellfish, would be less than the annual radiation dose limit for the public. Given the cautious assumptions underlying the assessment, it is concluded that, beyond enhanced monitoring of the marine environment, no protective actions would be required in Ireland.

Other aspects considered

Other aspects of the UK's proposed programme were also reviewed including: the process for selecting the sites; plans for fabrication of the nuclear fuel to be used; UK arrangements for radioactive and nuclear waste; and other activities associated with the proposed nuclear power plants. While there may be radioactive discharges associated with some of these activities; they would be less than those associated with the routine operation of the nuclear power plants themselves and thus would be of no radiological significance to people in Ireland. One issue of note from the review was the fact that, although plans are in place for the establishment of a deep geological disposal facility in the UK, no suitable final repository for spent nuclear fuel exists as yet. In the absence of a final repository being built within the necessary timeframe, the spent fuel from the New Build Programme could remain a long-term hazard which will need to be managed onsite after the proposed nuclear power plants have ceased operating.

Emergency preparedness

The findings from this assessment will be used to inform the RPII's, and Ireland's, emergency planning arrangements for nuclear accidents. The assessment of the potential impacts from severe accidents shows clearly that the most appropriate protective actions are food controls and agricultural measures, with the additional advisory of staying indoors being appropriate in the case of more severe nuclear accidents. In none of the accident scenarios studied, including the most severe one, was evacuation from the east coast of Ireland found to be an appropriate action to take.

Potential accident scenarios and consequences

Type of accident assessed	Chance of occurrence	Health impact in Ireland	Other impacts in Ireland
ST1: Severe accident caused by loss of external power (battery backups operate safety systems for about 4 hours).	*1 in 50,000 per year*	No observable health effects	No short-term protective actions would be required. Some food controls (or temporary agricultural protective actions) would likely be needed for a period of days to weeks. Additional monitoring of the environment and food required in the months following the accident.
ST2: Severe accident caused by loss of all power (battery backups also assumed to fail therefore, all safety systems quickly become inoperable).	*1 in 500,000 per year*	No observable health effects	No short-term protective actions would be required. Some food controls would be needed for a number of weeks together with agricultural protective actions for a period of months. These measures would have high socio-economic costs. Additional monitoring of the environment and food required in the months to years following the accident.
ST3: Severe accident caused by loss of power combined with bypass of the containment due to rupture of a steam generator tube.	*1 in 2.5 million per year*	No observable health effects	No short-term protective actions would be required. Some food controls would be needed for a number of weeks together with agricultural protective actions for a period of months. These measures would have high socio-economic costs. Additional monitoring of the environment and food required in the years following the accident.
ST4: Severe accident with loss of coolant combined with bypass of the containment.	*1 in 33 million per year*	Long term risk of an increase in cancer rates if the planned food controls and agriculture protective actions are not put in place	People would be advised to stay indoors as much as possible during the passage of the plume (24 to 48 hours). Food controls and/or long-term changes in farming practices would be required to ensure that long-term radiation doses from contaminated food would not reach levels that could increase cancer risks to the population. These measures would have high socio-economic costs. Additional monitoring of the environment and food required in the years to decades following the accident.
*ST5: accident with loss of coolant **and** core meltdown but largely functioning safety filtration systems.*	*1 in a million*	No observable health effects	No short-term protective actions would be required. No food controls or agricultural protective actions would be needed. Despite this, perceived contamination of food might lead to loss of consumer confidence in Irish food products for a period. No additional monitoring would be required beyond the immediate period after the accident for health protection reasons but could be required to support the Irish agri-food industry.

Radiological Protection Institute of Ireland
An Institiúid Éireannach um Chosaint Raideolaíoch

MISSION STATEMENT

To ensure that people in Ireland are protected from the harmful effects of radiation

Contact Us
Radiological Protection Institute
of Ireland
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Dublin 14
Ireland

Tel: 01 2697766
Fax: 01 2697437
Web: www.rpii.ie

Wylfa Newydd Submissions Summary

No.	Received From	Date Received	Summary
1	ELIG Environmental Law Implementation Group (Attracta Uí Bhroin)	18th Feb 2019	1. The implications of Brexit; 2. Issues arising consequent on suspension of the project and the UK's conflict of interest 3. Inadequacies with the Application 4. Failures in respect of Article 5 of the EIA Directive and the Espoo Convention, most particularly in respect of the analysis of severe accidents, and omission of basic information required 5. Failures in respect of the Habitats Directive 6. Paper to Joint Committee on Housing, Planning & Local Government 7.Submission from Nuclear Free Local Authorities.
2	ACG An Claíomh Glas (J. Byrne)	18th Feb 2019	1. Reiterate the ELIG's points 2. Article 37 Euratom Submission: - 7.1.1 Radiation Regulations - 801 – 803 - 804: **REPPIR does not prescribe the actions that an NPP operator must take in an emergency but it does require adequate on and off-site emergency plans be written to deal with reasonably foreseeable radiation emergencies** 3. "… breeze of just 19 knots will bring radioactive fallout to Ireland's east coast and most densely populated centres around Dublin in less than 4 hours" 4. Inadequate atmospheric modelling in application 5. possible transport of radioactive fallout to Ireland, its under-estimation
3	EPA Environmental Protection Agency (Ciara McMahon)	25th Jan 2019	1. Reference made to the EPA's original RPII document (included) 2. Impact from day to day operations - authorised discharge of radioactivity to air and sea. - Radiation doses - Site selection 3. Potential severe nuclear accidents - - wind, - sheltering, - food and agricultural produce contamination - socio-economic implications and costs - reputational damage 4. Non-routine discharges to the Irish Sea - fish.

4	Vincent Carragher	23rd Jan 2019	1. There is no or at least scant reference to the SDGs and their targets 2. SDG 17 is based in such cross boundary impacts – why ignore it 3. There are many SDGs which are impacted by transboundary aqueous and gaseous emissions impacting inter alia land and ocean 4. The storage impacts of the development appear to be computer modelled – guiding assumptions are not made explicit 5. No real-world experience supports this modelling 6. Within boundary impacts too - safety for UK citizens

Summary of Submissions Received Fingal County Council
Transboundary Environmental Public Consultation 2019 - Wylfa Newydd Nuclear Power Plant

Submission Number	Submission Received From	Summary of Submission
1.	Attracta Uí Bhroin, Environmental Law Implementation Group (ELIG)	• The implications of Brexit; • Issues arising consequent on suspension of the project and the UK's conflict of interest • Inadequacies with the Application • Failures in respect of Article 5 of the EIA Directive and the Espoo Convention, most particularly in respect of the analysis of severe accidents, and omission of basic information required • Failures in respect of the Habitats Directive and Matters set out in the report of Professor Steve Thomas, Joint Committee on Housing, Planning & Local Government such as • Houses of the Oireachtas issues with changes since the nuclear policy was adopted; the issues and experience of financing these projects; concerns about the strength and independence of safety regulation; and the legacy issues of waste disposal and decommissioning and the additional complexities and risks introduced consequent on Brexit, particularly the UK's withdrawal from the Euratom treaty - integral to much of the governance of nuclear matters NFLA core concerns summary set out below • The type of nuclear reactor being proposed for Wylfa B – the Advance Boiling Water Reactor (ABWRs) - have high gaseous emissions which are far more important than liquid emissions in terms of radiation doses to local people. • Bearing in mind that Hitachi is proposing to build 2 ABWR reactors at Wylfa, it can be calculated around 6 deaths will occur somewhere in the world for every year the station operates. • Over 60 years – the expected operating life for an ABWR - the total could be as much as 360 deaths. • Wylfa B would produce extremely high levels of radioactive spent fuel. In the year 2200 its spent fuel arisings would amount to ***80% of the radioactivity contained in all existing legacy wastes from the UK's nuclear power industry.*** • The requirement for 'Best Available Techniques' (and clean technology) for producing electricity should rule out building new electricity generating

		stations which produce such highly dangerous wastes. Especially as less expensive, quicker and safer alternatives are available which don't produce such wastes. • Energy efficient improvements could reduce the energy consumed in UK households each year equivalent to the output of six nuclear power stations the size of Wylfa B. • Offshore wind and solar are now both able to generate electricity more cheaply than nuclear power. If the UK had continued renewable expansion at the same rate as between 2010 and 2015 it could have achieved an all-renewable UK electricity supply by 2025. • In addition, a report from ESRI suggests, in the worst-case scenario, ***the economic cost of a nuclear accident impacting on Ireland could be as high as €161 billion.*** • An additional recent submission by NFLA / KIMO to the OSPAR Commission outlines that a full proposed UK new nuclear programme will only compound these issues and threatens the OSPAR Treaty regulations of 'close to zero' discharges into the Irish Sea by 2020 and beyond. • Sea level rises exacerbate by climate change put at risk in the medium to longer term the Wylfa B coastal site.
2.	J Byrne, Chair of An Claíomh Glas	• Supports the submission of the ELIG facilitator at the IEN referenced in submission 1 above • Geographical and meteorological concerns also set out • Concerns with level of readiness, preparation for emergencies and appropriate response to same

A Cháirde,

Please forward my submission in support of this application to the relevant authorities in the UK.

The United Kingdom will spend the next few 1000 years dealing on an ongoing basis with the legacy of their large nuclear programme which ran from the 1950s to the 1990s. The aggregate cumulative effect of a development such as this is to add another 100 years to a legacy which will last 1000s of years before radioactivity levels decrease to a safe or background level across the aggregate waste stockpile. I doubt whether this development will add more than a small fraction of 1% to this accumulated stockpile.

The site is located where 2 reactors were previously run for 50 years with no safety breaches and a competent safety inspectorate, skilled nuclear operatives, and an established safety culture are all in situ.

The site is also located in an area where Ireland may itself choose to build a nuclear reactor, we do not have a competent nuclear supervisory authority in Ireland and were we ever to decide on having a nuclear strategy of our own then Wylfa is a mere 100kms from Dublin, unlike Moneypoint which is nearer 300km away.

I also do not believe that Galway County Council should waste its time objecting to this development, such an objection would simply serve to make us look stupid…..not that some of our elected representatives could not be relied upon not seek cheap publicity by advocating such a course of action.

Is Mise Le Meas.

Cormac Ó Murchú

I wish to object to this going ahead as it will have a detrimental effect on our seas and environment for years to come.

thanks

Summary of submissions received by Galway County Council
Transboundary Consultation -Wylfa Newydd

Submission Number	Submission Received From	Summary of Submission
1.	Cormac O'Murchú	• Supporting application • UK already must deal with aggregate nuclear waste stockpile and this will only add about 1% to this accumulated stockpile • Site located near 2 reactors which have had no safety breaches in 50 years • Ireland may decide to build a nuclear reactor and as this is only 100km from Dublin, near to competent nuclear supervisory authority • He doesn't believe this local Authority should waste it's time objecting to this development as it would make us look stupid.
2.	Emma Marie Mone	• Objecting to development as *it will have a detrimental effect on our seas and environment for years to come*
3.	J Byrne in a personal capacity and as chair of An Claíomh Glas, Lucan, Co Dublin	• Refers to the submission from the ELIG Facilitator at the IEN • Goes on to talk about Radiation Preparedness & Public Information Regs • Easterly breeze would bring radioactive fallout to Dublin in less than 4 hours, and depending on weather conditions contamination may be worse in counties like Galway

Summary of submission of Joint Committee on Housing, Planning and Local Government[1] – on the Transboundary Environmental Consultation for Wylfa Newydd

As part of its examination the Joint Committee for Housing, Planning and Local Government (the Joint Committee), accepted submissions from:

a) Prof. John Sweeney, NUI, Maynooth; b) Prof. S. Thomas, Emeritus Prof. of Energy Policy, University of Greenwich and; c) Ms. Attracta Ui Bhroin, Vice Chair of An Claíomh Glas.

Recommendations and Observations from the Joint Committee on the potential transboundary environmental effects of the proposed nuclear power plant at Wylfa Newydd:

1. Ireland's proximity (118km) to Wylfa increases potential for contamination from accidental release of large quantities of radioactive isotopes.

2. Committee has concerns about safety record of the developer due to two serious safety breaches. $2.7m fine in US & difficulties on reactor pressure vessel in Fukishima plant.

3. Committee considers there is no economic justification for Wylfa due to falling electricity demand

4. Inadequate consideration of impact of sea level rise and wave climate change on site stability, especially for storage of radioactive waste on site.

5. The Committee recommends that use of a longer time-period for the analysis for assessing coastal flooding and erosion.

6. Inappropriate emissions figures used for core meltdown calculation. The Committee is concerned that the underestimate in emissions figures skews impact models used for potential human & agricultural impacts on Ireland from accident at Wylfa.

7. Committee recommends use of higher emission figures to ensure plume dispersion model provides more accurate and reliable data for downstream impacts on Ireland due to significant consequences for Ireland from accident. An easterly wind of 18 knots would deliver radioactive material to Dublin in six hours and evacuation would be impossible.

8. Committee deems sole use of Gaussian model as an insufficient metric for modelling transport of radioactive material. This model would not have predicted the transport of radioactive material to Ireland from Chernobyl, a transfer that did in fact occur following that disaster.

9. Committee considers assumptions for plume dispersion model to be inadequate. The Committee recommends the following changes:

a) Use site-specific obs to drive air dispersion models;

b) Use at least 30 yr. period of Meteorological data for climate conditions at Wylfa site - as recommended by World Meteorological Society;

c) Use more appropriate figures for layer depth and wind speed for more realistic assessment of plume transport to Ireland in event of nuclear accident;

[1] The Joint Committee is comprised of members of the Oireachtas (Parliament) chosen by one or both Houses of the Oireachtas (Parliament) and shadows the work of the Department of Housing, Planning and Local Government. It is similar to a Select Committee in the UK. Further information is available at these links https://www.oireachtas.ie/en/committees/our-role/ and https://www.oireachtas.ie/en/committees/32/housing/

d) An adequate study of inversion height in relation to height of any accidental release from Wylfa;

10. Gross underestimate of population figure for Dublin used (515,255), but the 2016 census records population of Dublin City and suburbs as 1,173,179. The Committee recommends that the assessment for population exposure be carried out again with a correct population figure.

11. The Committee considers tectonic factors have not been adequately considered. The Committee recommends assessment of Wylfa take into consideration the risk posed to the development by tectonic factors specific to North Wales, including greater consideration of risk to nuclear storage from earthquake activity.

12. The Committee notes that delays in constructing new nuclear plants means extending the lifetime of existing plants. The Committee is not in favour of using nuclear facilities beyond their lifetime and recommends an increase in inspections for those stations to ensure all safety requirements are met.

13. The Committee recommends that the DHPLG consider concerns in the Expert submission of Austrian Government for this transboundary consultation.

14. The Committee recommends that all necessary steps are taken to protect Ireland's natural and marine environment from contamination in the event of an accident and that such ecological considerations are examined in depth as part of any evaluation of Wylfa project.

Appendix II - submissions to Joint Committee

Evidence of Prof. Thomas, Emeritus Prof. of Energy Policy, University of Greenwich and Attracta Ui Bhroin, Vice Chair of An Claíomh Glas

1. Increasing costs and Government placing a large public stake in Wylfa while unwilling to look at renewables means safety will be compromised to ensure profit. Queries UK's ability to be objective

2. ABWR design for Wylfa is an update of a design used in plants in Japan, including Fukishima- includes safety improvements but brings unproven elements.

3. Queries ONR's independence – outstanding design issues on Hinkley unresolved until construction stage. Allowing old reactors to continue past previous limits to ageing, due to delays with new plants.

4. Risks posed by Brexit uncertainty – economic and regulatory -loss of Euratom expertise & independent oversight

5. Decommissioning and GDF facilities are decades away. Until these tasks are completed, new reactors add to risks posed to Ireland. Refers to 1976 Flowers Report – must <u>establish beyond a reasonable doubt</u> a safe GDF method for storing high-level nuclear waste before committing to a large nuclear programme. No such GDF exists in the world.

An Taisce submission

1. An inadequate estimation of need and alternatives.

2. Inadequate consideration of long-term sea level rise and wave climate changes.

3. Severe underestimation of potential radioactive release for a worst-case accident – refers to discrepancy identified by Austrian Government in its submission - much higher figures have been used in comparable EIA for nuclear plant in Czech Republic.

4. The extent to which the plume dispersion models employed provide an adequate vehicle for assessing potential atmospheric transport of hazardous material to Ireland

5. Inadequate consideration of tectonic risk for North Wales area

An Claíomh Glas submission - Attracta Ui Bhroin

1. Recommends Committee call on UK not to permit Wylfa in line with submission from German Federal State.

2. Gross underestimate of population for Dublin in accident risk analysis – needs to be reassessed

3. ESRI 2016 report highlights economic cost to Ireland of worst-case scenario nuclear release as €161 billion

4. Refers to evidence of Prof. Thomas and Attracta Ui Bhroin on the following:

- Conflict of interest for UK in governance and operation – safety vs profit
- Renewable technology cheaper – UK could have had all renewable supply by 2025
- Outstanding design and technical issues on ABWR
- Independence of ONR
- Economic and regulatory risks from Brexit
- Advancing new plants in absence of GDF solution unacceptable – decommissioning and GDF must be part of EIA in light of obligations under EIA Directive.
- Risks of extending lifetime of existing plants – cascaded accidents not adequately assessed

5. Shares concerns/obs of An Taisce on the following:

- An inadequate estimation of need and alternatives.
- Inadequate consideration of long-term sea level rise and wave climate changes.
- Inadequate plume dispersion modelling with regard to Ireland.
- Inadequate consideration of tectonic risk for North Wales area
- Severe underestimation of potential radioactive release for a worst-case accident

6. Adopts entirety of Austrian Government's submission and its queries

7. Adopts in full submission prepared by Nuclear Free Local Authorities

8. UK cannot rely on robustness of regulatory regime to decide risks from Wylfa are not significant

9. Risks from proposed undersea coalmine in Cumbria and potential cumulative impacts with Wylfa should have been considered in assessment of impacts on cetaceans under Habitats Directive.

10. Concerns about robustness of reactor vessel, secondary & emergency systems in terrorist attack.

11. Concerned Irish public will not have ability to challenge UK post Brexit under UN Conventions.

12. Criticises Irish Government for conduct of Wylfa Newydd transboundary consultation – timing, volume of documentation, no guidance on complex documentation etc.

The Joint Committee makes the following observations in regard to the potential transboundary environmental effects of the proposed development of the Wylfa Newydd Nuclear Power Plant, Anglesey, North Wales:

1. The Committee considers that the proposed development of the Wylfa Nuclear Power Plant does have the potential to impact Ireland. The Committee notes the close proximity of the proposed plant to Ireland (118km/90 miles). The potential for an accident at Wylfa to contaminate Ireland (through the accidental release of large quantities of radioactive isotopes) is increased due to its proximal location.

2. The Committee notes that the company involved in developing the Wylfa power plant (Hitachi GE) has previously had two serious safety breaches. The company has received a fine of $2.7mn in the United States relating to the development of a nuclear facility and construction difficulties also occurred with regard to a reactor pressure vessel in the Fukishima power station in Japan.

3. The Committee notes that UK electricity demand continues to fall and that 2018[1] electricity consumption levels are equivalent to those of 1994. Taking into account advances in energy efficiency and changes in consumer behaviour, the Committee considers that the economic justification for investing in developing nuclear power stations is lessened. Whilst acknowledging that it is the sovereign right of the United Kingdom to pursue its own energy mix, the Committee considers that it may be more economically viable to explore alternative models that focus on renewable energy sources.

4. The Committee is of the opinion that the Wylfa proposal does not adequately consider the potential for sea level rise and wave climate changes to affect the stability of the site as regards storage of radioactive waste. Evidence received by the Committee indicates the likelihood of continued sea level rises over several centuries. With sea levels potentially rising by three metres, the suitability of the current site to store radioactive waste until and beyond 2170 is a valid concern.

5. The Committee recommends that the analysis conducted in the assessment regarding coastal flooding and erosion should be extended to cover a lengthier period of time.

6. The Committee is of the opinion that the emission figures used for calculation of a core meltdown accident at Wylfa are not appropriate. Furthermore, the Committee expresses reservations that this underestimate in emission figures skews the impact models used to determine potential human and agricultural impacts in Ireland arising from a nuclear accident at Wylfa.

7. The Committee has been informed that the consequences for Ireland of a nuclear meltdown at Wylfa are significant. An easterly wind of 18 knots would deliver radioactive material to Dublin in six hours and that evacuation would not be possible. The Committee recommends that the assessment use higher emission figures so as to inform the plume dispersion model and provide more accurate and reliable data concerning downstream impacts for Ireland.

8. The Committee notes that both of the plume dispersion models employed for assessing potential atmospheric transport of hazardous material to Ireland were based on Gaussian models. The Committee deems the sole use of Gaussian models as an insufficient metric when modelling transport of radioactive material. The Committee is aware that such a model would not have predicted the transport of radioactive material to Ireland in the aftermath of the Chernobyl nuclear disaster which in fact occurred.

[1] Since 2008 electricity demand has fallen by 15 per cent.

9. The Committee considers the assumptions underpinning the plume dispersal model in the assessment as inadequate. The Committee recommends a number of changes including:

    - The use of site specific observations to drive air dispersion models;
    - The use of at least a 30-year period[2] of meteorological data to characterise climate conditions in the Wylfa site;
    - The use of more appropriate figures for layer depth and wind speed[3] to present a more realistic assessment of plume transport to Ireland in the event of a nuclear accident;
    - The adequate study of the inversion height in relation to the height of any accidental release from the Wylfa nuclear power station.

10. The Committee notes that the nearest major international hub to Wylfa is listed as Dublin. The Committee considers the figure provided for population exposure in Dublin (515,255) as grossly underestimated. The 2016 census return details the population of Dublin City and Suburbs as 1,173,179[4] and the population for the Greater Dublin Area increases to just under two million people. The Committee recommends that the assessment review the figure provided for in terms of exposure of the population of Dublin and substantially increase the figure to reflect the correct population level.

11. The Committee notes that North Wales is one of the most earthquake-prone regions in the United Kingdom. Earthquakes occurred in both 1984[5] and more recently in February 2018. The Committee considers that the tectonic risk posed, as evident from historical episodes, is not adequately considered in the Wylfa proposal. The Committee recommends that the assessment of the Wylfa proposal take into consideration the tectonic factors specific to the region and that greater consideration is given to nuclear waste storage in the context of earthquake activity.

12. The Committee notes that the commitment to developing nuclear plants is linked to extending the lifetime of existing nuclear facilities insofar as delays in the construction phase of new plants mean the continued use of established stations beyond their prescribed timelines. The Committee considers the use of nuclear facilities beyond their recommended timeframe to be sub-optimal. The Committee recommends that such power stations be subject to increased inspections to ensure that all safety requirements are met and to protect such structures from cracking, erosion and distortion – all of which have safety implications.

13. The Committee recommends that the Department of Housing, Planning and Local Government familiarise itself with and consider the concerns highlighted in the Expert Submission prepared by the Austrian Government in its engagement with the Transboundary Consultation.

14. The Committee notes that in conducting initial and subsequent screening decisions for the Wylfa Plant, the UK acknowledged the likelihood of significant impacts for Ireland. Impacts identified extended to the natural environment including impacts on birds, marine mammals (dolphins and porpoises) particularly in the context of Natura 2000 sites in Ireland. The Committee recommends that all necessary steps are taken to safeguard both Ireland's natural and marine environment from possible radioactive contamination arising from a nuclear incident and that such ecological considerations are examined in depth as part of any evaluation of the Wylfa project.

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[2] The World Meteorological Organisation recommends at least a 30 year period. The assessment for Wylfa uses a10 year period.

[3] The Assessment uses a mixing layer depth of 1000 metres and a wind speed of 8m/s which provide for much more favourable conditions for dispersal than could occur in an accident situation.

[4] https://www.cso.ie/en/media/csoie/releasespublications/documents/population/2017/Chapter_1_Population_change_and_historical_perspective.pdf

[5] The 1984 earthquake measured 5.4 on the Richter scale.

Appendix I – Committee Membership

Joint Committee on Housing, Planning & Local Government

Committee Membership:

Deputies

Maria Bailey (Fine Gael) (Chairperson)

Pat Casey (Fianna Fáil) (Vice Chair)

Ruth Coppinger (Solidarity-PBP)

Mattie McGrath (Rural Independent Group)

Darragh O'Brien (Fianna Fáil)

Eoin O Broin (Sinn Féin)

Fergus O'Dowd (Fine Gael)

Senators

Victor Boyhan (Independent)

Martin Conway (Fine Gael)

Jennifer Murnane O'Connor (Fianna Fáil)

Grace O'Sullivan (Green Party)

The Wylfa Newydd nuclear power plant project Evidence to the Joint Committee on Housing, Planning & Local Government Houses of the Oireachtas

Professor Steve Thomas, Emeritus Professor of Energy Policy, University of Greenwich and Attracta Uí Bhroin, Vice Chair of An Claíomh Glas

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1. Preamble

The invitation to make a submission to the Committee is most welcome and appreciated, as is the opportunity to reflect positively on its previous report on Hinkley Point C, following the hearing on May 1st 2018. It is hoped that the following considerations will be of interest and use to the Committee in its deliberations.

2. Introduction

The Wylfa Newydd project involves the construction of two Advanced Boiling Water Reactors (ABWRs), 2.9GW, supplied by Hitachi-GE on Anglesey, at the site of a 'Magnox' nuclear power station retired in 2015, less than 90 miles from Dublin and Ireland's most densely populated east coast. The current owner and developer of the site is Horizon, a wholly owned subsidiary of the Japanese reactor vendor, Hitachi. It also owns the Oldbury site in the Severn Estuary, where it also plans to build two ABWRs. This is also on the west coast of the UK, facing Ireland.

Despite the difficulties, outlined below, encountered with the Wylfa project and its nuclear programme in general, the UK government's commitment to its nuclear programme appears undiminished and, for Wylfa, the latest proposal is that the project is rescued by the UK government taking a substantial equity stake in it. It must therefore be concluded that the UK government is willing to go to extraordinary lengths to keep its nuclear policy from failing.

In light of issues outlined below, the UK government's objectivity regarding this project must be questioned and concerns raised given the extent of conflict of interests presented by its role as project developer/bankroller, power purchaser and consenting authority. This is particularly in light of its role in the various consents required for the project; the multiplicity of critical decisions regarding the adequacy of the proposals; the invariable implications for the regulatory authorities involved; the consequential tensions arising between cost and time to deliver versus safety and quality standards. These all need to be considered in the context of: the delivery of the plant; its future operation; and it's decommissioning. The core issues set out below address: issues with changes since the nuclear policy was adopted; the issues and experience of financing these projects; concerns about the strength and independence of safety regulation; and the legacy issues of waste disposal and decommissioning and the additional complexities and risks introduced consequent on Brexit, particularly the UK's withdrawal from the Euratom treaty - integral to much of the governance of nuclear matters. We submit these are all key considerations for the Committee in considering Irish interests as part of the transboundary consultation.

3. The UK nuclear power policy

The UK government's policy on nuclear power[1] was set out in its 2008 White Paper on nuclear, in which it stated the decision to build nuclear capacity would be a commercial one taken solely

[1] While the policy outlined is the UK policy, there are variations between the constituent nations. There have never been any plans for nuclear power plants in Northern Ireland. In Scotland, there are two retired Magnox plants (Hunterston A and Chapelcross) and two operating AGRs (Hunterston B and Torness). The devolved Scottish government's policy, that the Westminster government is honouring, is that there should be no more nuclear plants but it has no specific policy to impose a phase-out of the two existing plants while they are still licensable. The devolved government of Wales, site of two retired Magnoxes including Wylfa (and Trawsfynydd) and the proposed ABWR at Wylfa does not have a specific policy on nuclear power.

by private companies.[2] It also claimed that the cost of power from new nuclear power plants would be comparable to power from fossil fuel sources and, as a result, new nuclear capacity would require no public subsidies. It based these assumptions on a forecast that the construction cost of reactors of the size of Wylfa or Hinkley Point would be about £2bn (excluding finance charges). These forecasts have proved to be hopelessly inaccurate with the two Hinkley Point C reactors expected to cost about £10bn each on the same basis.[3] There is no evidence to suggest other designs of reactor such as the ABWR will be any cheaper to build and operate than the EPR design planned for Hinkley Point so it is not simply the case that the UK chose the wrong design for Hinkley.

Since 2008, far from growing by 15 per cent as the government forecast, electricity demand has fallen by 15 per cent with further reductions expected, so the need for new capacity of any type is dramatically reduced.[4] While the expected cost of nuclear plants has increased steeply since 2008, the cost of renewables has plummeted. The kWh price of new off-shore wind farms tendered in 2017, a technology not even commercially demonstrated in 2008, fell to about a third of the price offered in 2013 and not much more than half the price agreed for Hinkley Point. Rather than re-assess the policy and the scale of the nuclear programme in the light of these remarkable changes, the UK government has continually compromised from the principles set out in its 2008 White Paper. It is offering massive public subsidies including 35-year contracts to buy all the power at a guaranteed real price more than double the current wholesale electricity market price. For Wylfa, in 2018 it even agreed to take a direct equity stake in the plant of a third or more.[5]

Three consortia were created in 2009 to build nuclear plants in the UK and the government sold them sites of existing reactors to build new plants on. These consortia were Horizon (Wylfa and Oldbury), NuGen (Moorside/Sellafield) and NNBG (Hinkley Point and Sizewell). Their plans added up to 16GW of new nuclear capacity that was to be on-line by 2030 and that projection has been the basis of UK government statements on the nuclear capacity in place by then. The new reactors would be completed at about the same time as the existing nuclear capacity would be retired ensuring the nuclear share of generation would not fall. This would mean the output of existing reactors, which accounts for about 20 per cent of UK generation, would be more than replaced and would take the nuclear share up to about 40 per cent – as electricity demand falls, the nuclear share would increase even more. All three consortia were originally owned by large European utilities with Horizon set up by the two large German utilities, EON and RWE. However, since 2009, the utilities have all withdrawn apart from EDF, which controls NNBG. In 2012, RWE and EON sold Horizon to Hitachi. Subsequently, NuGen was bought by another Japanese reactor vendor, Toshiba, which then owned the US reactor vendor Westinghouse. The clear motivation for Hitachi and Toshiba was to create markets for reactors they would supply.

A fourth consortia was set up in 2015 led by the Chinese reactor vendor and utility, CGN, to build reactors of Chinese design (Hualong One) at the Bradwell site in the East of England.

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[2] https://www.gov.uk/government/publications/meeting-the-energy-challenge-a-white-paper-on-nuclear-power

[3] Finance charges might add about 50% to the construction cost depending on the interest rate on finance.

[4] https://www.theguardian.com/uk-news/2017/jul/05/nuclear-is-to-wind-as-betamax-is-to-netflix-why-hinkley-point-c-is-a-turkey

[5] https://www.gov.uk/government/speeches/statement-to-parliament-on-horizon-project-at-wylfa-newydd and https://www.ft.com/content/3334a6e6-67ff-11e8-8cf3-0c230fa67aec

This project is generally seen as behind the others in terms of when its reactors will be complete, but as delays accumulate at the other sites, it may be that the Chinese offer will be fast-tracked to fill the gaps created.

In terms of their asset value, reactor vendors are relatively small companies compared to the cost of a nuclear power plant and there was never any prospect that Hitachi and Toshiba could own a significant part of the plants they built. Their plan was apparently to develop the sites then sell the plants on to investors with much larger resources, while ensuring sales of their reactors.

In 2017, the Westinghouse reactor company went bankrupt almost taking the whole of Toshiba with it and the Moorside project has effectively been abandoned with the site likely to revert to the UK government. CGN has indicated that it believes the Moorside site is attractive and it may use the Moorside site in place of, or in addition to the Bradwell site.

4. Progress with sites

It now appears highly likely that, at most, only a small fraction of the UK government's target of 16GW of new nuclear capacity will be on-line by 2030. In 2010, EDF forecast first power from Hinkley Point would be in 2017. Latest estimates are that this will not be much before 2027. All other projects are several years behind Hinkley Point. Contracts between NNBG and the UK government binding both sides to the Hinkley Point project were only signed in October 2016. Up to that point, expenditures by NNBG and the government were at their own risk and that is still the case for all the other projects. Hitachi claims to have spent about £2bn so far on the Wylfa project.[6] Construction at Hinkley Point only started in December 2018.[7] Hinkley Point is far ahead of the next plants in the queue, which were Moorside, before its abandonment, and Wylfa. Negotiations with the government have begun for Wylfa but there is no indication of when contracts are expected to be signed for it. The Sizewell, Oldbury and Bradwell projects are behind Wylfa in terms of development.

The expectation in 2008 was that the new plants would replace most of Britain's existing nuclear capacity, the seven Advanced Gas-cooled Reactors (AGRs), from 2017 onwards. However, as the expected completion dates for the new plants slips, by a decade or more, there is pressure on the safety regulator, the Office of Nuclear Regulation (ONR), to allow the AGRs to continue in service **up to two decades beyond their design life**. By 2019, the two oldest plants, Hunterston B and Hinkley Point B, will have been in service for 43 years, 18 years beyond their design life. In 2016, the ONR had approved their continued operation, in principle, to 2023. This is despite the significant concerns which have arisen around the development of keyway cracks in the graphite blocks of the Hunterston B reactor, and the evident inability of EDF to model and understand these issues fully. (see Appendix 2). This issue of cracking will inevitably arise with the other AGRs. In short, the matter of the UK's commitment to new nuclear plants is directly linked to the pressure to extend the lifetime of existing nuclear plants given the now invariable slippages in delivering the new plants. Thus any consideration of the risks associated with the new plant strategy must also include consideration of the risks

[6] https://www.thetimes.co.uk/article/hitachi-may-drop-nuclear-bombshell-rjxnvmt0j

[7] The International Atomic Energy Agency defines construction start as pouring of first structural concrete, which is when spend increases significantly. Preliminary site works started several years before but these are relatively cheap.

presented by extending these old plants, particularly from an Irish perspective given its proximity to the UK.

5. Finance

An important issue that underlies the delays and the other problems with all the UK's nuclear projects is finding investors large enough to own an asset likely to cost around £30bn. Of the large utilities in Europe, which would have the financial capability to take on these plants, all except EDF have withdrawn from nuclear investment and, for Sizewell, even a utility as large as EDF cannot afford the cost, and a new financial model is being developed that will mean EDF will not take an equity stake (see Appendix 1 for further detail on funding models). The high price agreed for power from Hinkley Point (see below) proved so unpopular that it was clear to the government that different financial arrangements that would at least give the appearance of providing a lower price of electricity would be required for subsequent projects. The government hopes the Sizewell proposals (see Appendix 1) will form the model for subsequent nuclear projects and it has said it expects the proposal for Wylfa with a large government equity stake will be a one-off.[8] However, if the Sizewell proposals are not viable, the possibility of the government using the Wylfa model for other projects cannot be discounted.

Even though Japan has a 60-year history of reactor construction in Japan, until recently Japanese vendors have not attempted to win export orders. Despite the Fukushima disaster, from 2010 onwards the Japanese government has offered strong support in export markets for the three Japanese reactor vendors, Hitachi-GE, Toshiba and Mitsubishi. However, despite Japanese government support, they have still yet to win any orders. It appeared Mitsubishi had won a large order to Turkey but this collapsed and it has no other realistic prospects. A deal brokered by the Japanese government to supply Japanese reactors (vendor not specified) to Vietnam also collapsed. Toshiba has no sales prospects and Hitachi-GE's only prospect is the Wylfa order.

The Japanese government is therefore putting its full weight behind Hitachi for Wylfa with offers of loan guarantees to facilitate financing the plants and promises of identifying Japanese investors willing to buy stakes in Wylfa. After negotiations between Hitachi and the UK government in May 2018, Greg Clark, the UK Secretary of State for Business, Energy and Industrial Strategy (BEIS), reported to Parliament on these negotiations. He told it[9]:

> '.. for this project the Government will be considering direct investment alongside Hitachi, and the Japanese Government agencies and other parties.'

Clark confirmed the UK government's commitment to its nuclear programme – 'The UK is likely to need significant new nuclear capacity in order to meet our carbon reduction commitments at least cost'. However, he made it clear that the deal for Wylfa with a substantial public equity stake was a one-off (see Appendix 1 for a brief description of the regulated asset base model):

> 'It remains the Government's objective in the longer term that new nuclear projects like other energy infrastructure should be financed by the private sector, and so alongside our

8 https://www.gov.uk/government/speeches/statement-to-parliament-on-horizon-project-at-wylfa-newydd
9 https://www.gov.uk/government/speeches/statement-to-parliament-on-horizon-project-at-wylfa-newydd

discussions with developers we will be reviewing the viability of a regulated asset base model as a sustainable funding model based on private finance for future projects beyond Wylfa'

There are few details in the public domain on what the make-up of the ownership package for Wylfa will be but there are strong indications that the UK government is prepared to take at least a third stake in the project. There are also reports of the UK government providing two thirds of the cost, perhaps through a mixture of its own investment and through deals it has brokered with other investors. From the Japanese side, it seems unlikely that Hitachi has the financial strength to take any more than a token stake. It appears the Japanese government is not able to take an equity stake but might be able to broker some investment perhaps through government-owned agencies or Japanese utilities. By December 2018, there was no evidence of interest by any UK or Japanese investors. Given the extent of compromises made already by the UK government, the possibility of the UK government even increasing its proposed stake to a majority if other investors cannot be found cannot be discounted. If a deal can be done, a 'Contract for Differences', and a 'strike price' as for Hinkley Point (see below) would be determined. To fulfil the government's priority of getting a price substantially lower than the Hinkley Point price, the government could offer a further subsidy, for example, paying some of the interest charges, or it could pass some of the project risk on to consumers so that the strike price would go up if costs were higher than expected. These risks would include construction cost overrun, poor reliability and high operating cost. Thus the financial considerations of the project are likely to be inevitably linked and integral to how the risks associated with the project is developed and the plant operated into the future, and thus a key consideration from an Irish perspective, particularly given the multiple hats the UK Government will be wearing on this project.

The UK will still be subject to EU state-aid legislation, as Clark acknowledged in his statement to Parliament – 'the successful conclusion of these negotiations will of course be subject to full Government, regulatory and other approvals, including but not limited to value for money, due diligence and State Aid requirements'. Given that it is clear that state-aid measures needed for Wylfa will be even more extensive than for Hinkley Point, this could be a major barrier to the project. By January 2019, it was unclear what the terms of the UK's exit from the EU would be, indeed whether it would leave at all. The extent to which Brexit and the jurisdiction of the EU on such matters will impact consideration of the legitimacy of otherwise of the state aid provided by the UK is therefore yet to be determined, and may prove to be an important factor in all such considerations.

Despite earlier reports that negotiations between Hitachi and the UK government were going well, in mid-December 2018, it was reported that the talks were deadlocked.[10] The negotiations are rather strange in character given that the buyer of the power is the UK government while on the other side of the negotiations is Hitachi, a company unlikely to have a significant equity interest in Wylfa. For Hitachi, the priority would appear to be getting any deal that allows them to sell reactors at a profit. The largest element of the body selling the power is likely to be the UK government. So, in effect, the UK government is negotiating with itself.

[10] Japan Economic Newswire 'Hitachi may freeze British nuclear project due to swelling costs' December 16, 2018.

6. Cost of power

There is no authoritative estimate of the construction cost of the Wylfa ABWRs with the press quoting a wide range of numbers. Earlier forecasts by Hitachi of construction start in 2020 are clearly now infeasible but there are also no authoritative recent estimates of when Hitachi expects Wylfa to be completed. Given that there is absolutely no evidence that reactor designs other than the EPR planned for Hinkley Point would be cheaper to build and operate and more reliable, the only ways prices could be reduced would be a) shifting risk away from the plant owner to consumers and/or taxpayers - making the project less risky to its owners would make finance cheaper and easier to obtain - or by b) increased public subsidy.

The issues of concern with how the UK government proposes to pursue Wylfa B need to be viewed in the context of the unpopular Hinkley Point deal. At the heart of the Hinkley Point deal, there is a 'contract for differences' (CfD) and a 'strike price'. In simple terms, these add up to a take-or-pay contract between the plant owners and a UK government agency to buy all the power produced (plus that which could be produced if the power cannot be used) at a fixed price that goes up with inflation for the contract duration of 35 years.

The size of the strike price received almost universal condemnation, for example from the National Audit Office, Select Committees and independent analysts. The strike price of £92.5/MWh (2012 prices) is more than double the wholesale electricity price over the period since it was agreed in 2013. It is also far above renewables prices and, for example, the most recent prices (2017) for off-shore wind power were as low as £57.5/MWh (2012 prices) with every expectation that real prices would continue to fall. On-shore wind is cheaper still. Despite this, the UK government has withdrawn incentives for renewables other than off-shore wind, with no more on-shore wind capacity allowed, subsidies for solar panels have been removed and owners of solar panels will no longer be paid for any surplus power they export to the grid. It is hard to avoid the conclusion that the government is actively discouraging renewables investment to ensure there is plenty of space in the market, even allowing for falling electricity demand, for new nuclear capacity regardless of the cost to consumers. The motivation for this extraordinary position is unclear, but may be linked to the desire to pave the way for future trade deals outside the EU post-Brexit with countries like Japan and China, and other countries interested in nuclear matters and products.

Any deal for a nuclear plant that does not involve a substantially lower strike price than given to Hinkley Point – the government has talked in terms of a price reduction of up to 20 per cent – would be politically hard to sell.

7. The Design

The ABWR is often portrayed as being a design with proven construction and operational experience.[11] This is based on the fact that four ABWRs were completed, all in Japan, with another four under construction, two in Japan and two in Taiwan. These were supplied by combinations of Hitachi, Toshiba and GE, who collaborated in the original ABWR design. However, all the operating reactors and those under construction use the original 1986 (pre-Chernobyl) design. This was updated for the US market where it was given regulatory approval

[11] For a detailed review of ABWR experience see S Thomas (2018) 'The failings of the Advanced Boiling Water Reactor (ABWR) proposed for Wylfa Nuclear Power Station' Greenpeace. https://www.greenpeace.org.uk/abwr-briefing/

in 1997. However, the 1997 design was never ordered and regulatory approval expired in 2012. By this time, the collaboration between Hitachi, GE and Toshiba had ended and Hitachi-GE (for non-US markets), GE-Hitachi (for US markets) and Toshiba were offering their own individual versions of the ABWR.

The version Hitachi-GE is offering in the UK is a further update to the 1997 US design, for example, including requirements arising from the 9/11 attack on the World Trade Centre, such as an outer shell capable of withstanding a direct impact by a passenger jet plane. Hitachi has stated that meeting the ONR's requirements had substantially increased the cost of the ABWR.[12]

The design that is to be built at Wylfa must therefore been seen as substantially different to those built or under construction. While this may bring safety improvements it also introduces unproven elements. Experience with the four operating reactors all of different specification is mixed. All were built in 4-5 years, far quicker than reactor construction in most other countries but typical of reactor construction times in Japan. However, reliability has been poor and up to the Fukushima disaster (since then the reactors have been shut down), the load factor over the 36 reactor years of experience was about 60 per cent compared to the 90 per cent Hitachi is claiming Wylfa would achieve. The load factor is the output produced as a percentage of output that would have been produced had the reactor operated uninterrupted at full power. A load factor as low as 60 per cent (the global average for reactors is more than 80 per cent) shows there have been significant equipment problems requiring the plant to be shut down while repairs are made or outages are required for various reasons. The decisions to shut down clearly has financial implications and a concern arises given the UK's conflict of interest in such decisions into the future. It is clear these future decisions will be taken in the context of a very ambitious target of 90 per cent load factor performance which is far in excess of the actual experience of 60 per cent.

Two reactors were under construction in Taiwan for more than 15 years until the project was abandoned in 2016. Part of the delay appears due to political and financing difficulties but there were also serious quality concerns. Work on the two ABWRs under construction in Japan was largely halted by the Fukushima disaster and it is not clear whether they will be completed. Despite all of this the UK remains quite extraordinarily committed to the design and the project.

8. Regulatory Issues

The ONR carries out 'Generic Design Assessments' (GDAs) for new designs. GDAs are intended to resolve all design issues before construction is allowed to start. This process lasts at least four years and approval is valid for 10 years. An approved reactor design can be built at any site subject to local siting factors. The GDA for the EPR (planned for Hinkley and Sizewell) was completed in 2012, for the AP1000 (planned for Moorside) and for the ABWR was completed in 2017. The GDA for the Hualong One was started in 2017.

For all the completed GDAs, it is clear that the rhetoric of resolving all design issues is misleading. In all three cases there are design issues outstanding which the ONR claims will only be sorted out during construction. The decision to give the ABWR approval contains a 3-

[12] Japan Economic Newswire 'Hitachi may freeze British nuclear project due to swelling costs' December 16, 2018.

page section (out of a 36 page document) entitled 'Matters Arising during GDA for Consideration at the Site Specific Stage.'

Nevertheless, the ONR must oversee construction and is required to give a series of additional consents, for example on construction start and first power generation before the plant can go into service.

The UK ONR has been formally independent of the UK government in the sense of being Statutory Non-Departmental Public Body (NDPB), rather than a department of a government ministry, since 2013. However, its funds and senior appointments are made by government so the remaining scope for government influence is clear. As with any regulatory body, 'regulatory capture' under which regulatory bodies, through constant contact with regulated companies, become over-sympathetic to those companies or is influenced by government, is a constant risk. Recent decisions by the ONR suggest its independence cannot be assumed. These include, as discussed above, allowing design issues not to be resolved until construction has started and allowing the old UK reactors to continue in service despite previous limits to ageing being exceeded (see Appendix 2). As the schedule for new nuclear plants slips, there will be pressure on the ONR to allow the existing AGRs to remain in service to 2030 or beyond.

9. Brexit and the UK's withdrawal from Euratom

Brexit and its associated uncertainties brings a whole range of complexities to a range of considerations and sectors, and this matter is no different, but perhaps aspects of it and its implications for the risks to Ireland are more overlooked.

The UK Prime Ministers letter[13] notifying the UK's decision to exit the European Union also notified its withdrawal from the Euratom treaty. The implications of this are significant for the management of nuclear matters in the UK, and indeed movements to and from the UK of nuclear material. These movements are particularly relevant given the reality that the nuclear risk arguably arises for Ireland at the 12 mile nautical limit of Ireland's territorial waters being the nearest point for foreign nuclear transports – and not simply on the UK mainland as is generally considered.

While detailing the full scope of Euratom and the implications of the UK's proposed approach to addressing the functions are beyond the scope of this short submission – the Joint Oireachtas Committee is urged to consider this as a matter of significant importance to Ireland given the implications for safety and independence of oversight on nuclear matters as the UK will effectively self-police on key nuclear matters post-Brexit. The extent to which it is **not** clear whether this has been addressed in contingency considerations in the event of a Brexit no-deal scenario is addressed further below. But first the core considerations are set out to provide context for the issues at stake.

Simplistically and generically the Euratom treaty can be considered to be establish a separate nuclear community and is concerned with amongst other things, in the context of nuclear matters:

- promoting research and disseminating technical information;
- setting uniform safety standards to protect the public and industry workers;
- facilitating research;

[13] http://data.consilium.europa.eu/doc/document/XT-20001-2017-INIT/en/pdf

- ensuring civil nuclear materials are not diverted to other uses, particularly military.

However from the point of view of issues of interest to Ireland, some of the key functions and considerations which need to be considered include:

- Ensuring appropriate and adequate separation of interests between civil and military use of nuclear materials;
- Inspection of nuclear facilities, inventories and movements.
- The independence of such oversight

To put this inspection role in context, according to a Nuclear Free Local Authorities (NFLA) briefing on this matter:[14]

> "Euratom safeguards inspection frequencies currently range from very regular (every three out of four weeks) at sites like Sellafield, to monthly inspections at enrichment plants, less frequent inspections at power stations and inspections only once every several years at selected locations with smaller inventories of material. More than 100 UK facilities or other duty holders are subject to Euratom safeguards, with some 220 inspections (about 1,000 person days of Euratom effort) during 2014. (14)
>
> A quarter of all time spent on nuclear inspections by EURATOM inspectors is spent in Britain, due to the scale of nuclear fuel fabrication and waste management facilities, such as Sellafield. Britain's plutonium stockpile is also currently overseen by EURATOM inspectors. Sellafield has enough plutonium to make about 20,000 nuclear bombs. It is the world's largest stockpile of civilian plutonium – one of the most toxic substances on the planet – accumulated from decades of reprocessing nuclear fuel from power stations not only in the UK but also Germany, France, Sweden and other countries. EURATOM has a permanent presence at Sellafield and owns the cameras, seals and testing laboratory used to monitor Sellafield."

Put simply, in light of Brexit, it is proposed that the UK's Office of Nuclear Regulation (ONR) will replace Euratom performing a number of key additional oversight and inspection roles in addition to its existing functions, to replace the significant Euratom undertakings intimated in the above.

On this new role for the ONR, NFLA has further commented in that same briefing:

> "Without EURATOM the Office for Nuclear Regulation (ONR) will need to undertake many more inspections in order to meet IAEA requirements. There must be a question-mark over whether ONR will be able to hire and train the necessary new staff especially when ONR is already currently struggling to keep up with the assessment of several new reactor designs (EPR, AP1000, ABWR and Hualong One) under the Generic Design Assessment criteria. (15)."

The NFLA briefing also highlights that:

> "By 2020 the UK will be home to around 140 tonnes of plutonium, of which around 23 tonnes is foreign owned. (17)"

[14] http://www.nuclearpolicy.info/wp/wp-content/uploads/2018/08/A291_NB178_Brexit_and_nuclear_safeguards.pdf

The interests of EU Member States with nuclear facilities, such as Germany and France, are clearly a relevant consideration for these foreign inventories, whereas Ireland, of course, has no such interests.

There is one thing clear at time of writing that nothing in relation to Brexit is clear, but a number of scenarios need to be considered:

1. A disorderly withdrawal from the EU. Despite the negative implications for the UK and the EU, this cannot be ruled out at time of writing.
2. The proposed Article 50 Withdrawal Agreement is approved, and a transition period follows. The proposed agreement contains a number of provisions specifically dealing with Euratom related considerations. While the remaining EU 27 Member States have agreed the proposed text, it is, at time of writing, unclear whether the UK parliament will do so, or even when a vote will be taken on this.
3. An extension to the withdrawal period. The EU has indicated the limited conditions under which it would agree to this, but it is unclear if the UK Parliament will agree to seek it or accept it if offered.
4. The Withdrawal by the UK of the Article 50 notification. As clarified by the EU Court of Justice on December 10th 2018,[15] this is entirely possible, providing that it is done before the notification period is concluded, and prior to the entry into force of a withdrawal agreement and that it is done in writing and unconditional. Whether this would be contingent on a further referendum in the UK and the full circumstances for this are unclear.

In each of the scenarios 1-3 above the UK will need to address key elements of the Euratom regime, the variables being the timeframe available to comply, and what is agreed/committed to. A brief analysis of these scenarios follows.

Scenario 4 "No Brexit No withdrawal"

In this scenario 4, there is no withdrawal, so the status quo is maintained. Thus it is not considered further below beyond reminding the Committee of concerns previously raised to it in the Hearing on May 1st on Hinkley Point C about the adequacy of the Euratom Article 37 submissions made by the UK and ultimately accepted. These concerns were reflected by the Committee in its subsequent submission[16] to UK authorities. The concerns noted include the failures to adequately consider the island of Ireland and to correctly assess a number of factors including various climatological and atmospheric considerations. So, in short, Euratom is arguably not a perfect oversight solution as its stands. Therefore, any weakening of its effects and operation in the context of Brexit therefore must be of concern.

Scenario 1 'no-deal'

In considering the other Brexit scenarios, the prospect of a 'no-deal' in scenario 1 above is clearly of particular concern. Notably, on the 19th of December 2018, the EU

[15] Case c-621/18 Press release: https://curia.europa.eu/jcms/upload/docs/application/pdf/2018-12/cp180191en.pdf – full Judgment opinion and prior Advocate General Opinion: http://curia.europa.eu/juris/liste.jsf?language=en&num=c-621/18&td=ALL

[16] https://data.oireachtas.ie/ie/oireachtas/committee/dail/32/joint_committee_on_housing_planning_and_local_government/reports/2018/2018-05-11_transboundary-environmental-public-consultation-hinkley-point-c-nuclear-power_en.pdf

Commission published details of contingency action plans[17] in the context of a no-deal scenario. However these do **not** reference Euratom or considerations relevant to the nuclear sector specifically, whereas they do cover matters like aviation, citizen movements etc. Nor does the contingency plan[18] published by the Irish Government – save for referencing an earlier document of the commission setting out the implications of the withdrawal from Euratom in a long table of briefings. However, in the absence any commitments from the UK, it would seem clear that its ability to operate and transport nuclear material even for medical uses would seem to be impacted Nonetheless, the nature of what might be agreed relating to Euratom in a no-deal scenario does not seem clear, or at least is not clear to those consulted for this submission within the limited time available over the Christmas break to clarify matters. This is therefore a matter the Committee may wish to pursue as a matter of urgency in order to seek clarity on the solutions present or absent relating to Euratom in a 'no-deal' scenario.

It is noted that a sectoral preparedness seminar is envisaged with the EU 27 on January 10th 2019 which may bring some clarity.

In this regard it is also noted that: in our submissions made to the Committee in May 1st 2018, various risks to Ireland from a nuclear incident were highlighted including the findings of a key 2016 ESRI report[19]. The National Risk Register[20] published by the Department of An Taoiseach in July 2018 also acknowledges this report and the risks to Ireland from a nuclear incident, and indeed even in the context of no radioactive contamination the potential still for significant economic losses arising from reputational damage to Ireland's Agri-Food and tourism sectors in particular. It also details a multiplicity of risks and sectoral considerations. However it is silent on the overlap of nuclear risks in the context of Brexit,

Scenarios 2 and 3 – Ordered withdrawal agreement and/or some elements of transition

The withdrawal from Euratom, particularly if done in line with the proposed Article 50 Withdrawal agreement (Scenarios 2 and 3 above) will involve major undertakings to put in place IT/computer systems, processes, structures and expert resources and adequate funding for the necessary subsequent operations. However there are significant concerns about the UK's ability to deliver this and indeed the adequacy of the ambition proposed by the UK to fulfil the requirements. These concerns are not limited to the issues raised in a leaked report from the ONR reported[21] on by Sky News earlier this year, where ONR is the body intended to undertake much of the Euratom functionality. The leaked report indicated "red" warnings on the risk register for key considerations including: delivery of IT/computer systems, resources, training,

[17] http://europa.eu/rapid/press-release_IP-18-6851_en.htm

[18] https://www.dfa.ie/media/dfa/eu/brexit/brexitcontingency/No-Deal-Brexit-Contingency-Action-Plan-December-18.pdf

[19] https://www.esri.ie/pubs/BKMNEXT313.pdf

[20] https://www.taoiseach.gov.ie/eng/publications/publications_2018/national_risk_assessment_2018_-_overview_of_strategic_risks_-_final.pdf

[21] https://news.sky.com/story/red-warnings-for-uks-post-brexit-nuclear-safeguards-11374097

equipment and funding. Of particular concern are the suggestions around “redefined person spec”. The Sky News article stated that:

> “The document lists seven ways that risk can be mitigated, including "redefined person spec" and that standards may be lowered to plug the skills gap, suggesting there are insufficiently trained personnel.”

While these were being considered in the context of a March 2019 withdrawal – certain of the issues including the availability of sufficiently expert resources will remain a challenge, and it is unclear if the proposed transition period will be adequate to resolve the others.

As part of the legal architecture for the UK’s solution to replace Euratom, the UK’s Nuclear Safeguards Act completed its passage through Parliament and received Royal Assent on the 26 June 2018. This is the provision under which the draft Nuclear Safeguards Regulations will operate, In the summer of 2018 the UK undertook a consultation[22] relating to aspects of its proposed alternative Euratom regime and the safeguarding measures. However, it is very clear from various proceedings[23] and related actions of the House of Lords Select Committee on the European Union- Energy and Environment Sub-Committee there is much yet undecided and unresolved including the critical issues of how the new body is to be funded and thus be implemented and effective.

The issue of funding also raises major considerations and complications in respect of potential state-aid considerations if the UK doesn’t require industry to pay, and additional burdens and potential constraints on the ambition of proposals for the new regime if the UK has to fund it, through the taxpayer or alternatively force industry to foot the bill. As highlighted previously, the extent to which the EU’s requirements on state-aid have a bearing on such decisions in the context of what transpires in relation to Brexit also has to be considered. It would seem in the context of a transition and ordered withdrawal agreement – the EU rules and constraints would apply, the implications and consequences are however unclear.

Additionally, discrepancies between the ambition indicated in the consultation document and the requirements of the proposed Article 50 Withdrawal agreement are noted and commented upon in a Nuclear Free Local Authorities, (NFLA), briefing[24] on the matter.

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[22] https://www.gov.uk/government/consultations/nuclear-safeguards-regulations

[23] Select Committee on the European Union- Energy and Environment Sub-Committee; oral evidence: The Office for Nuclear Regulation’s Brexit preparedness, Wednesday 11 July 2018, http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/eu-energy-andenvironment-subcommittee/the-office-of-nuclear-regulations-brexit-preparedness/oral/86771.html
Parliamentary Answer 10th May 2018 https://www.parliament.uk/business/publications/written-questionsanswers-statements/written-question/Commons/2018-05-08/141755/
Letter from Lord Teverson to Richard Harrington, 18th July 2018 https://www.parliament.uk/documents/lords-committees/eu-energy-environmentsubcommittee/Correspondence/Letter-from-Lord-Teverson-to-Richard-Harrington-190718.pdf

[24] http://www.nuclearpolicy.info/wp/wp-content/uploads/2018/08/A291_NB178_Brexit_and_nuclear_safeguards.pdf

Of further and particular importance to the Joint Oireachtas Committee must be the extent to which the EU and interested member states will exercise diligence on the credibility and feasibility of the UK's delivery of its Euratom obligations under the Article 50 Withdrawal agreement (if agreed), in the first instance, and its actual delivery thereafter. Additionally the adequacy of remedies available to them to resolve any failures by the UK also needs to be considered particularly given the nature and potential implications of failures by the UK's regime. All of this remains to be seen, particularly given the extent of political and economic sensitivities pertaining But it provides an important context for the Committee's considerations of the proposals to extend the UK's nuclear operations in the context of the proposed Wylfa B plant, and the implications noted elsewhere in this document regarding the management of radioactive waste, and the operation of existing plants and the extensions to the operations of existing plants, and the independence of oversight by all concerned within the UK and within the EU.

The NFLA Briefing[25] referred to above also raises a number of other relevant concerns relating to the adequacy of the funding provisions, the pressures regarding nuclear weaponry and proliferation, and provides more detail on concerns raised in the context of a House of Lords Select Committee enquiry. The attention of the Joint Oireachtas Committee is particularly drawn to this more detailed discussion of these critical matters. The core considerations and concerns arising must be not only the practicality of delivering in within the required window of time adequate functionality and oversight necessary for the safe management of the UK's nuclear activity, but also the independence of the oversight body given the UK Government appoint key ONR resources and determine its funding, and thus the ONR's "independence" is open to question.

Finally Ireland as a non-nuclear state has very limited resources to execute sufficient independent oversight on its own behalf. Therefore the implications of losing the benefit of Euratom's expertise and resources are significant in the context of the UK's expansion plans in sites like Wylfa B and all of the consequences which flow from that, including the increase of highly radioactive waste which will be stored on-site pending the availability of a theoretical alternative solution, an issue which is expanded upon below.

8. Legacy issues

The seminal and much quoted 1976 UK Royal Commission on Environmental Pollution, Nuclear Power and the Environment[26], (commonly known as the Flowers Report) concluded:

'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 [in a Geological Disposal Facility or GDF] of long-lived, highly radioactive waste [High-Level Waste or HLW] for the indefinite future.'

[25] http://www.nuclearpolicy.info/wp/wp-content/uploads/2018/08/A291_NB178_Brexit_and_nuclear_safeguards.pdf

[26] Royal Commission on Environmental Pollution (1976) 'Nuclear power and the environment' Cmnd 6618, HMSO, London. https://webarchive.nationalarchives.gov.uk/20110322144120/http://www.rcep.org.uk/reports/06-nuclear/1976-06nuclear.pdf

No GDF for HLW is in operation anywhere in the world. It is a hotly disputed contention whether there can be sufficient confidence that the integrity of a GDF can be established over the period of hundreds of thousands of years that the material in it will need to be isolated. If decision-makers cannot be convinced of this and GDFs cannot be sited, the material will have to be stored effectively indefinitely in surface stores. This might be at the reactor sites or at a central facility such as Sellafield

Despite this, and despite several failed attempts to identify sites for GDFs, in terms of identifying deep GDF sites, the UK appears little if any further on than it was when the Flowers Report was published. In December 2018, the UK government launched another new attempt to identify GDF sites.[27] There is little reason to have any confidence that this new attempt will be any more successful than its predecessors. The government says identifying sites will take at least 15-20 years; then a pilot facility will have to be built; then this pilot plant will have to be observed for several years to determine whether the geology at the depths required is really suitable; then the actual facility will have to be built. This process cannot be completed in less than 50 years so, at best, a UK GDF might be in operation by 2075. The large volume of existing waste which is in temporary packaging, would necessarily have priority in being placed in the GDF so waste from new plants such as Wylfa Newydd could not be disposed, at the earliest, before the 22nd century and would have to be stored in carefully monitored surface stores, probably at the reactor sites until then.

Reactor decommissioning is not a well-proven process worldwide for large commercial reactors with decades of service, with only a handful of reactors near the desired endpoint of releasing the site for unrestricted use. The process of decommissioning the UK's old reactors appears little more advanced than HLW disposal. The first of 11 nuclear plants (seven of which, including Wylfa are on the west coast of Britain) of the original design, the Magnox, was closed in 1987 with the last in 2015. Despite this, all that has been done at the sites is to remove the fuel and send it to Sellafield and for some plants, the uncontaminated buildings have been demolished and the remaining heavily contaminated buildings sealed pending cutting up and disposing of the waste including some dangerous Intermediate-Level Waste (ILW). No site for ILW waste disposal has been identified and it is decades from being completed. The most challenging and expensive phase of decommissioning, cutting up and disposing of the material from the reactor vessels, is not expected to start before 2075 and will take at least five years for each plant, thirty years in total. Until that point, as for HLW, the security of the sites, for example from inundation from the sea, will have to be carefully monitored. The credibility of plans to deal with such eventualities is unclear and must be viewed sceptically however surely in the context of the issues with the basic operations, and the potential for the UK economy to suffer severe shocks following Brexit with consequential pressures on expenditure.

No time-line exists for the decommissioning of the seven second generation plants (AGRs), four of which are on west coast sites, and for the Sizewell B PWR but it is likely these will only be decommissioned once the Magnox sites have been fully cleaned up.

A particular concern is funding for decommissioning. Since 1979, electricity consumers' money has been earmarked to pay for this so 'the polluter will pay'. These funds have been

27 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/766643/Implementing_Geological_Disposal_-_Working_with_Communities.pdf

continually re-allocated, and effectively lost to their purpose, since then. For example, in 1990 the 11 years of contributions made up to that point were appropriated by the UK Treasury and by 2019 the funds available were minimal compared to the liability – in excess of £100bn to clean up all the UK's civil nuclear sites. Decommissioning for existing plants will therefore be paid for by future taxpayers at the time decommissioning takes place and funding for this will have to compete with all the other calls on public money such as health and education. The existing sites will therefore be a potential hazard for a century to come and, even then, there will be a risk that insufficient funds will be available to do the job properly.

The government has tried to produce more secure methods of funding so this situation does not recur but it remains to be seen whether funds that are adequate and secure over the century or more they will have to exist for can be guaranteed.

9. Conclusions

All the evidence from the time the UK began to try to promote new nuclear capacity more than a decade ago is that the UK government is willing to entertain an extraordinary range of options from massive public guarantees to public ownership to keep the programme from collapsing. Escalating costs of nuclear, sharply falling costs for renewables and falling electricity demand have not appeared to diminish its enthusiasm for nuclear in any way. It would therefore be unwise to see the problems currently being experienced with Wylfa in putting together a financial package as likely to kill the project. Evidence of the UK government's unwillingness to reconsider its nuclear programme was prepared to put together a complex package for Wylfa including a large public stake, that it claims will be a one-off, not the model for future deals. However, if the model proposed for Sizewell does not prove viable, the possibility of the Wylfa model being used for other projects cannot be discounted. This position puts the government in a conflict of interest, which it has not acknowledged as both owner of the plant generating the power, the buyer of the power and also the safety regulator of the plant. Over the six decades or more the plant is expected to operate there must be a risk that safety will be compromised in order to ensure that plant remains in service and profitable. The government's objective of getting an apparently lower kWh price than was agreed for Hinkley Point for Wylfa and the other nuclear projects can only be achieved by shifting even more of the project risk – construction cost escalation, poor reliability, high operating costs – away from the plant owners to the public either as taxpayers or as electricity consumers. If this happens, a comparatively low expected power cost could prove to be an illusion

From a technology point of view, the ABWR may have a less problematic record than the EPR or the AP1000, but in the form proposed for Wylfa, it is essentially unproven and the construction and operating record of the only version that has been built (from 30 years ago) is far from convincing.

Ageing of the UK's existing nuclear capacity including significant safety issues (see Appendix 2) may well mean some of it should be retired much sooner than expected. Other UK nuclear projects, such as Moorside, have failed or are failing so the government may feel it cannot afford to let Wylfa collapse if it is to retain its nuclear expansion policy.

The legacy of the UK's existing programme is of major tasks still decades away from being addressed. These require as yet unproven technology such as decommissioning old reactors and siting facilities such as disposal facilities for high-level and intermediate-level that will be

bitterly contested. Until these tasks are completed, probably at least a century away, existing facilities, especially those on Britain's west coast, represent potential hazards to the Republic of Ireland. And until the technologies required are demonstrated, new reactors would add to this risk.

Lord Flowers' recommendation of 40 years ago, that: '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' continues to be ignored.

The UK appears to be on the cusp of entering a period of significant unknowns in leaving the EU. Many experts including the Bank of England have estimated significant economic impacts – varying with whichever scenario eventually transpires and the extent of agreement or crash-out, and the extent of closeness or distance maintained with the EU. In times of crisis – corners have been cut even in the context of matters of such serious consequence as nuclear power – as is clearly evident in the context of the experience in Sellafield in the following extract from the Guardian[28]. It details the evidence of the late John Large, expert nuclear consultant. Large gave evidence to the House of Commons environment committee investigation into nuclear safety in 1986. The article indicates the spent fuel ponds were abandoned after they were overwhelmed with spent fuel during the 1974 miner's strike when Britain was put on a three-day working week by prime minister Edward Heath. Large is quoted as follows:

> "In order the 'keep the lights on', the UK's fleet of nuclear power stations were run at full tilt, producing high volumes of spent fuel that the Sellafield reprocessing facilities were unable to keep up with. During the three-day week they powered up the Magnox reactors to maximum, and so much fuel was coming into Sellafield that it overwhelmed the line, and stayed in the pool too long,"
>
> "The magnesium fuel rod coverings corroded due to the acidity in the ponds, and began to degrade and expose the nuclear fuel itself to the water, so they just lost control of the reprocessing line at a time when the ponds were crammed with intensely radioactive nuclear fuel,"

It would be remiss in the context to rule out the extent of uncertainties and pressures which will arise to compound the issues already set out in the above, and which present only a limited set of considerations relevant to the committee's considerations on the potential and actual transboundary risks.

Ireland is situated in such close proximity to the proposed site for Wylfa Newydd that such considerations cannot be ignored, particularly in the broader context of the issues raised in this submission, including the conflict of interests extant for the UK, and in particular the UK's withdrawal from Euratom and the implications for its future self-policing.

[28] https://www.theguardian.com/environment/2014/oct/29/sellafield-nuclear-radioactive-risk-storage-ponds-fears

Appendix 1 The Regulated Asset Base Model

As it became clear that no single investor, not even EDF, was willing and able to take on an investment on the scale, about £30bn, of a two-unit nuclear power station, the government and developers began to consider other options.

EDF suggested using the model, the Regulated Asset Base model (RAB) developed for the Thames Tideway system, commonly known as the super sewer. Clark's June statement makes it clear that the RAB model is the government's preferred option for projects **after** Wylfa. The Thames Tideway scheme was expected to cost £4bn+, large by water industry standards but small by nuclear power plant standards. Under this model, the asset would be owned by a large number of investors, such as investment funds, venture capital funds etc and they would be guaranteed a specified rate of return on their investment until the asset had been amortised. Effectively, this meant that the asset would be regulated in the same way as any other monopoly network asset, except it would be owned by a consortium of investors, not by the utility itself.

If this model was applied to a nuclear power plant, there would be major differences. In effect, the Tideway scheme owners would be paid just for it to continue to be there. For a nuclear power plant, there are additional risks partly because the plant produces saleable output. The main risk however would be the risk of construction cost overrunning. While water projects are not immune from cost overruns, the scale of overruns is much less. Given experience elsewhere where nuclear construction costs frequently end up several times the forecast cost, this would be a huge risk and one no investor would be willing to take. So the likelihood is that consumers would take the risk with the cost overrun added into the RAB and therefore the price they pay for power. There would also be the risk that reliability would be poorer than expected so there would be less output to sell and operating costs would be higher. Again, it seems likely that the only way such a package could be sold to investors would be if those risks were passed on to consumers.

So when the deal was done before construction, there would an indicative cost of power that would apply if the costs and performance were as forecast but this would be adjusted up if and when costs were found to overrun and would vary from year to year according to operating costs and reliability.

It is hard to believe that placing these risks entirely on consumers would be politically acceptable – effectively consumers would be signing a blank cheque. Nevertheless, if those risks were removed from the plant owners, the forecast price of power, if not the outturn price of power would be substantially lower than the Hinkley Point price, fulfilling the government's priority of getting a deal for nuclear plants beyond Hinkley Point that would be substantially cheaper.

Appendix 2 The UK's existing nuclear capacity

The UK had eight nuclear power stations in operation in 2018 (about 8GW), seven of which (each comprises a pair of identical reactors) use a UK design, the Advanced Gas-cooled Reactor (AGR) not built elsewhere, while the other is a PWR, a design widely used throughout the world. All are owned by EDF. The PWR, completed in 1995, is expected to remain in operation until at least 2045. Two of the AGRs (Hinkley Point B and Hunterston) went on line in 1976 with the others in the late 80s. All are now beyond their design life and permission for their continued operation is given by the Office of Nuclear Regulation (ONR) which reviews the plant at every major maintenance shut-down (typically every other year) but in much greater depth every 10 years in the Periodic Safety Review (PSR) which is mandatory in the European Union. EDF plans to keep the two oldest plants on-line until at least 2023 and the most recent PSR for Hinkley Point and Hunterston, in 2016 appeared to give tacit approval to this plan. It plans to keep the newer AGRs in operation until at least nearly 2030, subject to the PSR results due for all five plants in 2018/19. By the time these are retired, EDF hopes Hinkley Point C and perhaps Wylfa will be in service replacing most of the AGR output.

The life-limiting component in AGRs is the graphite moderator (this controls the nuclear reaction) which is in the form of about 3000 'blocks' which also have a structural function. These bricks are subject to cracking, erosion and distortion, all of which have safety implications and if the plants go beyond the regulator's limits on these factors, the plant should be closed permanently as the graphite cannot be replaced. If the cracking is too extensive the reactor could be subject to a serious accident involving large scale radioactivity release.

A particular issue has arisen with one of the reactors at Hunterston where the number of 'keyway' cracks detected, cracks that penetrate the whole of a graphite block, escalated from a handful in 2016 when the regulator completed its PSR, to 39 in May 2018 and more than 350 by November 2018, the limit imposed by the ONR.[29] It has not been determined whether the plant will have to close or whether the ONR will accede to EDF's request to increase the limit. It would be surprising if the other reactor at Hunterston and the reactors at the twin plant at Hinkley, did not suffer from the same problem. The other AGRs use somewhat different designs but the problems of cracking, erosion and distortion of graphite blocks exists at these other plants and it is evident from experience at Hunterston that ageing of graphite is not well understood and the AGRs may well not be able to operate as long as EDF hopes. It is unclear whether the five later AGRs will meet regulatory requirements up till their expected retirement in about 2030

From the government point of view the expectation that new nuclear capacity would replace existing nuclear capacity when it is retired is looking increasingly unlikely. Most new capacity cannot be completed before 2030 and existing capacity may well be retired earlier than planned, and other may be extended well beyond the original operational timescales introducing uncertain risks The government will therefore be looking to accelerate some projects and try to ensure plans do not collapse and may also seek to extend other existing plants.

[29] https://theferret.scot/350-cracks-hunterston-nuclear-reactor/ and https://www.bbc.co.uk/news/uk-scotland-glasgow-west-46290475

An Taisce
The National Trust for Ireland

Founded in 1948, An Taisce is one of Ireland's oldest and largest environmental organisations. An Taisce is a charity that works to preserve and protect Ireland's natural and built heritage. We are an independent charitable voice for the environment and for heritage issues. The work of our staff is focused in three areas: Advocacy, Properties and Education.

Advocacy: The An Taisce Advocacy Unit is dedicated to promoting the conservation of Ireland's nature and biodiversity as well as its built heritage.

Properties: An Taisce owns a range of heritage properties in trust, including historic buildings and nature reserves.

Education: The An Taisce Environmental Education Unit is responsible for developing and operating some of Ireland's most popular and successful environmental programmes and campaigns.
The Environmental Education Unit is the National Operator for all international environmental education programmes of the Foundation for Environmental Education (FEE), including the Blue Flag Award for Beaches and Marinas and Green-Schools, the international environmental education programme in operation across 93% of Irish schools. It also operates a number of national programmes including: Green Campus, Neat Streets, Clean Coasts, National Spring Clean (Ireland's largest anti-litter campaign), Green Homes, Green Communities, and the Irish Greening Community Award Programme.

Submission on Wylfa Newydd Nuclear Power Plant, Anglesey, North Wales, UK

This submission is a response to a request from the Department of Housing, Planning and Local Government pursuant to EU Directive 2011/92/EU.

"Under the terms of EU Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the EIA Directive) and the 1991 United Nations Convention on environmental impact in a transboundary context (the Espoo Convention), Member States are required to engage in transboundary public consultation in respect of projects likely to have significant effects on the environment of neighbouring States as part of the environmental impact assessment of a proposed development. For this purpose, the Member State in whose territory the project is intended to be carried out shall send to the affected State, no later than when informing its own public, a description of the project and any available information on its possible transboundary impact."

Wylfa Newydd Nuclear Power Plant, Anglesey is a project to construct a 2,700 MW nuclear power station with two advanced boiling water reactors (ABWR) on the island of Anglesey in North Wales. The plants is being developed in the UK by Hitachi-GE Nuclear Energy, Ltd using a 100% owned subsidiary, Horizon Nuclear Power.

Background

An Taisce's concerns in this matter do not stem from a pro or anti position regarding nuclear power. Their concerns centre solely on the extent to which transboundary impacts on Ireland have been adequately considered in the application. Potential transboundary impacts on Ireland are particularly relevant due to the proximity of the nuclear power station (118km) to the 40% of the Irish population residing in the Greater Dublin Region.

An Taisce welcomes this opportunity for consultation, particularly since post Brexit the UK will not be a member of the European civil nuclear regulator Euratom. We wish to focus our comments principally on the potential for accidental release of large quantities of radioactive isotopes and potential impacts on Ireland associated with such high magnitude-low frequency incidents.

Although extremely unlikely, we do not consider it appropriate to dismiss transboundary safety concerns as non-significant. We consider the accident risk calculations of 1:1M flawed on several grounds, demonstrably so based on recent nuclear accidents, and not capable of providing a level of comfort for the Irish population appropriate to the potential impacts which an accident at Wylfa would impose upon them.

We note that Hitachi have had two serious safety breaches in developing nuclear power stations, one of which resulted in a $2.7M fine in the US.Hitachi also supplied one of the reactors at Fukishima, though this was not operational during the tsunami. During the construction of this unit a deformation in the reactor pressure vessel was incorrectly handled.

The Economic and Social Research Institute is Ireland's independent source for evidence-based policymaking. In a report in 2016 it conservatively estimated the economic impact of a serious nuclear event anywhere in north western Europe close to Ireland as being in the region of €161B with catastrophic effects on agriculture lasting decades.

An Taisce wishes to structure its submission around the following topics:

1. An inadequate estimation of need and alternatives
2. Inadequate consideration of long term sea level rise
3. Underestimation of potential radioactive release for a worst case accident
4. The extent to which the plume dispersion models employed provide an adequate vehicle for assessing potential atmospheric transport of hazardous material to Ireland
5. Inadequate Consideration of Tectonic Risk

1. **An inadequate estimation of need and alternatives**

A recent report by Carbon Brief indicated that UK electricity demand is continuing to fall and in 2018 reached levels not seen since 1994. This reflects increased energy efficiency in appliances and by consumers and also structural changes in the UK economy. Despite the addition of 8M extra consumers over the quarter of a century concerned, electricity consumption has continued to decline. The absolute reduction is equivalent to the output of almost 3 Wylfa-type stations. The justification for Wylfa is not addressed in this context. Neither are the alternative options, principally that of renewable electricity generation which now accounts for 33% of UK electricity generation.

2. **Inadequate consideration of long term sea level rise and wave climate changes**

Wylfa is located at an elevation of 9-13m asl. The Highest Astronomical Tides in the region are 3.8m asl. Highly dangerous radioactive waste is to be stored on site until approximately 2170 with storage commencing 10 years after commissioning and extending for 140 years thereafter.

A sea level rise of 0.86m by 2080 underpins the assessment. It is however virtually certain that sea level rises will continue for several centuries, with ultimate rises of up to 3m possible. The stability of the site by 2170 under increased wave action from a higher level is not considered adequately in the proposal. The assessment required joint probability analysis to be carried out regarding coastal flood and erosion risk for a lengthier period than is demonstrated in the assessment.

3. **Underestimation of potential radioactive release for a worst case accident**

We draw your attention to the Austrian submission which questions the emission figures used for calculation of impacts in a core melt accident The assumed release of Caesium-137 in the EIA is 186 MegaBq (MBq). For a comparable situation in an EIA for a proposed nuclear power station in the Czech Republic the corresponding figure is 30 TeraBq (TBq), a factor 160,000 times higher.

The potential for an accident at Wylfa to contaminate the whole of Austria and much of continental Europe is evident in modelling carried out by the Austrian authorities. The crucial significance of this for a much more proximal location such as Ireland is obvious.

Furthermore, it is the outputs of the dispersion model based on this underestimate which is used to drive the impact models for the receptors such as human, and agricultural vulnerabilities in Ireland. The degree of confidence that can be placed in these downstream impacts is accordingly questionable.

It must be stressed that a fresh easterly breeze of 18 knots would deliver radioactive Caesium to Dublin in 6 hours in the event of a core meltdown. No possibility of evacuation would exist.

4. The extent to which the plume dispersion models employed provide an adequate vehicle for assessing potential atmospheric transport of hazardous material to Ireland.

Two models were used to evaluate the consequences of releases of airborne radioactive effluents from the propose facility. Both were based on Gaussian plume models. While the proposal emphasises that these are the accepted models for assessing air quality impacts, and while justification for selecting ADMS in this case is well argued, this does not eliminate the inherent weaknesses of the approach taken. Reliance on using Gaussian models for assessing long range transport of effluent is highly questionable. Long range transport of pollution and radioactivity experience confirms this. Chernobyl radiation reached Ireland by long range transport mechanisms and resulted in contamination of soils, vegetables and milk supplies. 10,000 upland sheep farms in Wales, England and Ireland were subject to restrictions for 26 years following the event. A complex recurving trajectory for the Chernobyl plume of contamination was evident. Gaussian modelling would not have predicted, even if complex topographical and meteorological conditions were incorporated, that this would occur.

To address plume dispersal in the event of a serious accident, an over simplistic set of assumptions have made for modelling the Wylfa contamination plume.

(i) Site specific observations were not used to drive air dispersion models. Rather, interpolations from nearby locations were used. These data inputs consisted of modelled outputs from grid sizes ranging from 4 - 1.5km with output resolution of 6kms.

(ii) Only 10 years of meteorological data was employed. This does not capture the range of conditions extant at the location and omits extreme events which may be important in impact assessment. The World Meteorological Organisation recommends at least a 30-year period for characterising climate conditions at a particular site.

(iii) The nearest major international conurbation to Wylfa is listed as Dublin with a population exposure of 515,255. In fact the population of Dublin city and County is 1,345,402 with just under 2M people living in the Greater Dublin Area. On any given day the figure is also 120,000 higher than the census figures due to visitors, tourists etc.

(iv) A mixing layer depth of 1000m and a wind speed of 8m/s is assumed for plume transport to Ireland. These provide for much move favourable conditions for dispersal than could occur in an accident situation. In particular the crucial

question of inversion height in relation to the height of any accidental release is not assessed adequately. Stability on land at Wylfa may also be very different from stability over a relatively cold marine surface during summer months and the extent to which the modelling exercise differentiated dispersal conditions on this basis is also not clear. Passage over a low friction surface such as the Irish Sea also inhibits dispersion. The air over the sea passage to Ireland, especially during summer, is much more likely to be stabilised and conducive to undisturbed transport of effluent. Studies which analyse the origins of polluted airmasses over south eastern Ireland confirm that effluent from industrial sources in the UK and Europe can be carried in stratified, stable airflows over a cool Irish Sea to be mixed down to the surface on reaching eastern Ireland. The LOCA scenario therefore is based on underestimated emissions and overestimated dispersion, both of which have potentially serious consequences for Ireland.

5. Inadequate Consideration of Tectonic Risk

North Wales has a significant tectonic history as one of the most earthquake-prone areas of the UK. The largest onshore earthquake of the 20th Century occurred in Gwynedd in July 1984 and measured 5.4 on the Richter scale. This event was felt throughout most of the UK and was followed by several months of aftershocks, one of which reached 4.3 on the Richter scale. A similar value was reached in an earthquake, with an epicentre in Wales, as recently as February 2018. While these are relatively minor events they indicate a potential risk to century scale nuclear waste storage that requires greater consideration on the basis of the precautionary principle. An earthquake of 6.6 in Japan in 2007 led to the closure of all seven reactors at Kshiwazaki Kariwa. This included ABWR reactors. Subsequently 2 units were permanently closed. Earthquakes of 5.8 have been recorded historically in UK waters.

Summary

The environmental assessment provided contains several aspects which do not provide sufficient assurance that worst case scenarios for the plant have been adequately considered. These relate to the adequacy of the data on which risk assessment was based, the flooding potential and the validity of the dispersal models used to simulate long range transport of radioactive effluent. Using model output to drive further model output to drive further model output is a feature of this EIA and such procedures result in a cascade of uncertainty. More than any other in the family of planned new nuclear power stations, Wylfa poses the most immediate threat to Ireland in the event of a malfunction and should be subjected to a higher degree of Irish governmental and public scrutiny than is demonstrated in this lengthy application.

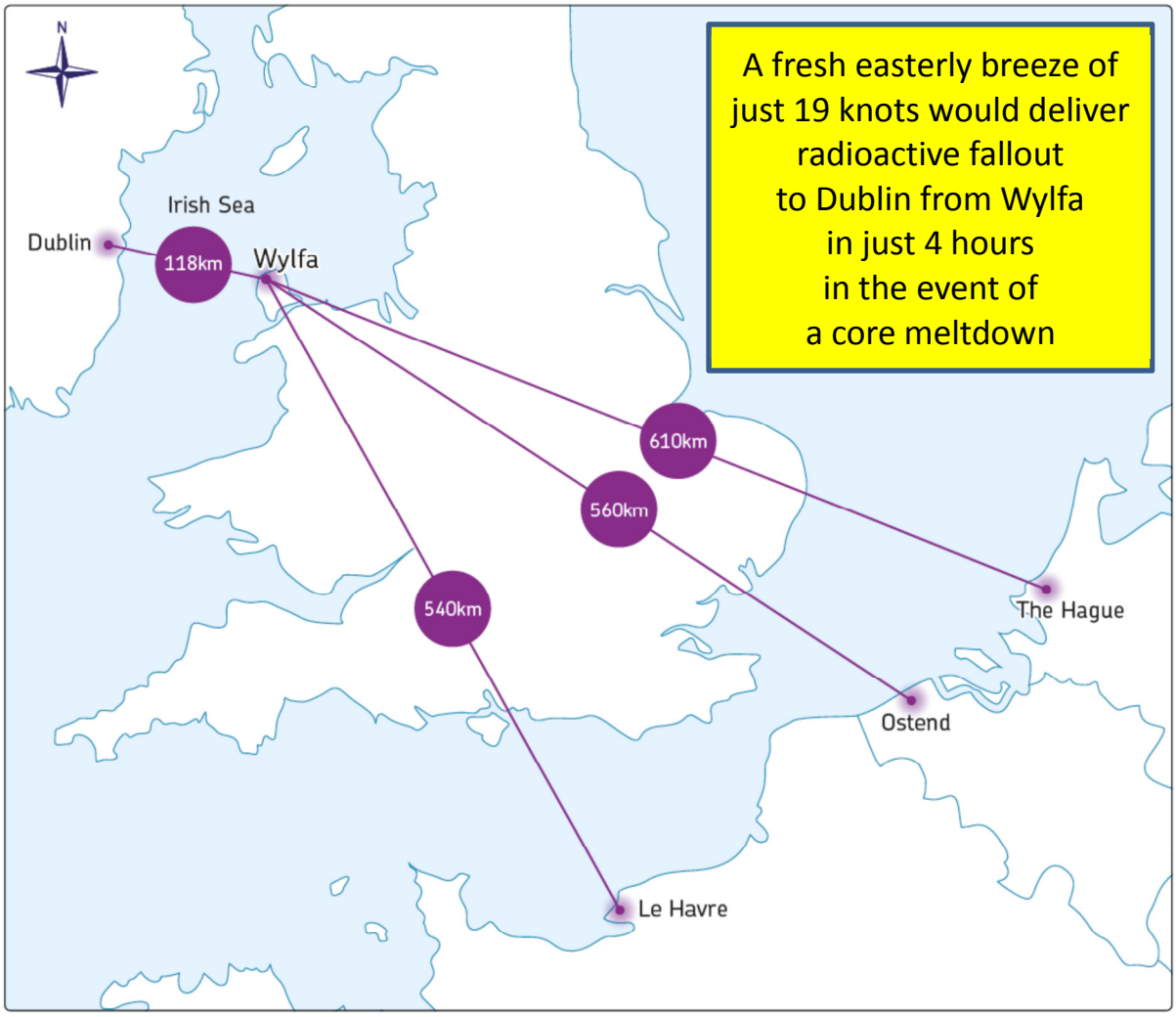
Further submission of considerations for:

Joint Oireachtas Committee on Housing, Planning and Local Government

Re:

The Transboundary public consultation in respect of:

Wylfa Newydd Nuclear Power Plant in Anglesey, North Wales



Attracta Uí Bhroin, Vice Chair, An Claíomh Glas,

An Claíomh Glas

V1.0 Jan 2019

Contents

Prefacing remarks:

Continued focus needed required despite recent media reports relating to the project

We have decided to preface our submission with the following note. This is given very current news reports relating to the Wylfa project, and the need to ensure the emerging news reports do not serve to de-rail focus from this transboundary consultation, and the focus on the risks of a new nuclear power plant at Wylfa to Ireland.

On Friday 11th January, 2019 Reuters reported[1]:

> "TOKYO (Reuters) - Hitachi Ltd (6501.T) has decided to freeze its 3 trillion yen nuclear project in Britain and to post a special loss of about $2 billion (1.6 billion pounds) for the year ending in March, the Nikkei business daily reported on Friday.
>
> Hitachi is set to vote on the planned suspension at its board meeting next week, the Nikkei said without citing sources.
>
> Hitachi's Horizon Nuclear Power unit has struggled to find investors for its plans to build a new power plant in northern Wales."

For the reasons set out in detail in the evidence to the committee co-authored by Professor Thomas and Attracta Uí Bhroin, and some additional reasons offered in this further submission, the Committee is urged to maintain its vigilance and focus on this proposed project and consultation process. This is because of the extraordinary lengths already demonstrated by the UK, to ensuring this particular project goes ahead, and also the lengths it has gone to maintain commitment to its new nuclear programme, despite many valid and compelling reasons for it to re-evaluate and indeed depart from it. It may be that some further variation of funding model is proposed to advance Wylfa B. Less likely is that relations might be brokered with other suppliers but the options are very limited. In any consideration of China for example, security considerations are likely to feature in any such decisions for the UK, and there would be cost implications for purchasing the site. It is perhaps unlikely that EDF would feature given how extended it is and the issues encountered with their EPR reactor. Given the timeframes indicated in the article for the decision by Hitachi of the week commencing January 14th 2018, (and presumably previously by Horizon), and the prospect of a vote in the UK Parliament on Brexit in the same week – it is far from clear what will happen, and in what timeframes on this matter.

[1] https://uk.reuters.com/article/uk-hitachi-nuclear/hitachi-to-freeze-uk-nuclear-power-project-post-2-billion-special-loss-nikkei-idUKKCN1P505Y?rpc=401&

The significance of the timing of the visit of Japanese Prime Minister, Shinzo Abe to London this week (on Thursday 10th January, 2019), and the potential interaction between the advancement of some further funding deal with Japanese Hitachi, and future trade deals outside the EU for the UK post Brexit, including with Japan, also cannot be overlooked. Your and your Committee's ongoing vigilance is therefore urged on this consultation.

Introduction

The opportunity to provide input into the deliberations of the Joint Oireachtas Committee on Housing Planning and Local Government on the matter of the Transboundary Consultation on the UK's proposed new nuclear power plant, Wylfa Newydd Nuclear Power Plant in Anglesey, North Wales (Wylfa B) is most welcome, and appreciated. The remit and contact points for the relevant UNECE convention on these transboundary consultations resides with the Department of Housing Planning and Local Government, (DHPLG).

Given the failures to adequately assess and set out the risks to Ireland from this development, your Committee's continued interest and focus on such matters is of significant strategic importance to Ireland. We also wish to take this opportunity to acknowledge and sincerely thank the Committee's secretariat for its assistance in these matters.

We hope this submission will assist the Committee to navigate its way through some of the issues arising in this phenomenally large and technically complex application of 447 core or basic documents, with many hundreds more of supporting correspondence and information, and to also identify and digest some of the valuable associated commentaries. We also set out: the UK's decision process underway on the application for development consent for Wylfa B, and the current context for the transboundary consultation and issues surrounding it.

A very highlevel submission providing some basic context and overviewing some key issues is provided below. Some of which will be expanded on in the two annexes:

- Annex A provides a little more detail in relation to the Austrian Expert submission.
- Annex B Details the experience of the consultation on Wylfa B so far and issues for the attention of the committee and makes very specific recommendations in relation to the consultation, and what we need to learn and react quickly to and address.
- Annex C – provides some brief introduction to our organisation and network.

Some of the issues raised are detailed more comprehensively in other referenced submissions. Two of these which will not be otherwise immediately available to the Committee are provided as appendicies.

- Appendix A: Austrian Government, including an Expert Submission;
- Appendix B: Model submission prepared by Nuclear Free Local Authorities,NFLA setting out certain details relevant to this transboundary consultation.

Given the volume of information to process associated with the application, it is not possible for us to address all of our concerns here including those regarding the compliance of the UK with existing EU obligations in respect of the environment and habitats and species, in

the timeframes required by the Joint Oireachtas Committee. We state that by way of clarification – lest it be concluded that this submission reflects the totality of our concerns, as it does not.

The Committee is urged to also revisit its earlier submission in respect of Hinkley Point C where many of the same concerns remain, particularly in respect of our reputational risks and our state of readiness, and the potential for an nuclear accident impacting on Ireland, except we have even less time to respond given the increased proximity of Wylfa B. In the JOC's submission of May 2018, your Committee reflected:

> "A 2016 ESRI report [3] – considered a scenario where there's a nuclear incident but **no** radioactive contamination actually reaches Ireland. It still estimated the losses to our economy at €4 billion – including reputational impacts to tourism and the Agri-Food industry. It also conservatively estimated the "discounted economic loss to Ireland" from a serious nuclear event anywhere in North West Europe close to Ireland as "€161 Billion". It refers to Agriculture as being "lost". This is of course not just a major economic consideration – but one which would impact the very fabric of rural society in Ireland, even if the worst effects on the human population can somehow by avoided.
>
> In considering the impacts to people, a Radiological Protection Institute of Ireland, report[4] refers to mitigating the impacts of radioactive fallout by sheltering indoors. But it fails entirely to address the feasibility of that in the context of our having no covered water supply, and the overall state of readiness of our population. One only has to consider the recent disruption and hardship from Storm Emma and the Beast from the East to envisage the implications on people and livestock. But radioactive contamination doesn't melt away like snow does in days. A further consideration is the extent of readiness of our services – as we are not a nuclear state. The HSE for example has indicated to Government – it has virtually no capacity to deal with "any" nuclear incident.[5]
>
> The Potential Economic Impact of a Nuclear Accident - An Irish Case Study, ESRI https://www.esri.ie/pubs/BKMNEXT313.pdf
>
> [4] Proposed Nuclear Power Plants in the UK, *Potential Radiological Implications for Ireland*,RPII http://www.epa.ie/pubs/reports/radiation/RPII_Proposed_Nuc_Power_Plants_UK_13.pdf 10

While of course we respect the sovereign right of the UK to pursue its own energy mix, we believe we and Ireland should not be shy about highlighting the risks of it and our concerns, and also the issues for the UK tax payers and citizens before it is too late.

In this regard, we note and applaud the clear and unequivocal statement in the submission from one of the Federal German Governments to the UK as part of this transboundary consultation process on Wylfa B, **we recommend the Committee similarly call on the UK to not permit Wylfa B and to move away from nuclear power.**

"….

The government of the Federal State of Rhineland-Palatinate is grateful for the opportunity to state its position – by means of relevant representation - within the frame of the process of the cross-border environmental impact assessment relating to the construction of a new nuclear power station at the Anglesey site - Wylfa Newydd Nuclear Power Station.

The government of the Federal State of Rhineland-Palatinate is acting in the knowledge that each member state of the European Union is entitled per se to determine the structure and composition of its power supply. The decision for or against a particular form and use of energy is incumbent on the individual states. The position taken by the Federal State of Rhineland-Palatinate on the above process of the cross-border environmental impact assessment is also based on this concept.

However, we are deeply concerned on the evidence of the plans developed by the United Kingdom to expand and continue the use of nuclear power, and declare ourselves emphatically against the project for a new construction at the Anglesey site (Wylfa Newydd Nuclear Power Station) and the plans proposed in this connection.

The government of the Federal State of Rhineland Palatinate does not perceive the use of nuclear power as a way to solve the challenges facing power supply in the future. It believes in energy conservation and the expansion of renewable energy sources.

The use of nuclear power was, is and remains an uncontrollable high-risk technology. In the case of disruptive incidents, it is associated with unforeseeable wide-ranging environmental hazards and serious consequences for human health. The fact that the severe impact on humankind and the environment reaches far beyond the national and regional boundaries of the respective country of origin has been clearly demonstrated by the serious reactor accidents in Chernobyl and Fukushima. The reactor accident in 1986 in Chernobyl especially showed how radioactive material could be disseminated via the air pathway over great distances and expanses. Due to the really short distance to the Anglesey power plant site (Wylfa Newydd Nuclear Power Station), in the case of a comparable disruptive incident in certain weather conditions, radioactive air masses could reach the boundaries of the Federal State of Rhineland Palatinate in just a few hours and lead to contamination.

Following the catastrophe in Fukushima in 2011, the assessment of nuclear power risks resulted in the German legislature deciding by consensus with a large social majority to abandon the peaceful use of nuclear power. The government of the Federal State of Rhineland-Palatinate played a role in organising this rapid withdrawal by the Federal Republic of Germany from the peaceful use of nuclear power and, in consequence, underlines once more its opposition to the construction of a new nuclear power station at the Anglesey site (Wylfa Newydd

Nuclear Power Station).

A further application or even expansion of nuclear power technology is unjustifiable not least because there is no repository in existence as yet in the world for highly radioactive waste and, in addition to the risk to their health, many future generations will be burdened with immense financial disposal risks.

Against the backdrop of these objections in principle, we request a revision of the decision on the plan to construct a new nuclear power station at the Anglesey site (Wylfa Newydd Nuclear Power Station)."

Commentary [2]by the Federal German State of the Rhineland-Palatinate in the context of the cross-border environmental impact assessment procedure pertaining to the construction of a new nuclear power station at the Wylfa Newydd site

We recommend the Committee similarly call on the UK to not permit Wylfa B and to move away from nuclear power.

[2] https://infrastructure.planninginspectorate.gov.uk/projects/wales/wylfa-newydd-nuclear-power-station/?ipcsection=relreps&relrep=26688

Overview of proposal, its context and its relationship to Ireland

This new Wylfa B nuclear power plant is to be built on the island of Anglesea, just some 118 km from Dublin and Ireland's most densely populated east coast. Our population is set to expand significantly within even the initial window for the build of the plant. It is likely to further expand within the 60 year lifetime proposed for the operation of the plant. As it stands the application documentation already significantly **underestimates** even our current population. According a very quick google search, readily accessible, - the Dublin Chamber of Commerce – provides the following details[3]: (emphasis added)

> "> Dublin City and County has a population of **1,345,402.**
>
> **> 1,904,806 people live in the Greater Dublin Area,** a region comprising Dublin and the counties of Meath, Kildare and Wicklow. **This figure is set to grow to 2.2 million by 2031.**
>
> > The Greater Dublin Area accounts for **40% of the population of the State**."

However, the application in detailing the accident risk identifies the population for Dublin only as only: "516 255 (estimate)"[4] This show in the first instance a fundamental failure to properly consider and regard the extent of population at risk, and who need to be managed in the context of an severe accident impacting upon Dublin and it environs, or indeed the populations on our east coast, and across the country as a whole. This is given the proximity of the plant, and the small size of our State. It is notable that DHPLG has extended the transboundary consultation to all Local Authorities, the implication of this under our Planning Regulations is impacts are not ruled out right across the country. It's diligence in this regard is noted and appreciated.

The proposal for Wylfa B involves the construction of two Advanced Boiling Water Reactors (ABWRs), 2.9GW, supplied by Hitachi-GE on Anglesey, at the site of a 'Magnox' nuclear power station retired in 2015. The current owner and developer of the site is Horizon, a wholly owned subsidiary of the Japanese reactor vendor, Hitachi. It also owns the Oldbury site in the Severn Estuary, where it also plans to build two ABWRs. This is also on the west coast of the UK, facing Ireland, as is Hinkley Point C, a plant which has already been given permission.

A more complete overview of the current status of the new plants proposed as part of the UK's nuclear expansion; the complexities arising consequent on the funding models proposed; and the associated risks arising from the conflict of interests this presents for the

[3] http://www.dublinchamber.ie/business-agenda/about-dublin
[4] Table 4-4 https://www.housing.gov.ie/sites/default/files/public-consultation/files/6.4.98_es_vol._d-_wnda_development_app_d14-2_analysis_of_accidental_releases.pdf#page=33

UK is provided in the evidence for the Committee co-authored by Professor Stephen Thomas and Attracta Uí Bhroin, (Thomas & Uí Bhroin)

An application was received for Wylfa B by the UK in summer 2018, and is being examined by the UK's Planning Inspectorate,(PINS) who are obliged to submit a report to the Secretary of State by April 23 2019[5], which is a prescribed 6 month deadline from the end of its preliminary meeting. The Secretary of State is then required to make a decision on whether to grant development consent, within 3 months. So a decision can be expected in July 2019. Horizon would also require a Marine Licence, environmental permits and other licences, including a Nuclear Site Licence.

While a transboundary consultation is currently being conducted with Ireland and the Irish public, it is important to realise the reasons for this are **not** consequent on any change in the perspective of the UK Government of the trans-national boundary risks to Ireland from an accident at the plant. Following the controversies and breaches associated with failure to consult on Hinkley Point C – the UK undertook to consult on its nuclear power plant applications in the future. While this is most welcome, we submit nonetheless that it is actually obliged to do so under its international and EU law obligations given the nuclear nature of the project. However, additional and specific impacts from the project have been identified and determined the need to consult with Ireland regardless. In conducting initial and subsequent screening decisions[6] for Wylfa B, the UK acknowledges there are likely significant impacts to Ireland from Wylfa B. These are sufficient in their own right to trigger the consultation obligations. The impacts they have identified in the conclusion of these screening decisions are to birds, and marine mammals (dolphins and porpoises) and are particularly in the context of Natura 2000 sites in Ireland and the sites and species designated for protection under the EU Birds and Habitats Directives. There was some consideration of impacts to shipping and fisheries which do not seem to be thoroughly examined, and are discounted. Impacts from routine operations and risks of accidents – are not considered to be significant risks in the UK's screening or in the applicant's documentation – and the robustness of the UK's regulatory regime is again relied upon with the screening documents stating:

> "**Due to the robustness of the regulatory regime there is a very low probability of unintended release of radiation, and routine radioactive discharges will be within legally authorised limits.**"

[5] The PINS timetable is set out in the following: (Note the document is first presented in Welsh quite appropriately given the development is in Wales. An English translation is in the latter part of the document.) https://www.housing.gov.ie/sites/default/files/public-consultation/files/6.11.18_uk_planning_inspectorate_examination_timetable_rule_8_letter.pdf

[6] https://www.housing.gov.ie/sites/default/files/public-consultation/files/transboundary_screening_assessment_secretary_of_state.pdf

The Committee's attention is also drawn to the concerns highlighted by Nuclear Free Local Authorities, (NFLA) submission on the risks associated with the normal operation of the plant. (It is included in full as a separate appendix B to this submission for ease of reference.)

Consideration of accidental risk is dealt with more specifically further below

The circumstances of this consultation exercise are expanded upon in Annex C,and explained in more detail and how it relates to the UK's decision making process, together with recommendations for the consideration of your Committee.

Consideration of accidents:

The potential risks associated with this development for the island of Ireland are significant in our view. The risks have been significantly under-estimated and are in-adequately set out and highlighted by Horizon in its application. There are a number of reasons for this.

Of particular concern is the **under-estimation by a factor of 160,000 of the extent of radioactivity release envisaged for a severe accident core-meltdown. This alone serves to set the entire accident analysis and risk to Ireland presented in Horizon's Wylfa B application at issue.**

A fresh easterly breeze of 19 knots will bring radioactive fall-out from Wylfa B to Dublin in 4 hours, and across to our densely populated east coast in the event of a severe accident like a core meltdown.

Therefore these are considerations which warrant serious attention from our Oireachtas.

This issue and discrepancy is identified in the Expert submission commissioned by the Austrian Ministry, and it raises a number of queries in relation to this, and this is expanded upon in Annex III below. The full submission is also provided for convenience as Appendix A, and sets out this issue and a number of other serious considerations and issues.

Prior to discussing this and further specifics issues with the analysis of risks and accidents in the application, we would like to take a step back and consider how such accidents should be viewed.

In addressing considerations around the risk of accidents we are always careful not to panic people or to be overly alarmist. However we are deeply frustrated by the reliance on probabilities and the view that accidents are of such low risk they do not need to be considered, or prepared for; and that the UK regulatory regime is so robust that the risk of accidents is negligible, as is asserted by the UK and highlighted earlier.

The reality is that **accidents, are by their very nature – accidental. They are not planned and designed. Also, no one can remember how many zeros there were in the probability calculated for the catastrophic nuclear events of Three Mile Island, Chernobyl or Fukushima Daiichi. They happened. That is simply all we need to know. Such incidents can't be ruled out.** It is thus not responsible not to do everything to avoid them, and to be appropriately prepared for them.

In this regard, in meeting with officials from the Austrian Ministry and sections responsible for these matters last year, the philosophy of their Ministry, and consequential guidance to their officials on such matters was most refreshing. It could be summarised simply and informally as follows:

- No politician, or ordinary person wants to look at complex maths and equations and argue whether there is one more or less zero.
- All that is of concern is whether you can you tell me that such an accident will never happen?
- If you can tell me it will never happen - great - then we won't have to deal with it.
- If not – then we have to deal with this, and do all we can to limit the risk to us.

Turning then back to the consideration of specific issues with the assessment of risks in the application have further concerns in relation to:

a) Technical and design considerations such as:
    i. Outstanding and unresolved issues with the design of the ABWR technology
    ii. The lack of transparency and robustness around secondary and emergency systems/solutions
    iii. Issues with the severe accident scenario used to assess impacts in the application
b) Risks consequent on the conflict of interest for the UK Government in the Governance of the development and operation of the plant
c) Specific additional risks arising in the context of Brexit
d) Risks consequent on the pressures to increase and extend the operation of existing plants beyond their designed lifetime – to maintain the share of nuclear in the UK's energy mix and to deal with the now invariable delays in delivering new plants.
e) Failures to adequately model atmospheric dispersion and the transport of radioactive fallout to Ireland
f) Failure to provide for a solution for radioactive waste
g) Failures to adequately model climatic changes and sea level risk and the risks associated with this through the lifetime of the operation of the plant, the entirely unclear window to decommission the plant, and the extended duration for onsite storage of highly radioactive waste arising from the normal operation of the plant.

In addition to highlighting the discrepancy and expert query regarding on the amount of radioactivity which could be released from the plant – the Austrian Government's Expert submission also identifies a number of further issues and associated queries. We adopt the entirety of the Austrian submission, and all of its queries, a brief overview of which follows.

We also recommend that:

The Joint Oireachtas Committee and Ireland adopt the entirety of the Austrian submission, and **all** of its queries and concerns.

a)Technical and design considerations:

The Thomas & UíBhroin submission, highlighted the issues of outstanding and unresolved Generic Design Assessment Process for the ABWR and indeed highlighted how the UK had departed from the principles around that process which was intended to assess and sign off on a number of designs for the technologies which could then be advanced. However in the face of unresolved issues and pressure to advance plants – this has been set aside and pushed down the road. The ability to call a halt arguably becomes increasingly difficult with the extent of investment and expenditure made, and concerns on liability and pressures for sign off from regulatory authorities.

The specific GDA issues outstanding are considered in some detail in the Austrian Expert Submission. Given the far-reaching implications of the matters for the safety of the operation of the plant – this is a significant concern. As indicated above we adopt the concerns and queries set out.

Concerns arise particularly also in relation to the secondary and emergency systems in the event of terrorist attack. For example while the reactor vessel is supposed to be resilient to aircraft attack, anyone who has watched a good thriller will know 'Terror' is the name of the game, and attacking secondary and emergency response systems which are intended to kick in massively increases the effect and impact of any attack, and they are also typically easier targets. It would seem a number of the additional systems proposed require human intervention – given this and other considerations, the extent to which their resilience can be proven is questioned in particular in the Austrian Expert submission.

The severe accident scenario selected is also questioned in the Austrian Expert submission and some further more detailed comments on this are offered in Annex A below, as even to a lay person the rapidity indicated to be able to contain and stop the release of radiation seems overly optimistic in the context of modelling really severe accident scenarios, and given the experiences of Fukishima, and the reliance proposed in Wylfa B for a number of human and unproven solutions. These are matters dealt with in more detail in the Austrian Expert Submission.

It is also recommended that the Committee and indeed Ireland:

Engage with the Austrian authorities who share concerns in this regard and who have access to independent nuclear engineering expertise, and in light of our common interests.

Given the absolute practical physical constraints which exist in the context of any need to evacuate the island of Anglesea given the constraints of the two road bridges to the island – one has to question the UK's decision to consider the site suitable in the first instance for a project of this nature. These issues are well set out in NFLA briefings on the project.

The fact Irish population figures were not considered even in the most recent step for the site selection process conducted by the UK for its deployments of nuclear power plants over 1GW post 2025, has already been highlighted to the Oireachtas committee in oral evidence in May 2018, and has been raised in submissions from eNGOs, including ourselves, to the UK, with seeming little effect.

However in simply considering the issue with a possible evacuation requirement from Anglesea, the prospect of evacuation by sea to Ireland may need to be considered. The extent of logistical issue which the UK will face in dealing with such an evacuation crisis from Anglesea over just two road bridges, in the midst of a nuclear accident, is chilling. The practical effects this will have on mobilisation and focus of the human beings called upon to act in emergency response at the plant, when their families may be at risk and face difficulties evacuating.

b) Conflicts of Interest for the UK's Governance :

The Thomas & Uí Bhroin submission considers the **further risks arise given the conflict of interest which arises for the governance of this application and the operation of the plant. This arises particularly in the context of the manner and extraordinary extent to which the UK Government propose to finance it, and where it will be project developer/bankroller, power purchaser and consenting authority through the build and operation of the plant.** The pressure to cut corners when you are paying the bills is a serious concern, as it the UK Government's recent and historic track record on due diligence. The Thomas & UíBhroin evidence raises concerns raised regarding the arguable lack of independence of the Office of Nuclear Regulation given its senior appointments are made by Government and its effectiveness is a function of funding where those funding decisions are made by the UK Government.

c) The Brexit dimension:

There is then also the **increasing uncertainties associated with Brexit and the UK's withdrawal from the Euratom treaty and the risks this presents for independence of oversight on the new and existing nuclear operations, nuclear inventories and movements and the separation of military and civilian interests**. Euratom is concerned with amongst other things independent oversight of nuclear facilities, movements and inventories and the separation of civilian and military use of nuclear materials. The UK propose to replace this regime by increasing the remit and funding to the Office of Nuclear Regulation, (ONR). Significant concerns have arisen in relation to these proposals in relation to the arguable lack of independence of the ONR and the feasibility of it being able to deliver a comparable regime, particularly if the UK crashes out in the context of a no-deal on Brexit. The Thomas & Uí Bhroin submission considers this in detail.

The concerns highlighted therein are particularly in light of leaked ONR report[7] identifying the key components of such a replacement regime to be all at a status red risk alert, including the IT/computer systems, resources, equipment, training, funding. The submission also considers the different Brexit scenarios and their implications. The scale of operations is intimated by the following small extract quoted in the Thomas and Uí Bhroin submission from a specific briefing[8] prepared by Nuclear Free Local Authorities, (NFLA) on the scale of operations to be addressed in the context of Brexit. It is included here for immediate convenience:

> **"**"Euratom safeguards inspection frequencies currently range from very regular (every three out of four weeks) at sites like Sellafield, to monthly inspections at enrichment plants, less frequent inspections at power stations and inspections only once every several years at selected locations with smaller inventories of material. More than 100 UK facilities or other duty holders are subject to Euratom safeguards, with some 220 inspections (about 1,000 person days of Euratom effort) during 2014. (14)
> A quarter of all time spent on nuclear inspections by EURATOM inspectors is spent in Britain, due to the scale of nuclear fuel fabrication and waste management facilities, such as Sellafield. Britain's plutonium stockpile is also currently overseen by EURATOM inspectors. Sellafield has enough plutonium to make about 20,000 nuclear bombs. It is the world's largest stockpile of civilian plutonium – one of the most toxic substances on the planet – accumulated from decades of reprocessing nuclear fuel from power stations not only in the UK but also Germany, France, Sweden and other countries. EURATOM has a permanent presence at Sellafield and owns the cameras, seals and testing laboratory used to monitor Sellafield."

On this new role for the ONR, NFLA has further commented in that same briefing:

> "Without EURATOM the Office for Nuclear Regulation (ONR) will need to undertake many more inspections in order to meet IAEA requirements. There must be a question-mark over whether ONR will be able to hire and train the necessary new staff especially when ONR is already currently struggling to keep up with the assessment of several new reactor designs (EPR, AP1000, ABWR and Hualong One) under the Generic Design Assessment criteria. (15)."

It also highlights that:

> "By 2020 the UK will be home to around 140 tonnes of plutonium, of which around 23 tonnes is foreign owned. (17)"

The reality that the nuclear risk for Ireland arises at the 12 mile limit of our territorial waters from our shores needs to be considered particularly in the context of Brexit. This is most particularly in the context of a 'no-deal' scenario. Close consideration is

[7] https://news.sky.com/story/red-warnings-for-uks-post-brexit-nuclear-safeguards-11374097
[8] http://www.nuclearpolicy.info/wp/wp-content/uploads/2018/08/A291_NB178_Brexit_and_nuclear_safeguards.pdf

needed on the controls which will or won't operate on the movements of nuclear and radioactive materials, and their independence and effectiveness, and the transboundary implications. This is something we urge the Committee to seek clarity on, both in the context of the increased risks arising from the development of Wylfa B and more generally.

The failure to identify an increased nuclear risk for Ireland in the context of last year's published national risk assessment's consideration of the impacts and risks of Brexit is of concern to us. We also wish to note that we are not aware of any significant, recent developments in Ireland's emergency planning to deal with such matters.

It is thus recommended that the Committee seek clarification:

*** Regarding the state of readiness of the ONR to oversee matters previously addressed within the Euratom regime, and**

*** The nature of controls which will and won't operate in relation to movements and inspections in particular, and any non-UK oversight which will apply and its effectiveness and transparency, and**

*** The extent of rigour and expertise which is to be applied to evaluations of the ONR's readiness in the context of both an orderly Brexit, or a no-deal situation.**

*** On contingency planning, which is needed for both such eventualities for Ireland, the UK and the EU.**

*** On the full extent and nature of monitoring for radioactivity being undertaken in Irish Waters, and on the monitoring of movements of vessels moving within close proximity to our waters.**

It is also recommended that the Committee:

Formally structure the committee's operations and functions to provide for regular oversight of these transboundary considerations.

As set out in the Thomas & Uí Bhroin submission there is a lack of clarity particularly in relation to contingency planning at this point, in Ireland and the EU in relation to Euratom, at time of writing.

While we all value our important and close relationship with the UK, it must be acknowledged that it is undoubtedly entering a period of significant turmoil, and faces an increasingly uncertain future**. It would be remiss in the context of our broader concerns**

regarding this project and its overall governance and operation, not to reflect on the very current and recent experience of the UK's approach to contingency planning in the event of a no-deal Brexit.

The Sea Borne Freight issue:

In December 2018, the Transport Secretary, Chris Grayling addressed Members in Parliament and wrote to cabinet colleagues seeking approval for massive spend to address emergency contingency requirements for shipping freight given concerns over the need to provide for an emergency situation in which blockages and delays at the existing ports and services would be impacted if the UK crashes out of the EU. Considerations were in respect of ensuring capacity for critical supplies such as medical supplies, given the commercial interests and pressures surrounding normal freight.

Further to pressure from UK transport unions it seems there was extensive pressure to ensure one of the new contracts was allocated to a UK operator**.**

It subsequently transpired that of the 3 freight operators chosen, and despite the conduct of a Due Diligence exercise, that the sole UK operator selected:

- **does not have ships,**
- **has no experience of shipping freight,**
- **the terms and conditions published for its operation were taken from a take-away pizza firm, and**
- **the login portals on its website transpired to be mere mock-ups and further issues arose in relation to its published privacy conditions[9] .**

The UK Government PR machine has swung into action and promoted the take-away pizza terms and conditions as a mistake, and indicated the Secretary's was anxious to support UK start-ups.

While we take no pleasure in reflecting on this recent experience, the Committee too can draw its own conclusions on the extent of rigour applied and note that this was in the context of emergency response planning and decision making, on matters considered to be of critical importance to the UK, and to deal with the envisaged emergency given concerns over impacts to freight routes from a no-deal. Our concerns for the future governance of Wylfa B are seen in this context.

Additionally, i**n the concluding remarks in Thomas & Uí Bhroin evidence, the chilling experience of what transpired at Sellafield during the Miner's strike is reflected upon,**

[9] https://www.theguardian.com/politics/2019/jan/03/brexit-freight-ferry-firm-appears-all-geared-up-to-deliver-pizzas

and this must not be forgotten as the UK stands on the brink of another challenging period and with a very uncertain economic future, with pressures on the exchequer.

The Thomas & Uí Bhroin evidence also focuses on the quite extraordinary commitment the UK has evidenced in advancing nuclear power at all costs. In further reflecting on that, and in the context of this submission we have been considering the UK's need to be able to broker trade deals with non-EU parties post Brexit. It is not intended to anyway trivialise matters, but it may be interesting to reflect of the all too often insightful satire of the much-loved BBC programme "Yes Minister". In the episode entitled "The Official Visit" [10], key financial and investment decisions and trade agreements were brokered with other countries in a reciprocal musical chairs. The UK invested and purchased with third countries, in order to ensure they in turn invested and purchased from the UK, and created jobs, and other diplomatic expediencies were all addressed. It may be relevant to consider the role of Japan and China as future trade partners in the context of UK's decision to relentlessly pursue nuclear and to invest with and purchase from such partners. Clearly the UK is perfectly entitled to engage with any parties it chooses. The point is merely made to highlight the while many are highlighting media messages about the difficulties of financing Wylfa B, and suggesting that it is hard to see how it can happen, there may well be factors at stake while will ensure it will happen at any cost.

The proposed visit to the UK of the Japanese Prime Minister, Shinzo Abe, in January[11] is arguably not insignificant. However while it is clear the UK Prime Minister will be seeking his support for Brexit – he may well wish to voice concerns for Japanese investments in the context of Brexit and future interests, or other matters of interest to Japan. We mean no disrespect by such speculation and note the speculation in the media on the focus of the visit. Therefore we wish to highlight the prospect of the development of a plant at Wylfa should not be discounted. The subsequent conflict of interest for the UK and the dysfunctional incentives to ensure the quality and safety of its development and future operations are set out in detail in the submission co-authored with Professor Thomas. Increased uncertainty of investment by third parties and suppliers may serve to increase the interest of the Government and its conflict of interest.

d) Pressures to extend

The Thomas & UiBhroin evidence highlights the direct consequence of the new nuclear programme on the existing plants and the risk of further pressurising the extension of the operation of these existing plants beyond their designed lifetime. The issues with the Hunterston B plant and the cracks emerging in the bricks of the reactor are described in that evidence. Further detail on these issues and the pressure to extend the permitted amount of these keyway cracks to a 1000, beyond the current limit of 350 (which has already been

[10] https://www.youtube.com/watch?v=j-ez9XZWG7A Key frame timings: 21:55 to 28:16

[11] https://www.theguardian.com/world/2019/jan/08/may-hopes-japanese-pm-shinzo-abe-will-back-brexit-stance-in-london-visit

surpassed) is detailed in a NFLA and other briefings detailed below on the matter. The issues with the cells in Hunterston B are not limited to just that reactor, and EDF's ability to model them accurately and understand their development is of serious concern.

The potential for new projects like Wylfa B to impact such pressures to extend plants and the consequential risks arising from those legacy plants – we see as a direct or at best indirect consequence and risk of any decision to advance Wylfa B. The prospect of cascaded accidents does not appear to have been considered or adequately assessed in the context of Wylfa B.

NFLA representatives attended the Scottish Parliament in January 2019 to press the Scottish Government not to consider the re-opening of Hunterston B. Materials from and associated with this are available here:

> Powerpoint presentations delivered in the Scottish Parliament on 9th Jan by Ian Fairlie and Pete Roche
>
> http://www.nuclearpolicy.info/presentations/hunterston-b-safety-concerns-briefing-for-msps/
>
> Briefing on Hunterston jobs and just transition, by Pete Roche.
>
> http://www.nuclearpolicy.info/wp/wp-content/uploads/2019/01/A297_NB184_Hunterston_Just_Transition.pdf
>
> Hunterston safety briefing by Dr Ian fairlie.
> http://www.nuclearpolicy.info/wp/wp-content/uploads/2018/11/A294_NB181_Hunterston_reactor_issues.pdf

To be clear, in the context of the plans to advance Wylfa B, the risks to continue the operation of legacy plants in the UK increases given the need to maintain the share for nuclear in the UK Energy mix and avoid it being eroded. Further risks arise consequent on the operation of such plants, and the pressure to continue the operation of plants where issues have been identified.

It is thus recommended that the Committee seek clarification on:

*** What information has been provided and what consulation has been made with Ireland in respect of plans to re-open Hunterston B**

*** What information is held or being sought on the potential risks to other plants in the UK from such issues**

*** What plans does the UK have to extend the operational lifetime of nuclear plants and what consultation is being done on this**

*** The possibility of a full briefing of these issues from NFLA**

e) Atmospheric dispersion of radioactive fallout

A number of **other key concerns** previously set out to the Committee in the hearing of May 1st 2018 in respect of Hinkley Point C are regrettably repeated in this new application. These include**: issues with the atmospheric modelling in considering transport of radiation to Ireland; and inadequacies in considering flood risk and climatological change analysis, particularly given the on-site storage proposed for radioactive waste.** These are well set out in the An Taisce submission.

In the interests of brevity – these further topics relating to accidental risk are dealt with together.

f) Failures to provide an appropriate solution for Radioactive waste &

g) issues with climatic modelling

h) Issues with decommissioning

It is now nearly 6 years on, from the UK granting consenting to Hinkley Point C. Yet the UK Government are no closer to providing a solution for its legacy waste, let alone the additional highly radioactive waste which will result from its new plants. (see NFLA submission in Appendix B). Regardless, it is advancing a further plant with WylfaB. On site storage of the radioactive waste is proposed for decades, for the waste from Wylfa B. It is likely to be on site at least up to 2090 and most probably well beyond that, and a dedicated on-site facility isn't even proposed to be built for 10 years.

Modelling for sea level risk at the site in the context of these extended timeframes for storage of on site radioactive waste is considered to be inadequate, and we highlight the expert commentary of Professor John Sweeney in the An Taisce submission in this regard, section 2. Design and development of facilities will need to be state of the art, in order to provide for the necessary levels of secure and safe containment.

As documented in Thomas and Uí Bhroin and in the Austrian submission and specific briefings of NFLA on the issue of radwaste – there is no proven technology anywhere for the underground/undersea Geological Disposal Facilities, (GDF) which the UK and Horizon indicates they propose to rely on, nor is there a suitable site identified let alone agreed and secured.

The NFLA submission included in Appendix B has provided very useful and succinct analysis on the scale of problem to be solved and highlight that given the highly radioactive nature of waste arising from these new generation plants – the area required for storage increases significantly, as does the challenge of containment.

So the projections on sea level risk will need to be more than comprehensive given the onsite storage will be needed for over 100 years and the site's security will need to be state

of the art to resist future terrorist threats. The radioactive waste itself presents risks to Ireland. The absolute failure of the UK to deal adequately with its waste and to also provide a robust solution for its decommissioning of plants has to be taken into context in considering the prospects for a robust radioactive waste solution. Regretably that context is far from confidence inspiring.

We would additional highlight the scandal of the big contract (£6bn) awarded by the UK's new Nuclear Decommissioning Authority, (NDA) which had to be abandoned after only a couple of the 5 years it was supposed to run. The NDA was found to have fixed the tender and UK had to pay £120m in compensation to those unfairly treated. The government commissioned an independent inquiry (from Steve Holliday) which it seems was completed about a year ago but is still not published because we understand the CEO of NDA is blocking it. So the contract to work on decommissioning Magnox plants has not been re-let. The issues of decommissioning plants and the funding for it has been fraught with difficulties. So the UK embarked on a nuclear pathway without having a full solution is glaringly apparent and can be of little comfort to us as it seeks to expand its operations further. The full impacts of decommissing Wylfa are not assessed and should in our view be part of the Environmental Impact Assessment to grant it permission to be developed, as should the development of solutions to deal with the waste arising from its operation, in light of the obligations prescribed under the EU EIA Directive.

The extent of course to which the UK's regulatory regime will deviate from the standards of EU Directives and regulations if of course a key concern. Issues with the future governance arrangments and such matters are referred to briefly on in the context of the comments made in Annex B on the experience with the transboundary consultation. Reference is made to a submission[12] which sets out the issues for the post-Brexit environmental Governance proposals from DEFRA made by Uí Bhroin with Dr Ciara Brennan, Dr Mary Dobbs, Dr Viviane Gravey

We note a failure to consider projects such as the undersea coal mine proposed in Cumbria and the extent of controversy surrounding this project, particularly given its proximity to Sellafield. The JOC may wish to consider seeking further information in respect of this project and its potential implications and the extent to which it may additionally contribute to risk. We have queried with the Cumbrian authorities whether any transboundary screening was conducted in respect of it, and sought a copy of relevant materials. We are unable to make any specific assertions in relation to its potential impacts and cumulative impacts with Wylfa B at this point. However in the context of potential impacts to cetaceans we do have concerns, and note it would seem this should have been at least considered in the context of the assessments on such species required for Wylfa B under the EU Habitats Directive.

[12] https://www.brexitenvironment.co.uk/wp-content/uploads/dlm_uploads/2018/08/Brennan-Dobbs-Gravey-Ui-Bhroin-submission-to-DEFRA-Environmental-Governance-Consultation.pdf

Issues with normal operations:

Nuclear Free Local Authorities, (NFLA) have prepared a briefing in respect of the Wylfa B application for the purposes of this transboundary consultation with Ireland. It covers a number of our concerns but not all the matters of issue to us. This is included in full in Appendix B and adopted in full.

Particularly importantly, NFLA additionally highlight the risks associated even the basic routine and normal operation of such a plant, and the additional issues arising from the radioactive waste arising under normal conditions. An extract from some of their key findings is included below:

- The type of nuclear reactor being proposed for Wylfa B – the Advance Boiling Water Reactor (ABWRs) - have high gaseous emissions which are far more important than liquid emissions in terms of radiation doses to local people.
- Bearing in mind that Hitachi is proposing to build 2 ABWR reactors at Wylfa, it can be calculated around 6 deaths will occur somewhere in the world for every year the station operates from the radioactive emissions to the environment.
- Over 60 years – the expected operating life for an ABWR - the total therefore could be as much as 360 deaths.
- Wylfa B would produce extremely high levels of radioactive spent fuel. In the year 2200 its spent fuel arisings would amount to 80% of the radioactivity contained in all existing legacy wastes from the UK's nuclear power industry.
- The requirement for 'Best Available Techniques' (and clean technology) for producing electricity should rule out building new electricity generating stations which produce such highly dangerous wastes. Especially as less expensive, quicker and safer alternatives are available which don't produce such wastes.
- Energy efficient improvements could reduce the energy consumed in UK households each year equivalent to the output of six nuclear power stations the size of Wylfa B.
- In 2008, the UK expected energy demand to grow by 15%, where infact it has fallen by 15%, and could fall even further.
- Energy efficient improvements could reduce the energy consumed in UK households each year equivalent to the output of six nuclear power stations the size of Wylfa B.
- Offshore wind and solar are now both able to generate electricity more cheaply than nuclear power. If the UK had continued renewable expansion at the same rate as between 2010 and 2015 it could have achieved an all-renewable UK electricity supply by 2025.
- In addition, a 2016 report from ESRI suggests, in the worst-case scenario, the economic cost of a nuclear accident impacting on Ireland could be as high as €161 billion.

- A recent submission by NFLA / KIMO to the OSPAR Commission outlines that a full proposed UK new nuclear programme will only compound these issues and threatens the OSPAR Treaty regulations of 'close to zero' discharges in the Irish Sea by 2020 and beyond. (3)
- Sea level rises exacerbated by climate change put at risk in the medium to longer term the Wylfa B coastal site, and the radioactive waste which will be stored on that site in particular for decades.

Annex A

Provides a little more detail in relation to the Austrian Expert submission.

Failure to adequate assess accident risk

The Austrian Ministry commissioned an expert statement as part of their submission to the UK on Wylfa, and presented this in a most timely fashion last September of last year. We commend this submission in full to the JOC and attach a copy of it for ease of reference in Appendix A. We recommend that your would adopt all the queries and issues raised in it.

It is very technical – but some of the key points we wish to reflect on here are as follows and these are dealt with reference to the other joint submission provided with Professor Stephen Thomas and also the submission prepared by Professor John Sweeney for An Taisce.

In relation to the discrepancy indicated in our main submission on 160,000 fold discrepancy in the amount of radiation which could result from a core meltdown – we note the following:

On page 58 of the Austrian Expert's statement (attached) in considering the low level of release predicted by Horizon[13] in the Wylfa B application it comments as follows:

> "In the Environmental Statement, a severe accident with a release of Caesium-137 of 1.86E+08 Becquerel (Bq) was analysed).
>
> Such a release of Cs-137 is very low compared to the releases other EIA procedures mentioned for severe accidents:
>
> In the EIA for the planned ovany NPP (Czech Republic), the assumption of the maximal release of Cs-137 for a severe accident was 3.0E+13 (30 TBq). (UMWELTBUNDESAMT 2018).
>
> The EIA procedure for the Hanhikivi NPP (Finland) calculated possible transboundary effects of Cs-137 release of 1.0E+14 TBq. (UMWELTBUNDESAMT 2014)
>
> As discussed in chapter 4, the choice of the representative severe accident is not justified. A core-melt accident with containment failure or by-pass, resulting in the release of huge amounts of radioactive material in the environment, cannot be excluded. Thus, the analysis of the possible transboundary effects is presented in the following chapter."

In comparing the figures to conclude a factor of 160,000 in the difference between the UK and the CZ plant:

> 3.0 E+13 divided by 1.86 E+8 = 3 divided by 1.86 E+13-8 =1.6 E+5 = 160,000 , or

[13] The relevant document in the Horizon application is : 6.4.98 ES Volume D - WNDA Development App D14-2 - Analysis of accidental releases Here: ***

1tera = 10`12 therefore 30 tera = 30 x 10'12 30 X 10'12 / 1.86 x 10'8 = 161,290

Also as is flagged in the above extract, the issues with Horizon's accident risk assessment in the application documentation are not limited to this discrepancy. The Austrian submission also questions the nature of severe accident modelled, and the basis for its selection, and submit it is not an appropriate scenario. Even as a lay person – the assumptions indicated in the extract below from the Horizon application documentation[14] about the ability to contain and limit the radiation leakage for the Horizon Severe Accident scenario seem overly optimistic, particularly in the context of Fukishima.

> "***Release paths and release durations***
>
> 4.1.8 The release paths and release durations for the reference accidents are summarised in table 4-1. For the LOCA and FHA scenarios, a nominal release period of 24 hours was chosen. **For the OGF, a period of one hour was chosen for the release,** which is consistent with the description of the accident scenario given in section 3.3. For the SA, the release paths and release durations are consistent with the PSA analysis for internal events at power (leading to a degraded core).
>
> 4.1.9 The long-range model used for calculations to the nearest country is based on **a nominal release duration of 12 hours**. **For the OGF and SA scenarios, this minimum release duration of 12 hours has been applied to the calculations for Ireland whereas the release duration for calculations for areas close to the Power Station site is less than 12 hours.** It is noted that the main effect of an increased release duration is the broadening of the plume in the cross-wind direction due to wind meander (i.e. small variations in the wind direction over time).
>
> ….

The Austrian submission also highlights and details significant outstanding decision issues with the Generic Design Assessment for the reactor type for WylfaB, and the severe accident model amongst other concerns and we commend the submission in full for your consideration.

We would recommend that the JOC adopt all of the queries in the Austrian Expert Statement relating to the accident scenario, the emissions, the GDA, and indeed all the queries set out on other matters relating to the Wylfa B application.

[14] https://www.housing.gov.ie/sites/default/files/public-consultation/files/6.4.98_es_vol._d-_wnda_development_app_d14-2_analysis_of_accidental_releases.pdf

Annex B

The experience of the consultation on Wylfa B so far and issues for the attention of the committee and specific recommendations.

This annex addresses also: *What we need to remember and learn about the difficulty in securing these consultation rights the implications for our ability to defend our interests in the future; and recommendations given concerns about the Irish Government's approach to the Wylfa B consultation.*

What we need to remember and learn about the difficulty in securing these consultation rights:

The Committee is aware that there was significant controversy over the UK's failure to conduct transboundary consultations in respect of the development of its nuclear power plant Hinkley Point C. An Taisce took a court challenge all the way to the Supreme Court of England and Wales, on the basis that the UK had not complied with its legal obligations for transboundary consultation, put simply. Their final appeal was rejected by the Supreme Court who **incorrectly** indicated the core issue of interpretation of the core legal obligations at stake in the case had already been sufficiently decided and clarified generally by the EU Court of Justice, and therefore there was no need to consider the matter further, put simply.

An Taisce's position was subsequently vindicated with two UNECE committee's of the two international conventions which underpinned the legal provision at issue in the court case found the UK to be in breach of its obligations.

It was regrettable necessary for further escalation to one of these Committees to then ensure Ireland actually facilitated the consultation then being offered by the UK for the Irish public. This was conducted earlier this year – some 5 years after permission was granted.

Your Committee made a powerful and most welcome submission on the matter to the UK authorities in May of 2018. How your recommendations have been responded to will be addressed later below.

While the UK accepted the findings of one of these UNECE committee's that it had breached its obligations in respect of Hinkley Point C, it did not the other. But notwithstanding this, it indicated that it would in the future undertake to conduct transboundary consultations on applications for new nuclear power plants, which is of course welcome in the context of our near and important neighbour and the concerns at stake.

While this approach by the UK is welcome and is part of the reason for the consultation now being conducted on the WylfaB Plant – it is important to first reflect on the difficulty encountered in securing those consultation rights – some 5 years after Hinkley Point C was

given permission. In the context of Brexit – the Irish public will no longer have the benefit of the EU environmental laws and the EU Environmental Acquis, and recourse to the EU Commission and EU Court of Justice. The ability to effectively challenge in the UK courts and through whatever Governance system put in place to replace the EU Commission and EU Court of Justice remains to be seen. As has been set out in detailed submissions on preliminary proposals on such new Governance arrangements published by DEFRA* there are significant misgiving about the toothless nature of the Governance proposals, the legislative framework which is emerging post-Brexit and the ability of the Government to effectively restrict access to the courts. So reliance on these UN Conventions which are to some extent limited as they cannot quash permissions, will be our primary and limited recourse. Ireland will thus need to be increasingly vigilant and cannot risk missing any opportunity to ensure its interests are addressed at the earliest and all opportunities, and that it fully leverages and engages to ensure responses and engagement is optimised. This however has not been the case for WylfaB, as the following shows.

On the February 1st 2017, as part of its new commitment to transboundary consultation, the UK authorities wrote to Parties to the Convention, including Ireland, inviting them to indicate if they wished to be consulted. In the context of the Irish letter, they additionally acknowledged that in the case of Ireland the consultation was being additionally triggered as they had in fact identified likely significant effects on Ireland – which would of its self trigger the consultation obligation.

It requested the Irish Government reply by March 17th 2017 to indicate if it wished to be consulted.

It is noted with regret and concern that Ireland missed that deadline to confirm it wished to be consulted. **It is far from clear to us why an immediate and unequivocal response was not issued to clearly indicate the opportunity to consult would be fully availed of.**

On May 19th 2017, more than 2 months after the deadline had passed, , a formal letter* was sent to the UK indicating Ireland wished to be consulted following the development being "mentioned" at an unstipulated meeting with UK authorities on April 27th.

On July 6th 2018, following the receipt of the actual application for development, the UK wrote to initiate the consultation and suggested a period of 6 weeks, with a deadline of August 17th 2018. (The 6 weeks is non-binding duration for a consultation and clearly very inadequate in the context.) It seems Ireland wrote to request an extension of the window for comments. It is not clear to us at time of writing when this was done.

On Nov 22nd 2018 – the consultation with the Irish public was initiated, some 5 months later, and on the eve of the Christmas period, with notices published in national papers. Errors with the links to the UK website published in the Departments newspaper notices, seemingly were only corrected on the DHPLG website.

The consultation is due to conclude on the 25th of January 2019, so 65 days in total including all public holidays in the Christmas period and weekends.

As part of the UK's decision making process, the Planning Inspectorate examines the application and will be making its report, after which the Secretary of State will then make the final assessment and decision. The timeframes for these steps are governed by UK law.

In accordance with those requirements, the timetable indicated for the end of the PINS process is ** April 2018. The SoS has 3 months thereafter to make his decision.

As part of the PINS procedure, oral hearings are being conducted and parties needed to register for these.

It is more than regrettable there has not been more active engagement and effort to facilitate meaningful participation with the Irish public in particular by the Irish authorities, who have a shared responsibility with the UK to facilitate the consultation under international law – quite apart from what one could reasonably expect from one's own Government.

It would seem entirely possible to seek an extension for comments from the Irish public and to ensure there is more meaningful engagement over an extended period, and still afford the UK PINS time to reflect on the comments received prior to making its final report on April **. We believe your JOC is well positioned to advocate for such a step, and would welcome this.

We therefore recommend the Committee

*** Seek an extension for the Irish transboundary consultation and greater engagement and publication of it.**

We would also recommend that

*** The JOC's powerful and interested cross-party structure engage with Government to ensure there is a clear and unequivocal policy position that Ireland wishes to engage in all transboundary consultations with the UK, and all such consultations particularly in respect of nuclear, and that this should be established and implemented immediately.**

As noted a subset of the application information was printed and made available at Local Authorities in the planning sections. The consultation clearly was in our view significantly compromised by the running of it in such close proximity before and during the Christmas holiday period. Most if not all County Council offices were closed from the 21st to the 31st of December. Many of the documents are large, and it is not necessary to highlight the issues with broadband access in Ireland, particularly for rural communities. Council Planning desks

run at limited hours and not at weekends, the time when interested members of the public potentially have an opportunity to engage on such matters and view the physical files.

Additionally, people are not familiar with the UK's procedures. One of the first letters they would come across on the DHPLG website would be to say the UK expected comments by August of last year – so it is entirely understandable the context would not have been really clear.

The nature of the application given we are not used to nuclear power applications brings its own complexity. The fact that a number of the key explanatory documents appear with text in welsh can be disconcerting. While of course we fully and unequivocally support the primary use of the Welsh language for a development planned in Wales – it can be a bit disconcerting when it is not clear that there is an English version of the text also in the same document, which you have to page through – often substantially to locate.

The volume of the application is a further consideration. It is noted that An Taisce's submission estimates the volume of pages to be in excess of 40,000. Just the basic application comprises around 440 documents. Over the 65 days allotted (including every weekend, Christmas Day, St Stephen's Day and New Year's Day) – this would mean reading effectively 7 documents per day, or some 615 pages. Some of these documents – run to 100's of pages. The basis on which DHPLG had selected documents for printing and circulation to the Local Authorities was queried the day the consultation was launched. It took 16 days to get a response, on the 8th of December.

By this time I had already visited South Dublin County Council's offices on December 5th to inspect the file. I was presented with this:

There was no guidance on where to begin. I unpacked everything, and was conscious this was only a subset of the application documents.

I had to wait for over 20 minutes at the counter to be served, and over 20 minutes then for the materials to be brought out. I was on lunch break.

I realised there was supposed to be a notice published in the Local Authority. I went looking for that on the notice boards and the planning desk, but could find nothing. So I asked and was eventually advised it was posted on the entrance door to the Council offices. However, I had not observed this on entering, yet I was alert to the application. On inspecting the entrance with the assistance of a most helpful person from the planning desk – it became immediately obvious why I missed it. The notice was on 2 A4 pages, with a densely written typeface, with no large type of emphasis to highlight the subject matter. The doors are automated, so when you come within around 2.5 feet of them they swing open, and the notice is on the far side of the door as you enter so you miss it entirely, as the following hopefully shows:

As indicated it is considered necessary to highlight this to urge the JOC to act in respect of the very under-stated way the DHPLG is approaching the consultation.

Finally we also feel obliged to highlight the following important matter:

Handling of the JOC's recommendations in its Hinkley Point C submission and the Irish Government's response to these:

Despite the very first recommendation from the submission of your committee on Hinkley Point to the UK Government calling for a full Environmental Impact Assessment to be conducted, (which had of course not been conducted in accordance with the Espoo Convention) – it would seem from the evidence available to us detailed below that this call has **not** been reflected by the Irish Government when it reverted to the Espoo Implementation Committee on the recommendations which should arise following the consultation.

In reviewing the recently published Draft Findings and Recommendations[15] made by the Espoo Implementation Committee, (EIC) who were investigating the breach on Hinkley Point – it seems in commenting to the EIC on the outcome and views following the round of transboundary consultation finally conducted – no party had requested further steps under the Convention, (para 109*). Such further steps had in fact been suggested for consideration earlier by the EIC including conducting an EIA procedure under the convention, which was exactly as per your recommendation.

In para 30 of the EIC Findings and recommendations, it is noted that Ireland replied to the Espoo Implementation Committee on the 29th of June – so after your report and submission of May 2018 was made on Hinkley Point. But it would seem that these recommendations

[15] http://www.unece.org/fileadmin/DAM/env/eia/documents/mop7/ece.mp.eia.2019.1e_-_Advance_copy_01.pdf

from your Committee have not been addressed in the letter sent to the EIC. Nor does it appear to us that further steps have been taken in terms of readiness or preparedness – quite apart from the engagement issues highlighted above. It is respectfully suggested that these are matters which should be the subject of further investigation and clarification by your Committee.

This is the context in which the substantive issues associated with this development now need to be seen.

Annex C:

An Claíomh Glas is a small independent environmental non-Government organisation, eNGO. Formerly known as the Finnstown Input Group, the FIG, it was renamed in 2016. This was to reflect the increasingly broad focus and range of environmental matters and issues of concern to it and on which it engaged, since the group had developed since it was founded back in the early 2000s. Founded in the early 2000, in response to local developments issues in the Dublin area, and in particular in response to the Adamstown Strategic Development Zone in which it had engaged proactively to support the successful development of the SDZ along with the needed infrastructure. However it has been since active on a whole range of environmental matters within Ireland, the UK and the EU.

Its purposes include:

1. To promote and encourage the enhancement, restoration, protection and conservation of the natural and built environment, for both current and future generations for the public benefit, including for the protection of human health and well-being, and also for the benefit of all other species on the planet and for the improved sustainability of the planet itself, including for the public benefit.
2. To support the protection of wild animals in particular, and prevent their injury, suffering, disturbance and the deterioration of their habitats, and in particular to leverage the law in this regard.
3. To contribute to effective action on climate change.
4. Through our engagements to advance the education and awareness of our members and volunteers, and the public and public authorities where possible, in matters relating to the law and its application and in the administration of justice in connection with the environment, and to seek and promote compliance with environmental law.
5. To create greater awareness and seek compliance with the human rights convention on ACCESS TO INFORMATION, PUBLIC PARTICIPATION IN DECISION-MAKING AND ACCESS TO JUSTICE IN ENVIRONMENTAL MATTERS done at Aarhus, Denmark, on 25 June 1998, "The Aarhus Convention", through our engagements.
6. To support improvement in the proper transposition, implementation, compliance and enforcement of environmental law, including improvements in the administration of justice and access to justice in relation to the environment and matters related thereto, all in order to protect the environment.
7. To promote enjoyment and appreciation of the natural and built environment in our activities where possible.

It is entirely voluntary in nature, does not receive any public funds, and operates with a network who engage to support the focus and work of ACG on issues of concern to them.

Its vice chair is Attracta Uí Bhroin, who authored this submission on behalf of ACG and in her own right for

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Transboundary Environmental Public Consultation

Planning Application for proposed Wylfa Newydd Nuclear Power Plant, Anglesey, North Wales, United Kingdom

24th January 2019

Enclosed is a submission from the Environmental Health Service and the Department of Public Health with regard to the transboundary public consultation for the planning application for proposed Wylfa Newydd Nuclear Power Plant, Anglesey, North Wales, United Kingdom.

Consultation within the Health Service Executive was made prior to making this submission.

[redacted]
Assistant National Director, Environmental Health Service

Environmental Health Service Submission

Summary

After reviewing the environmental assessment process carried out and the relevant literature, the Environment Health Service comments can be summarised as follows:

a) A review of the environmental assessment process for the proposed nuclear power plant would indicate that EU guidance on transboundary environmental assessment and the EU and UK development regulatory framework has not been followed and the requirements of 2011/92 EU and the Espoo Convention have not been met with regard to consideration of the alternatives.

b) Alternatives have not been considered in the environmental assessment process as per the statutory requirement of the relevant EU Directives and published guidance. The rationale for this seems to be that a strategic site identification process by the UK Government is considered adequate discharging of this duty. It is the opinion of the Environmental Health Service that this does not discharge the legal duty to consider alternatives and is contrary to UK planning policy and regulation. Supporting evidence is included in this submission.

c) The potential transboundary impacts to Ireland are from the routine operation of the plant and are from routine and accidental process emission or from a minor to a catastrophic accident. The potential significant construction impacts are not relevant to Ireland.

d) The impacts from operation and accidental release would be on human and animal health and/or socio and economic impacts.

e) The Radiological Protection Institute of Ireland (RPII) published a report in 2003 that considered potential impacts from the building of nuclear power plants in the UK. This report clearly predicts what the impacts from different scenarios would be and what action would be required to be taken. The worst case situations from catastrophic accidents predict 'high' socio and economic impacts.

Consideration of the Alternatives

The environmental assessment process for the proposed development does not consider alternatives and the Non-Technical Summary states of the Environmental Impact Statement states:

2.5 Main alternatives considered
Location of the Power Station
2.5.1 NPS EN-1 and EN-6 set out the "urgent need for new electricity generation plant, including new nuclear power". The UK Government identified the area of land surrounding the Existing Power Station as potentially suitable for the deployment of a new nuclear power station in 2011 following a Strategic Siting Assessment and confirmed this support more recently in a Ministerial Statement on Energy Infrastructure issued in December 2017. Alternative energy generating technologies and alternative locations have therefore not been considered further as part of the assessment.
https://www.housing.gov.ie/sites/default/files/public-consultation/files/6.11_environmental_statement_es_non-technical_summary_rev_1.0.pdf

It should be noted that the criteria for Strategic Siting Assessments and for alternative energy sources does not indicate that there was any transboundary element of consultation.

The rationale for not considering the alternatives in the environmental assessment is based on that this has been done in the overarching National Policy Statement for Energy (EN-1) July 2011 and National Policy Statement for Nuclear Power Generation (EN -6) July 2011, issued by the UK Government Department of Energy and Climate Change.

The UK legislation transposing EIA Directives on Environmental Assessment is:

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009
And
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
In SCHEDULE 4 of the 2009 Regulations:
Information for inclusion in environmental statements
PART 1
18. An outline of the main alternatives studied by the applicant and an indication of the main reasons for the applicant's choice, taking into account the environmental effects.
And in Schedule 4 of the 2017 Regulations
2. A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

UK National policy Statement (EN-1) section 4 states:

4.4 Alternatives

4.4.1 As in any planning case, the relevance or otherwise to the decision-making process of the existence (or alleged existence) of alternatives to the proposed development is in the first instance a matter of law, detailed guidance on which falls outside the scope of this NPS. From a policy perspective this NPS does not contain any general requirement to consider alternatives or to establish whether the proposed project represents the best option

4.4.2 However:

•• applicants are obliged to include in their ES, as a matter of fact, information about the main alternatives they have studied. This should include an indication of the main reasons for the applicant's choice, taking into account the environmental, social and economic effects and including, where relevant, technical and commercial feasibility;

•• in some circumstances there are specific legislative requirements, notably under the Habitats Directive, for the IPC to consider alternatives.

These should also be identified in the ES by the applicant; and in some circumstances, the relevant energy NPSs may impose a policy requirement to consider alternatives (as this NPS does in Sections 5.3, 5.7 and 5.9.)

In EN-6

2.5 The IPC's assessment of alternatives

2.5.5 Therefore, subject to any contrary legal requirements, the IPC should judge an application on a listed site on its own merits and a comparison with any other listed site is unlikely to be important to its decision.

Guidance on Transboundary Impacts

In May 2013, the European Commission published 'Guidance on the Application of the Environmental Impact Assessment Procedure for Large-scale Transboundary Projects'. The aim of the EC Transboundary Guidance document was to build on "experience and the good practices identified so far" in the EIA field and to provide a greater clarification of how to approach "large-scale transboundary projects". (EU, 2013)

The Guidance identifies a number of steps in transboundary EIA as required by EIA Directive 2011/92 (known as the EIAD) and the Espoo convention in transboundary environmental impacts, which is integral to EU law:

1. Notification and transmittal of information (Articles 7.1 and 7.2 of the EIAD; Article 3 Espoo);
2. Determination of the content and extent of the matters of the EIA information – scoping (Article 5.2 of the EIAD);
3. Preparation of the EIA information/report by the developer (Articles 5.1, 5.3 and Annex IV of the EIAD; Article 4 and Appendix II Espoo);
4. Public participation, dissemination of information and consultation (Articles 6, 7.3 EIAD, Article 3.8, 2.2, 2.6 and 4.2 Espoo);
5. Consultation between concerned Parties (Article 7.4 EIAD, Article 5 Espoo);
6. Examination of the information gathered and final decision (Article 8 EIAD, Article 6.1 Espoo);
7. Dissemination of information on the final decision (Article 9 EIAD, Article 6.2 Espoo).

The Guidance is very clear that there should be assessment of the reasonable alternatives.
'a description, where appropriate, of reasonable alternatives (e.g. in terms of location, technology to be employed, etc.) and also the no-action alternative'

'The joint environmental report should include, where appropriate, an assessment of reasonable alternatives (for example, location or technology used, and the no-action alternative)' (EU, 2013)

(See Appendix II (b), Espoo Convention and Annex IV (3) to the EIA Directive)

Conclusion

There does not seem to be any basis in legislation or guidance on transboundary impact assessment that an assessment of alternatives (including do nothing scenario) can be excluded from the environmental assessment process due to a national policy position or a strategic site assessment process. This is of a particular concern where the strategic site assessments and subsequent conclusions did not include transboundary consultation.

Furthermore, the UK Government Policy Documents EN -1 and EN -6 recognise that a national policy position cannot over ride statutory requirements for consideration of the alternatives in section 4 and section 2 respectively.

The Environmental Health Service therefore requests that the environmental assessment of the project includes an assessment of reasonable alternatives. This should include the do nothing scenario, alternative sites, alternative technology, and alternative power generation, as per statutory requirements and EU Guidance Documentation.

Bibliography

Espoo Convention
The Espoo (EIA) Convention sets out the obligations of Parties to assess the environmental impact of certain activities at an early stage of planning. It also lays down the general obligation of States to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries
https://www.unece.org/env/eia/eia.html

full text: https://www.unece.org/env/eia/about/eia_text.html

DIRECTIVE 2011/92/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment
(codification) (OJ L 26, 28.1.2012, p. 1)
As amended by:
Directive 2014/52/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 April 2014

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ISBN 978-92-79-29946-9 doi: 10.2779/35899 © European Union, 2013
http://ec.europa.eu/environment/eia/pdf/Transboundry%20EIA%20Guide.pdf

EIA/IC/CI/5 United Kingdom
https://www.unece.org/environmental-policy/conventions/environmental-assessment/areas-of-work/review-of-compliance/committee-initiative/eiaicci5-united-kingdom.html

EN -1 National Policy Statements for energy infrastructure
https://www.gov.uk/government/publications/national-policy-statements-for-energy-infrastructure

EN- 6 National Policy Statement for Nuclear Power Generation
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47859/2009-nps-for-nuclear-volumeI.pdf

Transboundary Environmental Public Consultation

Planning Application for proposed Wylfa Newydd Nuclear Power Plant, Anglesey, North Wales, United Kingdom

In accordance with the provisions of the 1991 United Nations Convention on environmental impact in a transboundary context (the Espoo Convention) and the EU Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the EIA Directive), the Minister for Housing, Planning and Local Government has received notice from the UK's Planning Inspectorate (PINS) in relation to the development consent application (planning application) by Horizon Nuclear Power for the proposed Wylfa Newydd Nuclear Power Plant, in Anglesey, North Wales, United Kingdom. The proposed development principally comprises a proposed new nuclear electricity generating station on the north coast of Anglesey, North Wales with a projected electrical output of approximately 3.1 gigwatts. The proposed development would also include permanent and temporary works in the marine environment; off-site power station facilities, including a control centre, laboratory and emergency equipment garage; and associated off-site development comprising a worker accommodation campus, temporary park and ride facility, construction logistics centre and highway improvements.

The proposed development is subject to an environmental impact assessment procedure and the UK's PINS has identified that the proposed development has potential transboundary effects on the environment in Ireland. Accordingly, the UK's PINS has invited Ireland to undertake a transboundary consultation in respect of environmental information relating to the proposed development. The UK's PINS is currently examining the development consent application for the proposed development. The UK's PINS will submit a report on the application, including a recommendation to grant or refuse development consent, to the UK's Secretary of State for Business Energy and Industrial Strategy, who will make the decision on whether to grant or refuse development consent.

A member of the public may make a written submission or observations in relation to the potential transboundary environmental effects of the project, by sending them to his or her local planning authority, to be received **by close of business on Friday 25 January 2019** at the latest. Submissions or observations should **not** be made to the Department of Housing, Planning and Local Government.

Contact details for each planning authority are set out in the public consultation notice, which is available to view in the public consultation section of the website of the Department of Housing, Planning and Local Government at www.housing.gov.ie , together with the correspondence from the UK's PINS, digital copies of extracts from the applicant's Environmental Statement; associated documents and links provided by the UK's PINS to the full Environmental Statement and all other documentation relating to the development consent application for the proposed development.

The public consultation notice is also available to view in the office of the Planning Section of each planning authority nationwide during office hours together with a printed copy of the correspondence from the UK's PINS inviting Ireland to undertake a transboundary consultation under the Espoo Convention and the EIA Directive; extracts from the applicant's Environmental Statement and associated documents that appear to be most relevant for the

purpose of the consultation. A copy of these documents is available for inspection, or purchase at a fee not exceeding the reasonable cost of making a copy, during office hours at the office of each planning authority nationwide.

All documentation related to the development consent application for the proposed development, including additional or amending documentation accepted at the discretion of the UK's PINS, is also available to view on the website of the UK's PINs, including any additional information accepted by the UK's PINS at:

https://infrastructure.planninginspectorate.gov.uk/projects/wales/wylfa-newydd-nuclear-power-station/

In the interests of transparency, it should be noted that, following consultation with the Minister for Housing, Planning and Local Government, each planning authority will forward to the UK's PINS all submissions or observations it receives through this public consultation, and may also forward a summary of the submissions or observations. Submissions or observations received, or a summary of same, may be published on the website of the planning authority concerned or on a website of the UK's PINS. The DHPLG will not publish any submissions or observations or summary of same.

An Roinn Tithíochta,
Pleanála agus Rialtais Áitiúil
Department of Housing,
Planning and Local Government

Submission and appendices attached.

A summary of the submission is as follows

Submission No	Name	Summary
1	Attracta Uí Bhroin, Environmental Law Implementation Group Facilitator at the IEN	This submission addresses briefly - The implications of Brexit; - Issues arising consequent on suspension of the project and the UK's conflict of interest - Inadequacies with the Application - Failures in respect of Article 5 of the EIA Directive and the Espoo Convention, most particularly in respect of the analysis of severe accidents, and omission of basic information required - Failures in respect of the Habitats Directive This submission adopts in full the submissions made by the Austrian Government on the project, and all associated queries. It also adopts in full the submission made by Nuclear Free Local Authorities, (NFLA) to the Irish transboundary Consultation, included here as Appendix B, and also the NFLA submission to the UK authorities. It also adopts any additional arguments raised in the An Taisce submission, and all concerns raised in relation to the inadequacy of the application and transboundary impact assessment raised by any interested party in the context of all the consultations conducted on this project, and including all technical and legal arguments made regarding the application.

We have no further submissions to make at this time.

From: Edward Horgan [redacted]
Sent: Wednesday, January 23, 2019 2:06 PM
To: plandev <planning@limerick.ie>
Subject: Transboundary environmental public consultation – Wylfa Newydd Nuclear Power Plan

To: Limerick City and County Council
Planning Section, Floor 1, Limerick City & County Council Offices, Dooradoyle Road, Limerick V94 WV78
planning@limerick.ie

Subject: Transboundary environmental public consultation – Wylfa Newydd Nuclear Power Plan

Date: 23th January 2019
Name: Edward Horgan
Address: [redacted]
e-mail: [redacted]

Dear sir/madam,

I'm submitting this as my opinion against the Wylfa Newydd (Wylfa B) project in the Isle of Anglesey, Wales.

While Wylfa in north Wales may seem to be remote from County and City of Limerick, and damaging effects of any radiation leaks for any nuclear plant in the UK or indeed in any part of the world are likely to have very serious implications for human and animal health in Limerick and elsewhere.

Recently Hitachi, a parent company of Horizon, the operator of this project, has published its intention of suspending this project because of financial uncertainty. But once Hitachi finds some source of funding in the future or some other company (of another country) takes over, this project might be revived. I'm afraid there will be no consultation anymore at that time if I miss this opportunity so I'm sending this anyway.

Transboundary environmental public consultation – Wylfa Newydd Nuclear Power Plan

I'm strongly against the Wylfa Newydd Nulcear Power Plant project in the Isle of Anglesey, Wales, based on what I have seen what has happened at nuclear power plants in Japan, the country where I was born, especially after the Fukushima nuclear power plant accident and also based on what I have learned about the Wylfa Newydd project so far.

1, Impact to health and environment

According to the study of the UK Environment Agency's ABWR (the Advanced Boiling Water Reactor) Assessment Report on gaseous radioactive waste disposal and limits published in 2017, it is expected that each year the proposed ABWR-type reactors would emit to air 2700 gigabecquerels (GBq) of tritium (ABWR is the same type of the reactor as the Fukushima nuclear power plant. In the Wylfa B project, 2 reactors are planned to be built.). This amount is much bigger than the one from EPR reactor types, 500 GBq. The gaseous tritium moves quite fast and wide. It's easily mixed with rainwater, falls on the ground and is taken into plants. Also it drops on the sea and is taken by marine lives. Once it's taken into human bodies, it causes leukemia and brain tumour and also damages DNA. In USA, UK, Germany and Japan, there are studies and the official statistics that the number of leukemia is bigger in the areas around nuclear power plants than other areas. This happens by the emission of radioactive gas/water from nuclear power plants in their daily operations and their regular maintenance.

Tritium and other radioactive substances will be discharged directly to the sea as well as emitted as radioactive gas. The Irish sea has been contaminated radioactively by nuclear facilities in the UK for many years and we shouldn't allow it anymore.
2, In the case of a nuclear accident
What happened in Fukushima at the time of the nuclear accident was;
Neither the national government or the electricity company didn't inform the local governments when the explosions happened. Even after the government issued the evacuation order the notification didn't go to the local governments around area, only to the town where the nuclear power plant was located. Also the government had the data which direction the radioactive plume would be flown to by wind but they didn't give the info to the local governments and a lot of people evacuated to the direction that the plume would move to and were irradiated.
The Chernobyl accident and the Fukushima accident are typical examples but in the case of other accidents as well. the government and the electricity companies wouldn't try to protect even their own people, rather would be busy for hiding the seriousness of the accident. I can't imagine that the UK government and the electricity company in UK will give the correct information quickly enough to the Irish government in the case of a serious accident. Or even if the UK government gives the Irish government the information, is there any such preparation for the Irish government to take action to protect citizens? Anglesey people might evacuate to Ireland by boat!
Once I read the minutes at the *Seanad* Éireann. In the discussion an officer from the Department of Communications, Climate Action and Environment said there is no need to worry about the accident at Wylfa Newydd as the wind doesn't blow from Wales to Ireland so that radioactive plum would not come to Ireland. But at this time of the climate change, no body can say "it won't happen".

This 2016 report was commissioned by ESRI for the Irish Environmental Protection Agency to consider what the economic impacts could be from a UK or French based nuclear accident sending a radiation cloud over parts of the island of Ireland.

'Headline' issues noted from the report include:
• In the worst-case scenario, a nuclear disaster in North West Europe (originating from the UK or France in particular) could create total economic damage to the Irish economy of €161 billion.
• Irish agricultural production would grind to a halt, with the tourism industry and exports also incurring substantial damage.
• Even the most benign scenario considered by ESRI, where no radioactive contamination occurs, could still see a total loss estimated at €4 billion, due to the reputational damage this could have on Ireland.
• By comparison, the total value of corporation tax collected in the first nine months of 2016 (when the report was published) was €4.16 billion.
• ESRI also acknowledge that their analysis underestimates the true extent of such an incident to its cost to the economy.
• For example, in addition, health risks from high levels of radioactive contamination, could put a significant strain on the health service, requiring additional resources to be found.
• The total cost of a low-level radioactive contamination scenario, which requires the imposition of food controls to reassure the public and restrictions food imports to Ireland,

would be €18 billion.
• The impact on tourism would also be significant, with long-term reputational damage resulting in an economic cost of €80 billion.
• In the absolute worst-case scenario in the ESRI study, not only would exports be decimated but the need to import much of the country's food would lead to far higher domestic costs. There could also be significant emigration.

We have to note that the impact mentioned above is the one to national economy and that the impact to each citizen will never be compensated enough. After the Fukushima accident, TEPCO, the electricity company, has tried to reduce or refuse to compensate to affected people. At this moment , even after 8 years of the accident, more than 30 court cases are going on against the national government and TEPCO for enough compensation and clean up their home towns.

3, Nuclear waste

As THORP spent fuel reprocessing factory in Sellafield has been closed since 2018, all spent fuel (very high temperature and highly toxic) will be stored in the site of Wylfa Newydd until it'll be cool down and be prepared to moved to the final disposal facility. The document by Horizon says it'll take 140 years. If Wylfa Newydd starts operation in 2030 it'll cease operation in 2090. if you calculate simply, somebody will have to watch it until 2230. Will Horizon be at that time? Who will be able to take responsibility for such long time? (And it will not the end, Then the cooled down fuel should be moved to the final disposal facility and should be kept under control more than 100,000 years.)

Some expert is estimating that the sea level might rise more than 6 meters in the worst scenario because of the global warming. How will Horizon protect highly radioactive spent fuel (human beings can't touch it) in the case the sea is about to wipe out the site?

4, Nuclear is not the answer to climate change

It takes too much time to construct. It won't emission CO_2 when it generates electricity but all big works, esp. concrete, emits CO_2. Uranium has to be transported somewhere far away and fuel is needed for it. (Also a lot of health and environmental hazards are reported at uranium mining sites.)

5, For security

Nuclear power plants can easily be targets of terrorist's attack.

6, Conclusion

If the UK government says the Wylfa Newydd will not cause any accident and be definitely safe, then they should build it near London or somewhere, close to the area which consumes the electricity. Then they don't have to build big pylons and can save the cost for transmission.

Not only the UK government but any government should put more effort to develop real renewable generation system like solar, wind and waves. It will also create more sustainable jobs.

I wish to point out also that another serious danger with regard to nuclear power stations in the UK exists with regard to the Hinkley Point nuclear power plant being constructed in the Severn Estuary just opposite to Counties Wexford and Wicklow. This should also be of concern to Limerick City and County Council.

Yours sincerely

Dr Edward Horgan

Limerick ....One of the 'TOP 10 PLACES TO INVEST IN EUROPE'- 6th Global Best to Invest Report, Site Selection Magazine Limerick City & County Council Disclaimer: This electronic message contains information (and may contain files), which may be privileged or confidential. The information is intended to be for the sole use of the individual(s) or entity named above. If you are not the intended recipient be aware that any disclosure, copying, distribution or use of the contents of this information and or files is prohibited. If you have received this electronic message in error, please notify the sender immediately. This is also to certify that this mail has been scanned for viruses. Tá eolas sa teachtaireacht leictreonach seo (agus b'fhéidir sa chomhaid ceangailte leis) a d'fhéadfadh bheith príobháideach nó faoi rún. Is le h-aghaidh an duine/na ndaoine nó le h-aghaidh an aonáin atá ainmnithe thuas agus le haghaidh an duine/na ndaoine sin amháin atá an t-eolas. Murab ionann tusa agus an té a bhfuil an teachtaireacht ceaptha dó bíodh a fhios agat nach gceadaítear nochtadh, cóipeáil, scaipeadh nó úsáid an eolais agus/nó an chomhaid seo. Más trí earráid a fuair tú an teachtaireacht leictreonach seo cuir, más é do thoil é, an té ar sheol an teachtaireacht ar an eolas

láithreach. Deimhnítear leis seo freisin nár aimseodh víreas sa phost seo tar éis a scanadh.

Lorraine Quigley

From: [redacted]
Sent: 25 January 2019 13:09
To: Planning Group
Subject: Transboundary environmental public consultation – Wylfa Newydd Nuclear Power Plant
Attachments: Wylfa Transboundary impacts submission..docx

To whom it concerns,
Please forward my attached submission on the potential transboundary impact of the Wylfa Nuclear New Build proposal to the relevant section of the UK Planning Inspectorate.
I note the recent withdrawal of Hitachi from the project and regret that this development did not give rise to an extension in the public consultation period given the confusion the announcement caused, even among people of experience in this area.
I am a member of Louth County Council and long time activist on nuclear issues. I am also the Co- Chair of the Irish Forum of the Nuclear Free Local Authorities.
I make this submission on my own behalf.
Many thanks

[redacted]

--
Mark Dearey.

Oifigeach Poiblí Ainmnithe faoin Acht um Brústocaireacht a Rialáil 2015
Designated Public Official under the Regulation of Lobbying Act 2015

2. Introduction

After significant pressure from Irish environmental groups including the NFLA All Ireland Forum, and a judgement from the Espoo and Aarhus Convention Committees, the UK Government has offered the opportunity to non-UK residents, governments and groups in Europe to make submissions and review the environmental impact report and the accompanying documents for possible cross-border environmental impacts. The NFLA All Ireland Forum welcomes this procedure being undertaken by the Irish Government through the Planning Sections of Irish Councils so as to allow Irish views on the transboundary impacts of a nuclear reactor development the other side of the Irish Sea to it.

This submission provides information that the NFLA has submitted to previous UK Government environmental consultation on Wylfa B, to the current National Planning Inspectorate inquiry into a Development Control Order for the proposed Wylfa B site, and to a joint response submitted by NFLA and KIMO International to the OSPAR Radiation Substances Committee.

3. Gaseous Discharges from an ABWR built at Wylfa

According to the UK Environment Agency's ABWR Assessment Report on gaseous radioactive waste disposal and limits published in 2017 (1) it is expected that each year the proposed ABWR-type reactors would emit to air 2700 gigabecquerels1 (GBq) of tritium; 910GBq of carbon-14; and 9180GBq of radioactive noble gases. These are large amounts of radioactivity when compared with the French EPR proposed for Hinkley Point C. The table below compares gaseous emissions from ABWR with the AP1000 (which was originally proposed for Moorside near Sellafield) and EPR reactor types.

Radionuclide	EPR (2)	AP1000 (3)	ABWRs (4)	Range for 1000 MWe station (5)
Tritium	500GBq	1800GBq	2700GBq	100 – 3600GBq
Carbon-14	800GBq	606GBq	910GBq	40 – 530GBq
Radioactive Noble Gases	350GBq	8047GBq	1980GBq	100 – 10,000GBq

Table 1: Predicted gases discharges for a single reactor of each type.

The UK Committee on Medical Aspects of Radiation in the Environment (COMARE) recommended that as: "*...part of a new generation of plants, it might be expected that discharges would be lower than existing facilities, rather than 'within the range of historic discharges' which seems to be the criterion being applied by EA.*" (6)

This begs the question: if EPRs can reduce tritium emissions to the atmosphere to 500GBq per reactor why can't ABWRs being planned for the Wylfa site?

4. Radiation Risks

In the assessment of radiation risks to local people, aerial emissions from nuclear reactors are more important than liquid discharges for two reasons. First, the key parameter in estimating radiation doses to local people from radioactive isotopes is their concentration in

environmental materials. Contrary to popular perceptions, air emissions result in much higher environmental concentrations than sea discharges, because water is much more effective than air at diluting contaminants. This is not to accept that dilution is the solution to pollution: it isn't. It merely reflects the fact of current (ill-advised) methods of disposing nuclear wastes. (7)

Second, individual and collective doses from aerial emissions are much larger than from sea discharges. People living near Nuclear Power Plants (NPPs) receive doses from eating contaminated food, drinking contaminated water, breathing contaminated air, and skin absorption (especially of tritiated water vapour).

For example, the contamination of local foods occurs by air emissions - particularly tritium and carbon-14 emissions. The only exception is contaminated sea foods. But these concentrations are very low. People who elect to live near discharge sites can largely avoid eating contaminated sea foods but, they cannot avoid breathing contaminated air from aerial emissions. It is for these reasons that NPP operators go to considerable lengths to divert radioactive releases away from aerial emissions towards sea discharges. The tritium discharges to sea for example from the AP1000 type of reactor are almost 20 times larger than tritium air emissions. With the ABWR this situation is revered with tritium emissions to the atmosphere thirteen times larger than tritium emissions to the sea.

It is also worth noting that COMARE has highlighted the recent report of the Advisory Group on Ionising Radiation (AGIR) (November 2007) which suggests that current dose estimates for tritiated water are ***too low***. (8)

5. Tritium

The largest aerial emissions are of tritium in the form of tritiated water vapour, i.e. radioactive water. In recent years, many official reports have discussed the hazards of tritium - the radioactive form of hydrogen. In the past, this isotope had been regarded as being only "weakly" radiotoxic: this view is now changing among governments and international agencies concerned with radiation exposures. For example, recent reports have been published by radiation safety agencies in the UK, Canada and France. (9) These reports draw attention to the hazardous properties of tritium including its extremely rapid distribution in the environment, its heterogeneous distribution within tissues, its ability to bind with organic molecules resulting in higher doses, and its high biological effectiveness compared with gamma radiation.

Over 60 epidemiological studies world-wide have examined cancer incidences in children near nuclear power plants (NPPs): ***most of them indicate leukemia increases***. These include the 2008 KiKK study commissioned by the German Government which found relative risks (RR) of 1.6 in total cancers and 2.2 in leukemias among infants living within 5 km of all German NPPs. The KiKK study has retriggered the debate as to the cause(s) of these increased cancers.

Although several studies in the late 1980s and early 1990s revealed increased incidences of childhood leukemia near UK nuclear facilities, official estimated doses from released nuclides suggest these would have been too low by 2 to 3 orders of magnitude to explain the increased leukemias.

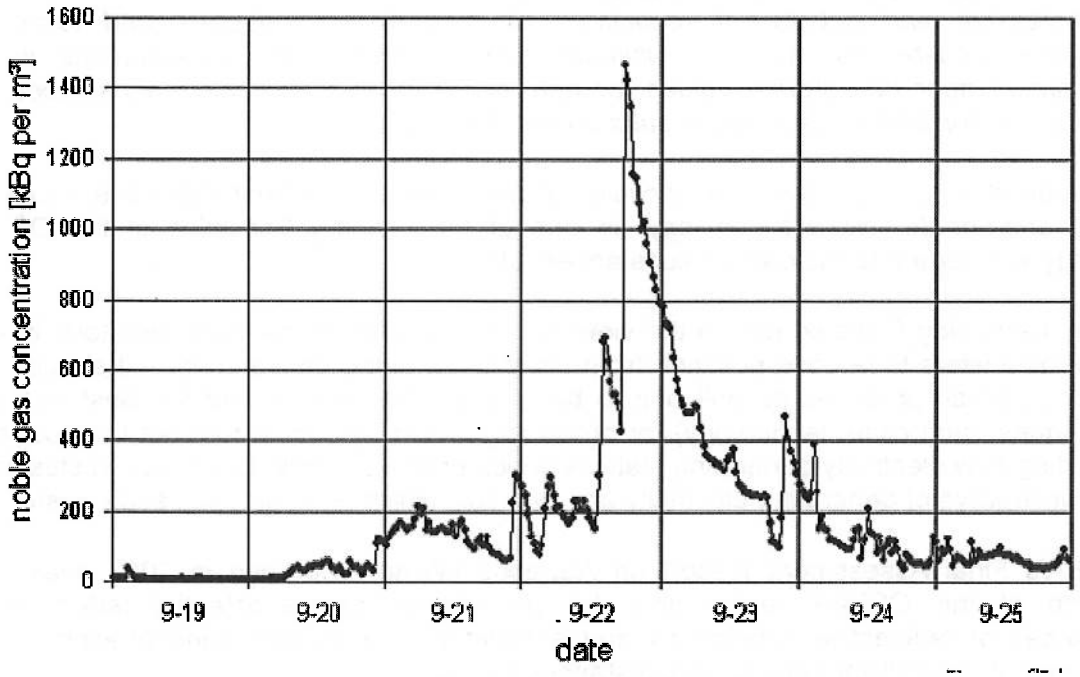
A suggested hypothesis is that the increased cancers arise from radiation exposures to pregnant women near NPPs. However any theory has to account for the >10,000 fold discrepancy between official dose estimates from NPP emissions and observed increased risks. An explanation may be that doses from spikes in NPP radionuclide emissions are

significantly larger than those estimated by official models which are diluted through the use of annual averages. In addition, risks to embryos/fetuses are greater than those to adults, and haematopoietic tissues (stem cells that create other blood cells) appear more radiosensitive in embryos/fetuses than in newborn babies. The product of possible increased doses and possible increased risks per dose may provide an explanation. (10)

The evidence for radionuclide spikes during refuelling was revealed for the first time in November 2011. Published data from the Gundremmingen NPP in Southern Germany showed that very large spikes of radioactive noble gases were released during refuelling than were emitted during normal power operation throughout the rest of the year. (See graph below). According to the International Physicians for the Prevention of Nuclear War (IPPNW) in Germany, the normal emission concentration during the rest of the year is about 3kBq/m3 but during inspection/refuelling episodes this concentration increased to ~700kBq/m3 with a peak of 1,470kBq/m3. Nuclide emissions during the period of refuelling were about 65% of total annual releases. Noble gas concentrations can be used as a proxy for other gaseous emissions, including tritium, C-14 and iodine releases. (11)

The table below provides this information:

Graph 1. Noble gas concentrations from Gundremmingen C. 1/2 hourly values. Sept 19 to 25



In order to refuel, the pressure vessels of all nuclear reactors are opened up about once a year. This releases large volumes of radioactive gases and vapours, including noble gases, tritium, carbon-14 and iodine-131, to the environment. Until now, these nuclide releases had been published only as annual data throughout the world. After repeated requests by the SPD-Green Party Government in Bavaria, half-hourly data were made available for scientific evaluation for the first time. Brief exposures to high concentrations are more hazardous to residents near NPPs than chronic exposures to low concentrations. Exposures to high concentrations result in higher internal doses, so these nuclide spikes during re-fuelling could go a long way to explaining the increased incidences of child leukaemias near NPPs shown by the KiKK findings.

6. Liquid Discharges

Radionuclide	EPR (12)	AP1000 (13)	ABWRs (14)	Range for 1000 MWe station
Tritium	52,000GBq	33,400GBq	200GBq	2,000 – 30,000Gbq
Carbon-14	23GBq	3.3GBq		3-45GBq
Iodine radionuclides	7MBq	15MBq	0.035MBq	10-30MBq
Other radionuclides	0.6GBq	2.7GBq	2.3MBq*	<1-15GBq

Table Two: Predicted liquid discharges for a single reactor of each type.

*This is Fe-55. According to the Environment Agency the aqueous discharge activity is dominated by tritium (H-3), which is not abated and constitutes over 99.99% of the activity in the aqueous discharges. The second largest contributor of activity to the discharges is iron-55 (Fe-55), which only constitutes 0.0012% of the activity discharged.

With regard to the UK's proposed new reactor programme concern has been expressed about the UK's lack of compliance with its obligations under the OSPAR Convention on the Protection of the Marine Environment of the North East Atlantic. (15)

Under the treaty the UK Government is committed to:
"*...progressive and substantial reductions of discharges, emissions and losses of radioactive substances, with the ultimate aim of [achieving] concentrations in the environment near background values for naturally occurring radioactive substances and close to zero for artificial radioactive substances.*" [by 2020].

The application of "*best available techniques and best environmental practice, including, where appropriate, clean technology*" is one of the Guiding Principles of the OSPAR Strategy with regard to radioactive substances. (16)

"Clean Technology" should not, in the view of many environmental commentators, involve end-of-pipe filters to remove pollution from discharges to the environment – it should be a technique which produces no pollution to begin with. The requirement for 'Best Available Techniques' (and clean technology) for producing electricity should rule out the possibility of building new electricity generating stations which produce highly dangerous wastes when alternative ways of generating electricity are available which don't produce such wastes.

The EA's Final Assessment Report on Aqueous Waste, published in 2017, makes no mention of the OSPAR requirement for progressive and substantial reductions in discharges of radioactive substances and achieving close to zero concentrations in the environment for artificial radioactive substances by 2020.

7. Critical Group Doses

The NFLA notes that the UK environmental regulators the Environment Agency (EA) and Natural Resources Wales (NRW) have assessed that the total impact of radioactive discharges (including gaseous discharges) from a single ABRW reactor to the most exposed person to be around 14 - 24μSv y^{-1}. The contribution from aqueous discharges is less than 1 μSv y^{-1} illustrating the point made earlier that aerial emissions are more important than liquid discharges. The critical group dose from aerial emissions is dominated by carbon-14.

These numbers compare with the radiological dose limits to members of the public of 1,000μSv y^{-1} with dose from any single new source not to exceed 300μSv y^{-1}. The former Health Protection Agency (now Public Health England) had advised the UK Government to select a constraint value of less than 150 μSv (0.15mSv) per year for members of the public for new nuclear power stations. (17)

The UK Strategy for Radioactive Discharges 2001-2020 included an aim to progressively reduce human exposure to ionising radiation arising from radioactive discharges, so that a representative member of a critical group of the general public will be exposed to an estimated mean dose of no more than 20μSv y^{-1} from liquid radioactive discharges to the marine environment made from 2020 onwards. (18) The 20μSv y^{-1} figure was subsequently dropped from the 2009 updated strategy without explanation, but it still aims for "*progressive reductions in human exposures to ionising radiation resulting from radioactive discharges.*" (19)

Given that the Wylfa B proposal is to build two ABWR reactors, each potentially giving a critical group dose of 24μSv y^{-1}, the 20 μSv y-1 figure could be breached albeit from a combination of liquid and gaseous discharges.

8. Collective Doses

In 1991, the International Commission on Radiological Protection (ICRP) adopted a linear, no-threshold model for radiation's effects. Thus no dose of radiation, no matter how small is without some added level of risk. Collective dose is an important measure of the total exposure of a population over time from a given release of radionuclides and it is an indicator of total detriment to health. The collective dose is, to a first approximation, the average individual dose in an exposed population multiplied by the size of the population. Collective dose represents an attempt to quantify the radiological impact of radioactive discharges to populations larger than the critical group. Collective doses are measured in person-sieverts (person Sv).

Collective doses are sometimes calculated for UK or European populations, but for radionuclides which have long half-lives and become globally dispersed, including tritium, carbon-14, krypton-85 and iodine-129, it is internationally accepted practice to calculate their global collective doses. Calculating the global collective dose can also be seen as morally important when one considers the fact that no-one outside the UK is receiving a countervailing benefit from discharges.

As with critical group doses, estimates of the risks associated with a particular collective dose are fraught with uncertainties and unknowns. The behaviour of radionuclides in the global environment must be predicted over long time-scales and the computer models used to do so are unlikely to be validated by comparison with sufficient data. Future human behaviour and the behaviour of each radionuclide in the human body must also be predicted and estimation of the dose-risk factor in itself involves a large number of assumptions and several models all with uncertainties attached which have to be multiplied together.

Such risks from collective doses are underestimates as they do not include detrimental human health effects other than fatal cancers (e.g. skin cancers) and genetic effects.

Of course the above dose/risk estimates in this report neglect detriment to ecosystems, organisms and species.

It is sometimes argued that collective doses should be truncated to 500 years, because after that the uncertainty becomes too great. However, just because there is uncertainty does not seem to be a good enough reason to assign a zero risk.

To convert from collective doses to fatal cancers, the ICRP's absolute fatal cancer risk of 10% per Sv can be used, although some analysts apply a dose and dose rate reduction factor (DDREF) which reduces the number of estimated fatal cancers in Europe by a factor of 2, and in the US by 1.5. However, as pointed out by Beyea (2012) many epidemiology

studies offer little support for the use of such a factor, certainly for solid cancers (Little et al, 2008). Also, the recent WHO (2013) report on risks from Fukushima recommends that a DDREF should not be used for longer term exposures. (20)

The EA and NRW report that its independent assessment calculated collective doses to be 30 person Sv per year of discharge for the world (truncated to 500 years). (21)

The radiation protection community is usually reluctant to translate collective dose into numbers of deaths. This seems to stem from the Greenpeace campaign during the THORP public consultation in 1993-4 when it was argued that THORP would cause 600 deaths (calculated using a 5% risk factor). But Sumner and Fairlie have stated that radiation protection should be about protecting people, not the industry from criticism. (22) Bearing in mind that Hitachi is proposing to build 2 ABWR reactors at Wylfa B, the total collective dose would be in the region of 60 person Sv per year of discharge. By applying the risk factor of 10% per sievert it can be calculated that this means there will be around 6 deaths somewhere in the world for every year the station operates. Over 60 years, the total could be 360 deaths.

9. Uncertainties

There are many uncertainties in current estimates of radiation doses and risks and larger uncertainties exist with internal radiation. These arise mainly from the many steps used to derive doses, and partly from lack of statistical precision in deriving risks from epidemiology studies. The size of these uncertainties has been estimated by a number of expert dosimetrists: for some nuclides these are very large. A report by the Committee Examining Radiation Risks of Internal Emitters (CERRIE) recommended that uncertainties should be acknowledged and dealt with by the government. Its parent committee, the Committee on Medical Aspects of Radiation in the Environment COMARE, backed these findings. (23)

A 2001 Consultation Paper from the UK Department for Environment Food and Rural Affairs summed up the view which prevailed at the time:

"*The unnecessary introduction of radioactivity into the environment is undesirable, even at levels where the doses to both humans and non-human species are low, and on the basis of current knowledge are unlikely to cause harm*" (24)

10. Radioactive Waste Volume

The nuclear industry and the 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. (25)

Volume is not the correct 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 Wylfa Newydd is expected to use will be much more radioactive than the spent fuel produced by existing reactors like Heysham 1 and 2. So rather than using volume as a yardstick, the Bq amounts of radioactivity in the waste, (which in turn affects how much space will be required in a GDF), is a much more appropriate way of measuring the impact of nuclear waste from new reactors.

According to Radioactive Waste Management (RWM) 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.

For the NFLA, it would be interesting to see how much the mooted Wylfa B reactors would add to this pile. This can be estimated from the Radioactive Waste Management Ltd Derived Inventory 2013. This calculated that the waste inventory in 2200 after a 16GW programme of new reactors would be around 27,300,000 TBq – an extra 22,530,000TBq or 1,408,125TBq for every GW of new nuclear capacity. If we multiply this by Wylfa Bs proposed 2.7GW of capacity we get 3,801,938TBq. ***This is about 80% of the radioactivity in existing nuclear wastes.*** (26)

The UK Government expects spent fuel from the proposed new generation of reactors to be stored not reprocessed. In fact the Thermal Oxide Reprocessing Plant (THORP) at Sellafield which reprocesses the spent fuel from Heysham closed in November 2018, and there are no plans to replace it. Instead spent fuel is expected to be emplaced between 200 and 1000 metres underground in a Geological Disposal Facility (GDF) –(27) a site for which has still to be found. A GDF is not expected to be ready to receive such wastes until around 2045. The UK and Welsh Governments have initiated a process to seek 'volunteer' communities to consider hosting such a facility – this is the seventh attempt by UK authorities over the past 40 years to do this, and great uncertainty still exists as to whether the eight attempt will be successful.

Waste from new reactors like Wylfa B is not expected to be emplaced in the GDF until after all the government's existing waste has been emplaced which is expected to take around 90 years – around 2130. This means that spent fuel could remain on the site for at least the next 100 years. The other factor which needs to be taken into account is that Wylfa Newydd s 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. So assuming Wylfa Newydd comes on stream around 2030, although spent fuel might start to be emplaced in 2130, as the reactors are expected to have a life of 60 years, there may be some spent fuel still stored on Anglesey up until about 2190.

11. Safer, sustainable renewable energy alternatives to Wylfa B

Clearly there are cleaner ways to generate electricity available which do not discharge radioactive wastes into our atmosphere and seas. These should be used in preference to building Wylfa B. The evidence is stacking up to show that, in the words of Professor Keith Barnham, author of '*The Burning Answer: A user's guide to the solar revolution*' the UK "*...doesn't need a new generation of expensive nuclear reactors or a dash for shale gas to keep the lights on. An all-renewable electricity supply can provide energy security.*" (28)

The Environmental Impact Assessment for Wylfa B should compare the potential impact of building two new ABWR reactors in Anglesey, Wales, with improving energy efficiency or supplying energy from alternative sources such as renewable energy. Horizon Nuclear's Environment Statement does not do that.

NFLA notes that, according to the UK Energy Research Centre (UKERC), energy efficient improvements to home heating, insulation, lighting and appliances could reduce the energy consumed in UK households each year the equivalent to the output of six nuclear power stations the size of Hinkley Point C saving consumers £270 off the average household energy bill of £1,100. (29) In fact, when the UK government first endorsed Hinkley Point C, (HPC) it was projecting an increase in electricity consumption of 15% by now, whereas in practice the UK is consuming 15% less than a decade ago. In other words Government projections were out by 30%, and the need for new nuclear therefore lessens. (30)

The price of £57.50 per megawatt hour unveiled recently for two giant wind projects, off the coast of the UK is almost half the level expected to be paid for HPC - £92.50/MWh at 2012 prices (which by now will be around £100/MWh). What is more the offshore wind payments only continue for 15 years compared with nuclear payments which continue for 35 years.

NFLA also note that, according to the *Daily Telegraph,* Britain could theoretically produce up to 595GW from offshore wind at competitive cost, an order of magnitude more than Britain's entire power needs, even at peak times in the dead of winter (53GW). Some excess power could be sold to Europe through interconnectors, and some could be turned into hydrogen through electrolysis and used to replace fossil gas. (31)

Solar power, once so costly it only made economic sense in spaceships, is becoming so cheap that it will push coal and even natural-gas plants out of business faster than previously forecast according to the Bloomberg New Energy Finance (BNEF) outlook. (32) According to the 100% renewable utility, Good Energy, the wholesale price of electricity in the UK is falling, mainly due to the rise in solar photovoltaics (PV) and wind power. (33) Emeritus Professor Keith Barnham says if renewable expansion had continued at the same rate it did between 2010 and 2015 we could have achieved an all-renewable UK electricity supply by 2025.Why cull such popular and successful industries, apart from the political imperative to develop new nuclear?

The UK has more than 32GW of renewable power, 10 times the power the Hinkley Point C nuclear plant may achieve in 2030. Hinkley's power is not only almost irrelevant; its inflexible nature will make it redundant. Once operating, a nuclear reactor should run with constant output, 24/7, month to month, but power that complements wind and PV has to vary in less than one hour. What the UK needs (like Ireland) is flexible, not continuous baseload power generation to back up wind and PV power. (34)

Clearly, the electricity which HPC is expected to generate could be replaced by energy efficiency measures and renewable energy systems more cheaply, more quickly and without radioactive discharges to the environment or the generation of radioactive waste. The risk that the UK, Irish and European public will be subjected to by the construction of HPC can, therefore, no longer be justified.

12. Additional observations

NFLA would like to note a number of additional observations, which add relevant concerns.

ESRI report – The Potential Economic Impact of a Nuclear Accident: an Irish Case Study

This 2016 report was commissioned by ESRI for the Irish Environmental Protection Agency to consider what the economic impacts could be from a UK or French based nuclear accident sending a radiation cloud over parts of the island of Ireland. (35) The report looked at a range of scenarios from one where no radioactive contamination occurs, to others with minor, significant or high on-land contamination. NFLA encourages the UK Government to study this report and respond directly to its totality as part of this consultation process.

'Headline' issues noted from the report include:

- In the worst-case scenario, a nuclear disaster in North West Europe (originating from the UK or France in particular) could create total economic damage to the Irish economy of **€161 billion.**
- Irish agricultural production would grind to a halt, with the tourism industry and exports also incurring substantial damage.
- Even the most benign scenario considered by ESRI, where no radioactive contamination occurs, could still see a total loss estimated at €4 billion, due to the reputational damage this could have on Ireland.
- By comparison, the total value of corporation tax collected in the first nine months of 2016 (when the report was published) was €4.16 billion.
- ESRI also acknowledge that their analysis ***underestimates*** the true extent of such an incident to its cost to the economy.

- For example, in addition, health risks from high levels of radioactive contamination, could put a significant strain on the health service, requiring additional resources to be found.
- The total cost of a low-level radioactive contamination scenario, which requires the imposition of food controls to reassure the public and restrictions food imports to Ireland, would be €18 billion.
- The impact on tourism would also be significant, with long-term reputational damage resulting in an economic cost of €80 billion.
- In the absolute worst-case scenario in the ESRI study, not only would exports be decimated but the need to import much of the country's food would lead to far higher domestic costs. There could also be significant emigration.

NFLA / KIMO submission to the OSPAR Radiation Substances Committee -
In early 2018, NFLA was commissioned by KIMO International, to consider the potential impacts of the entire proposed UK new nuclear programme, which at that time included Hinkley Point, Wylfa, Sellafield Moorside, Sizewell, Bradwell, Oldbury, Heysham and Hartlepool. (36)
This table summarises the levels of planning electricity such a programme could generate:

Proposed Nuclear Station	Technology Proposed	Developer	Construction start expected	Commercial operation forecast
Hinkley Point C (Somerset)	2 x 1600MW EPRs	EDF 66.5% CGN 33.5%	First concrete 2019	End of 2025 with risk of 15 month delay (11)
Wylfa Newydd (Anglesey)	2 x 1350MW ABWRs	Horizon Nuclear Power - wholly owned subsidiary of Hitachi, Ltd.	2020	First electricity mid-2020s - 2025-2028 (12)
Moorside (Cumbria)	3 x 1150MW AP1000s (but could be replaced by 2 x 1400MW APR1400)	NuGen (currently owned by Toshiba – but hoping to sell to KEPCO) (13)	No date – but a 4-5year Generic design Assessment process required for APR1400, so ~2023-4	Not by 2025 – no new date
Sizewell C (Suffolk)	2 x 1600MW EPRs	EDF 80% CGN 20% (14)	2021	2031 (15)
Oldbury B (Gloucestershire)	2 x 1350MW ABWRs	Horizon Nuclear Power - wholly owned subsidiary of Hitachi, Ltd.	Late 2020s at the earliest. (16)	Mid to late 2030s?
Bradwell B (Essex)	2 x 1000MW UK HPR1000	CGN 66.5% EDF 33.5% (17)	No defined timeline; began GDA process in Jan 2017	

The NFLA / KIMO submission also considered the potential levels of gaseous and aqueous discharges from such a programme.

Given that there are four EPRs proposed, three AP1000s and four ABWRs from Table 1 above we can derive the total gaseous discharges from the proposed new nuclear programme noted in Table 3.

Table 3: Predicted gaseous discharges from notional UK new reactor programme

Radionuclide	4 x EPRs	3 x AP1000s	4 x ABWRs	Total
Tritium	2,000GBq	5,400GBq	10,800GBq	18,200GBq
Carbon-14	3,200GBq	1,818GBq	3,640GBq	8,658GBq
Radioactive Noble Gases	1,400GBq	24,141GBq	7,920GBq	33,461GBq
Radio-iodines	200MBq	630MBq		830MBq

Similarly from Table 2 we can derive the following liquid discharges shown in table 4.

Table 4: Predicted liquid discharges from notional UK new reactor programme

Radionuclide	4 x EPRs	3 x AP1000	4 x ABWRs	Total
Tritium	208,000GBq	100,200GBq	800GBq	309,000GBq
Carbon-14	92GBq	9.9GBq		101.9GBq
Iodine radionuclide	28MBq	45MBq	0.14MBq	73.14MBq
Other radionuclides	2.4GBq	8.1GBq	9.2MBq	10.5GBq

The report goes into detail about these issues and it concludes:

- Gaseous and liquid emissions from the UK's proposed new reactor programme could mean up to 23 theoretical deaths somewhere in the world for every year all of the reactors operate. Since they are each expected to operate for 60 years the total number of theoretical deaths could be 1380.
- The new reactors would produce extremely high levels of radioactive spent fuel. In the year 2200 spent fuel arisings would amount to almost five times the radioactivity contained in all existing legacy wastes from the UK's nuclear power industry.
- The requirement for 'Best Available Techniques' (and clean technology) for producing electricity should rule out building new electricity generating stations which produce such highly dangerous wastes. Especially as less expensive, quicker and safer alternatives are available which don't produce such wastes.

These two additional reports adds much to the concerns of the NFLA All Ireland Forum that the transboundary impacts of Hinkley Point C and the wider UK new nuclear programme could be significant and severe.

13. Sea Level Rise

In 2007, a report for Greenpeace by the Middlesex Flood Hazard Research Centre took as the basis for its worse-case scenario the collapse of the West Antarctic Ice Sheet (WAIS), which would trigger an abrupt and extreme rise in sea level, estimated at 5-6m. The report pointed out that there are widely divergent opinions on the likelihood of this extreme sea-level rise but one view is that WAIS collapse could begin in the 21st century. (37)

In 2012 an assessment, carried out by the Department of Environment, Food and Rural Affairs, of the risk of flooding and storm surges for the UK's nuclear sites did not show a high risk of flooding and erosion by 2080 at Wylfa. (38) Nevertheless, it might be expected that Horizon Nuclear would at least mention that it has looked into the risks to the site of sea level rise, when there is little evidence that it has.

The 2012 assessment was before the increasing volume of melting of the Greenland ice cap was properly understood and when most experts thought there was no net melting in the Antarctic. Now estimates of sea level rise in the next 50 years have gone up from less than 30cm to more than a metre, well within the operating lifespan of Wylfa B – let alone the period before final decommissioning of the reactors, and the period when spent nuclear fuel is likely to be stored on site.

Some researchers say sea levels could rise by six metres or more even if the 2 degree target of the Paris accord is met. Sustained warming of one to two degrees in the past has been accompanied by substantial reductions of the Greenland and Antarctic ice sheets and sea level rises of at least six metres – several metres higher than what current climate models predict could occur by 2100. (39)

NFLA note that one group of researchers believe we could soon cross a threshold leading to boiling hot temperatures and towering seas in the centuries to come. Even if countries succeed in meeting their CO_2 targets, we could still lurch on to this "irreversible pathway". The climate might stabilise with 4-5 degrees C of warming above the pre-industrial age. Thanks to the melting of ice sheets, the seas could be 10-60 metres higher than now. (40)

Such issues are of real and great concern for a coastal site like the proposed Wylfa project.

14. Conclusions

ABWRs have high gaseous emissions which are far more important than liquid emissions in terms of radiation doses to local people. Bearing in mind that Hitachi is proposing to build 2 ABWR reactors at Wylfa we can calculate around 6 deaths will occur somewhere in the world for every year the station operates. Over 60 years the total would be 360 deaths.

Wylfa Newydd would produce extremely high levels of radioactive spent fuel. In the year 2200 its spent fuel arisings would amount to 80% of the radioactivity contained in all existing legacy wastes from the UK's nuclear power industry.

The requirement for 'Best Available Techniques' (and clean technology) for producing electricity should rule out building new electricity generating stations which produce such highly dangerous wastes. Especially as less expensive, quicker and safer alternatives are available which don't produce such wastes.

Other concerns, like the economic damage to Ireland of a nuclear accident, and the real concern over sea level rises also suggest this proposed development should not go ahead.

There are cheaper, waste free sustainable renewable energy alternatives, which coupled with energy efficiency and energy storage schemes, are much more quicker to develop with none of the environmental externalities that new nuclear facilities would inevitable create.

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green party

[redacted]

14/2/2019

To whom it may concern,

I am writing to you today in relation to the extension of the deadline for the consultation period for transnational boundary concerns regarding the Wylfa Newydd nuclear power station at Anglesea in Wales. I am sure that there have been many submissions in regard to this and I do not wish to repeat what I'm sure many have said but do believe that as Green Party Representative for the Dundalk and Carlingford LEA it is important to outline my own position and concerns which I believe are shared by many in the community.

The UK Government has asserted its position regarding nuclear power as part of it decarbonising agenda for energy going forward, and it is my view that this is as much a political decision as it is one of a Greening Agenda. There is a tremendous feeling of ownership in certain quarters of the UK over nuclear power as it is felt that as pioneers of the original technology it is incumbent upon them to continue its development going forward. It is my view that is a flawed vision of the world going forward and it should be asserted to the relevant authorities at all levels that nuclear power is not an adequate response to the decarbonised economy. The failure of Hitachi and the UK government to come to a suitable deal at Wylfed Newydd revolves around the cost of generating nuclear energy when compared with current renewable energy prices. This is just another example of the failure of this logic in the face of ever cheaper and more greener renewable technology and should be seen as an example to us all of how not to do things going forward.

It is my view that the siting of a Nuclear Power Station anywhere along the Western UK shore should be of the highest concern to the Irish Government and our Local Authorities and we here in County Louth should be particularly concerned of any new development plans. Our borders with the UK have long been a source of contention, but it is particularly evident when certain matters arise and few are as emotive as the issue of nuclear power and waste. This is just as relevant now with the recent public outcry on both sides of the border in relation to the siting of a nuclear Geological Disposal Facility (GDF) in the North. This issue is an on-going one and I would remind all of the work

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of The Green Party, Stop Thorp Alliance Dundalk (STAD) and Nuclear Free Local Authorities (NFLA) as well as other groups and individuals in opposing nuclear facilities and their effects on our community since at least the 1990s.

The Welsh government has said that this facility will not only be used for interim storage of spent fuel and waste, and that there will be a Marine Off Loading Facility (MOLF) at the site, which would imply that there is the potential for waste or spent fuels being transported in the Irish Sea. This should in my view be seen as unacceptable to everyone in Ireland and certainly those living along the East Coast. The potential for any kind of accident in the Irish Sea, no matter how remote the possibility, should be the overriding concern for all those involved in such matters and this MOLF alone should be enough of a concern for the Irish Government to register its dissatisfaction. When coupled with the nuclear power station and the obvious inherent risks associated with nuclear power, we should be concerned about the potential for disaster along the Irish Coast.

While I am sure that the 3rd Generation nuclear technology utilised by the Horizon team in Wales is no doubt state-of the art, and one would not call into question the intention of anyone involved in the project I do believe that we cannot underestimate the potential danger involved. Many would have considered the disaster at Fukashima as the unlikely outcome of a series of unfortunate events, nevertheless the unthinkable happened. As a result the Institut de Radioprotection et de Sûreté Nucléaire (IRSN) have investigated the environmental impacts as a result of the disaster and have written reports in areas such as Radionuclide air concentrations; radioactive environmental deposits; contamination of Japanese foodstuffs; and contamination of marine environments. Given the importance of the environment to the Irish economy in terms of tourism, farming and fishing, I'm sure you would agree that the result of such a disaster along the Western UK would have devastating implications for the Irish people. This is further compounded by the time periods involved with nuclear disasters, as according to TEPCO, the company operating the Fukashima nuclear site, the decommissioning process of the site will take upwards of thirty years to complete and at its peak so far has employed 7,400 people.

While the threat of potential is stark but remote, the current situation in the Irish Sea should be just as concerning to the Irish people. According to the Irish Environmental Protections Agency's most recent Radioactivity Monitoring report (Radioactivity Monitoring of the Irish Environment 2014-2015) the Sellafield Nuclear Fuel Reprocessing Plant is already the most significant source of artificial radionuclides in the Irish Marine Environment. The presence of these artificial radionuclides is due to the discharge from that plant, situated on the coast of north-west England. The EPA operates a set of monitoring stations and the findings of these stations are reported periodically. Of particular interest are the levels of Caesium-137 in the area of the Irish Sea, measured by stations in seawater, sediment and seaweed, while the EPA also monitor the levels found in landed catches of fish and

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shellfish also. The levels of Cs-137 in the area off our shores in Louth have been reported to be elevated compared to other places around the country and while this is not a concern for the health of Irish people, it poses enough of a concern that of all the monitoring stations around the country, six are on land or close to the shores of our county while a further four stations are dotted offshore between Louth and the north-west coast of England.

By the UK governments own estimations the use of nuclear power in supplying the UK's energy need is already declining and is expected to do so over the next number of years. The use of nuclear power is seen as supplementary to renewable technology, providing power when renewables are unable. Again this in my view a flawed vision, as while it may at first glance appear nuclear is a good option for a decarbonised economy, the truth is that there are still environmental issues with the technology as there is still the risk associated with dealing with the waste and spent fuels. Particularly in the context of falling renewable energy prices, as a result of heavy investment by governments around the world in the technology, short of a revolutionary breakthrough nuclear power still represents old technologies.

I would ask that Louth County Council and the Irish Government consider these factors and would implore the UK Government to desist from further development not just at this Welsh site but all sites along their coastline. Nuclear technology is coming to its natural conclusion as evidenced by the site closures across the UK and the pricing problems associated with new ones and this should be allowed to happen as we transition to a modern, greener and environmentally friendly future.

Yours Sincerely,

[redacted]

Eoin Daly, B. Eng.
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Summary of the submissions made to Louth County Council in the matter of the Transboundary Environmental Public Consultation on the proposed Wylfa Newydd Nuclear Power Plant UK.

3 submissions in total have been received from the following:

1. Councillor Mark Deery.
2. Eoin Daly (Green Party) and
3. ELIG (Environmental Law Implementation Group at the Irish Environmental Network;

The content of the submissions are summarised below under bullet point headings:

- Welcome Transboundary Environmental Public Consultation;
- Development Consent Process – inadequacies within the application in the matter of full Environmental Impact Assessment (Environmental Impact Report) in regard to basic data and assessment of severe accident (area of note non-compliance with transboundary provisions as set out in Article 3 of 2014/52/EU);
- BREXIT uncertainty general – in specific uncertain legislative framework & additional transboundary risks in the development and operation of the project;
- UK Government potential Conflict of Interest in supporting and investing in the project while acting as decision maker in the development consent process (the withdrawal of the third party in the finance and operation of the project – Hitachi – results in UK Government investment / support compounding conflict of interest in the decision making process);
- UK government on-going commitment to the expansion of the Nuclear Power Programme: the UK position on Nuclear Power does not consider alternative energy generation objectively in terms of renewables, cost, energy conservation; Nuclear Power is not an adequate response to the decarbonising economy; UK legacy support for Nuclear Power is motivated by non-objective factors such as UK ownership as the pioneer of the original technology;
- Gaseous Discharges from ABWR reactors at Wylfa – ABWR's have high gaseous emissions - there is potential to reduce emissions by using alternatives (e.g. Hinkley Point EPR);
- Radiation Risks greater from air discharge than sea discharge – assessment of collective doses of radiation relevant to impact on human health
- Matter of Nuclear Waste Miss-leading in terms of volume in the assessment of its impact- Wylfa Newydd it is claimed would produce extremely high levels of radioactive spent fuel;
- Impact of Nuclear Power generation and of the Project on the Irish Sea, the east coast of Ireland and Ireland general – concern expressed at location of project western UK shore given geographic proximity of Ireland (in particular County Louth) and potential impact on the Irish Sea – link to existing nuclear operations at Sellafield Nuclaer Fuel Reprocessing Plant and discussion of Geological Disposal Facility (GDF) in Northern Ireland; potential for catastrophic economic impact from nuclear accident at existing nuclear power generator; sea level rise and risk of flooding, storm surges and coastal erosion to Nuclear Power generation sites.

Anthony Abbott King
Senior Planner - Louth County Council

25th February 2019

From: Mihoko Morita [redacted]
Sent: Thursday 24 January 2019 23:06
To: planning@mayococo.ie
Subject: Transboundary environmental public consultation – Wylfa Newydd Nuclear Power Plan

Mayo County Council
Planning Section

Dear Sir/Madam,

I would like to express my opinion with regard to the Transboudary environmental public consultation- Wylfa Newydd Nuclear Power Plan.
https://www.housing.gov.ie/planning/other/transboundary-environmental-public-consultation-wylfa-newydd-nuclear-power-plant?fbclid=IwAR1srfjkKjV0U3yjqYfBRX7FECPv9f_GwWk02jBQ7Jiwp6wdezk_QEAokgk

I just would like to oppose to this plan as a Japanese national who experienced the Fukushima Nuclear Incident in my home country in March 2011.
I do not believe the safety of Nuclear industry and the power stations.
Ireland has been developing natural energy resources such as wind, tidal and solar, and I respect that way from my bottom of heart.
I would also like this country to advice and the UK to follow the same pass.

Best Regards,
Mihoko Morita

Mihoko Morita
[redacted]

Wylfa Newydd Transboundary Consultation

Summary of submissions received by Mayo County Council

SUBMISSION 1 – MIHOKO MORITA (SUBMISSION IN FULL)

Dear Sir/Madam,

I would like to express my opinion with regard to the Transboundary environmental public consultation- Wylfa Newydd Nuclear Power Plan.
https://www.housing.gov.ie/planning/other/transboundary-environmental-public-consultation-wylfa-newydd-nuclear-power-plant?fbclid=IwAR1srfjkKjV0U3yjqYfBRX7FECPv9f_GwWk02jBQ7Jiwp6wdezk_QEAokgk

I just would like to oppose to this plan as a Japanese national who experienced the Fukushima Nuclear Incident in my home country in March 2011.
I do not believe the safety of Nuclear industry and the power stations.
Ireland has been developing natural energy resources such as wind, tidal and solar, and I respect that way from my bottom of heart.
I would also like this country to advice and the UK to follow the same pass.

Best Regards,
Mihoko Morita

[redacted]

SUBMISSION 2 – ENVIRONMENTAL LAW IMPLEMENTATION GROUP AT THE IRISH ENVIRONMENTAL NETWORK

This submission is broken down into numerous main headings, these are summarised briefly below —

- **Implications of Brexit**
  The primary concern is that the application was submitted under EU Law and is bound by the EU Environmental Acquis. The ongoing uncertainty pertaining the UK's exit from the EU and that the associated regulator regime governing the application and decision making are unclear. The lack of clarity on the manner of the UK withdrawal is fundamental to the issue of transboundary risk assessment. The Planning Inspectorate & Secretary of State in the UK continue to discount transboundary risks & impacts when there is no evidence, and certainly have no adequate evidence to support any such conclusion

- **Issues arising consequent on suspension of the project and the UK's conflict of interest**
  The applicant suspended the project in January 2019, however the project according to the Irish Department of Housing, Planning & Local Government has yet to be withdrawn. The UK government's interest in the project is highly conflicted as they are a funder, co-developer, power purchaser, regulator and the decision maker on the project.

- **Failure to assess transboundary risks arising from the existing and legacy operation consequent on the issues in delivering the new build nuclear programme**

  The UK's ongoing commitment to nuclear programmes despite vast cost overruns and delays and the desire to persevere with Nuclear Power and reject alternative energy sources and the time to successfully migrate to them is noted. The transboundary risks of this have not been reflected in the assessment and note this is a major omission in the assessment of transboundary risks.

- **Failure to comply with the EIA Directive and Espoo Convention**
  It is considered that the application failed to meet the requirements of Article 5 of the EIAD and also the requirements of the Espoo Convention Article 4 (1). The public consultation information was inadequate on issues such as transboundary impacts. It is considered that a full EIA is also required under the Espoo Convention

- **Issues with Source Term Specification and Severe Accident Analysis**
  The estimates of time indicated by the applicant in their severe accident scenario to get any uncontrolled release are not substantiated, particularly in respect of the resilience of secondary & emergency response measures and the lack of transparency and detail in the description. The UK's reliance on the RPII analysis of impacts on Ireland is not realistic and the RPII have not substantiated their assumptions in respect of risk of exposure, failed to update their analysis in line with the particulars of the plants being deployed and failed to adequately execute consideration of the most severe accidents scenarios which could impact Ireland

- **Further gaps & issues with the Environmental Information provided by the applicant**
  The application fails to adequately assess significant issues such as the long-term sea-level rise and wave climate changes, plume dispersion of airborne radioactive effluents and tectonic risk. North Wales has a significant tectonic history and the most earthquake prone area of the UK, with the most recent taking place in Wales in February 2018. The application also fails to adequately consider alternatives and also the impacts associated with dealing with radioactive waste and decommissioning of plant.

- **Habitats Directive Obligations**
  The applicant focuses on obligations arising from Eu Habitats Directive Article 6 but fails to adequately address the obligations of Article 12, 15 & 16 of the EU Habitats directive and does not meet the requirement of Article 16 derogation licences. It is not credible for the Secretary of State to conclude with the requisite degree of certainty for the purposes of an Article 6 (3) assessment, that adverse impacts on the integrity of Natura 2000 sites will not arise.

Summary of Submission Received By Sligo County Council
Transboundary Environmental Public Consultation 2019

Submission Number	Submission Received From	Summary of Submission
1.	Environmental Law Implementation Group (ELIG) at the Irish Environmental Network	1. Implications of Brexit with regard to the legislative framework pertaining to the application 2. Issues arising consequent on suspension of the project and the UK's conflict of interest 3. Failure to assess transboundary risks arising from the existing and legacy operation consequent on the issues in delivering the new build nuclear programme 4. Failure to comply with the EIA Directive and Espoo Convention 5. Issues with Source Term Specification and Severe Accident Analysis 6. Failure to assess impacts from normal operations adequately 7. Failure to address obligations of Articles 12, 15 and 16 of the EU Habitats Directive

Summary of Submissions Received by Westmeath County Council
Transboundary Environmental Public Consultation 2019

Submission Number	Submission Received From	Summary of Submission
1.	Environmental Law Implementation Group	No Observations on this application.

[redacted]

Planning Section
Wexford County Council
County Hall
Carricklawn
Wexford

10 January 2019

Dear Sirs,

Re: TRANSBOUNDARY ENVIRONMENTAL PUBLIC CONSULTATION
Wylfa Newydd, ANGLESEY, WALES

Following the article in the "Wexford People" please find attached our objection to the above. Could you please forward this to the UK's Planning Inspectorate.

Yours faithfully,

[redacted]

S J Teahan (Mrs)

Mrs S J & Mr J Teahan
"Froyle", [redacted]
Rep of Ireland

10 January 2019

Dear Sirs,

Re: Objection to:- TRANSBOUNDARY ENVIRONMENTAL PUBLIC CONSULTATION - WYLFA NEWYDD NUCLEAR POWER PLANT

We wish to object to the above proposed development. The main reasons for this being:-

HAZARDOUS/ACCIDENTS - Accidents can happen anywhere, but where nuclear plants are concerned any accident has the potential to affect a very wide area and the contamination would be devastating and long lasting. Such accidents affect people, animals, land, sea, food, crops, etc. This in turn affects future generations. Any accident will cause these problems for many 100's of years. Accidents are just that, accidents. Which means they cannot be predicted. This means safety cannot be guaranteed.

RADIOACTIVE WASTE - No matter how you try to dispose of the waste, **it is NOT "disposed of", it has just been moved**. Before creating any more radioactive waste, we should learn how to make safe the existing radioactive waste, of which there is plenty in many parts of the UK. Currently we have a massive time-bomb of radioactive waste.

We cannot keep deliberately creating such dangerous waste when we really have no idea how to deal with it. We cannot keep storing this waste in the hope that sometime in the future a way may be found to make this waste safe. There is a chance that a way of making radioactive waste safe may never be found.

We will just leave a radioactive planet in the hope future generations may find a way to survive on it.

That is pure selfishness and greed, only hoping we may survive it, don't worry about those who come after us.

.../2

STORAGE OF THE RADIOACTIVE WASTE - How will the waste products be stored? If, as has previously been the case,
The waste is stored in concrete this is not acceptable as any future cracking or degrading of the concrete results in the waste leaching out;
The other option was containers in water storage, if a container leaks then the waste leaches into the water storage, meaning contaminated water could then leak out, this method also produces "radioactive sludge" which itself then needs treating and storing;
Burying deep underground is not safe due to water and soils spreading along cavities underground.

There is still no safe or quick way to dispose of this waste. This waste can be hazardous for thousands of years.
There is no fail-safe method to dispose of this waste.

The risks involved in the waste disposal, along with the risks of the nuclear plant, are just not worth taking.

Why turn areas into radioactive dumps?

There is still too much "guess work" involved when it comes to disposing of the waste. It is still too early to know the problems that may be caused in the future by the radioactive waste that was "dumped" in the past (60+ years ago), problems that may not be realised for 100's of years.

CANNOT BE GUARANTEED AS SAFE - It would not take a major or deliberate act to make the power plant dangerous. An unexpected leak could be deadly. There have been leaks in the past at Nuclear facilities (re-processing plants and reactors) and we are not always told about these leaks until well after the event. These leaks are more common than we, the public, know. Sellafield being one example.

It was less than 20 years ago that the Irish Government were so concerned about problems with Sellafield that they sent every house on the east coast of Ireland a packet of tablets, to be taken in the event of a leak at Sellafield. Sellafield has had many leaks over the years.

.../3

We are now at a stage where we do not believe all we are told by Governments, Politicians, etc. You cannot state that nuclear power and it's waste is safe, there are too many variables for it to be classed as safe.

It was only a few years ago Governments were encouraging people to buy diesel vehicles. How wrong were they then?? By the time Governments realise what a big mistake Nuclear Power is, it will be too late. You cannot reverse the effects of radiation on the environment or mankind.

PREVIOUS LEAKS/DANGERS AT NUCLEAR PLANTS - Apart from the obvious, **Chernobyl**, there is **Sellafield** Re-processing plant, which I mentioned above.
Also, **Sizewell** - in January 2007, whilst it was being decommissioned, radioactive water was found to be leaking from the cooling pond and going into the North Sea. It was estimated that 40,000 gallons had leaked out. This leak was found purely by accident, any drop in the water level of this pond was supposed to set off an alarm, however the alarm failed to be activated. If this had not been discovered by pure chance many more thousands of gallons of radioactive water would have been released into the North Sea. If the exposed fuel had caught fire the result would have been air-borne release of radiation. It was pure good fortune that this did not end in disaster.

These instances alone have to prove that Nuclear Energy is NOT A SAFE OPTION. No matter how many alarms are in place to alert of various failings in the systems, THEY CANNOT BE RELIED UPON.

Do you not think that all the previous problems, where disaster has been narrowly avoided, should be a warning to stop using and building nuclear plants?

NOT NEEDED - A new nuclear plant is already in the pipeline for Suffolk. That means a new nuclear plant on the east coast as well as the west coast. So much research has gone into other means of producing power, it is now widely accepted that the other means are not only safer but are much cheaper and more cost effective.

I thought all the research into wind/water/solar power was intended to find an alternative to Nuclear? It appears all that research was a waste if the UK is planning to build TWO nuclear power plants.

.../4

END OF LIFE - Once any nuclear plant reaches it's end of life there is still the need for storage of the waste products. Decommissioning does not mean the problems disappear, the waste is still hazardous for generations to come.

POTENTIAL TERRORIST TARGET - We currently live in a very dangerous world with terror attacks being planned which use every method conceivable. Nuclear plants are an easy target for terrorists, which would definitely cause maximum impact. No matter how much security there is, the possibility remains either via terrorists getting jobs within the site or even using drones to drop explosives onto the site. This means nuclear power plants are now at greater risk than they were in the last century.

Anything involving nuclear/radiation/plutonium is extremely hazardous, that is why it is used in weapons. I really do not see how or why a nuclear plant should be seen as acceptable, especially in populated areas and especially now we know there are more environmentally friendly options.

Why develop something that creates such a dangerous risk to all future generations?

The risks of this nuclear plant, and its subsequent waste, far outweigh the benefits of using alternative means of producing power. We do not need another Chernobyl, no matter how it is caused, the potential is there for a disaster at each and every Nuclear Facility.

I do feel I should point out that I (Mrs Teahan) am English, this objection is not because I object to a "foreign" country building this plant, this objection is based on my concerns for safety of the environment and mankind.

I sincerely hope you will not build this nuclear plant but you will put the safety of the environment and people first.

[redacted]

[redacted]

S J Teahan (Mrs)

From: [redacted]
Sent: 13 January 2019 22:12
To: Planning Counter
Subject: Nuclear plant submission date

To whom it may concern,

I recently heard about our deadline to submit objections to the proposed nuclear plant in Anglesey on talk show on television. I am interested to know as to why this has not been better publicised by Wexf County Council. I've just checked your website and was hoping it would be on your latest news feed, b can see no information at all. I am also on your text message service to hear about planning changes i area, but have not received any text or email regarding this very serious matter.

I am also interested to know what stance Wexford County Council are taking regarding this proposal and whether or not you will be submitting your own objection?

I expect a prompt response given the short time that is left for submissions.

Regards,

Carmel McCabe

Clair Walsh

From: [redacted]
Sent: 02 January 2019 00:14
To: Planning Counter
Subject: Proposed nuclear power plant in Anglesea ,North Wales

Dear Sirs,
I was horrified to read in the *Wexford People* on Tuesday 1st January 2019 about the proposed nuclear plant to be located on the north coast of Anglesea in North Wales.

The very thought of nuclear reactors being sited a mere 130 miles or so from the Wexford coast here is deeply unsettling. Isn't it interesting that the site is so far away from London (283 miles) where those who would plan this project reside.

Nuclear reactors can and do go wrong, and the UK have had a number of 'accidents' already. I strongly object to being 'a sitting duck' in an accident caused by another country.

Ireland's residents have no power over what the UK decide. The UK will care even less about Ireland when they leave the EU.

We have to hope that Ireland receives strong support from the EU in refusing this planning application.

Yours sincerely,
Margaret Sanders

[redacted]

FAO of Wexford County Council,
Newtown Road
Wexford.

24th January 2019

TO WHOM IT MAY CONCERN

I strongly oppose to the building of the Anglesey Power Plant in Wales. It will have detrimental consequences on our environment.

[redacted]

Catherine Murphy [redacted]

[redacted]

23/1/19

Dear Sir/Madam;

I am writing to let you know that I am completely opposed to the proposed development of a nuclear power plant at Anglesey North Wales on environmental, safety and health, and moral grounds. Please bring this to the attention of all relevant parties.

Kind Regards

Bernadette Lacey

[redacted]

23rd January 2019

To whom it may concern,

I am writing to voice my very strong opposition to the proposed construction of a nuclear power plant in Anglesea North Wales.

[redacted]

Jessica Du Bois

Tony Nolan

From: Planning Counter
Sent: 24 January 2019 08:41
To: Tony Nolan
Subject: FW: Transboundary environmental public consultation -Newydd Nuclear Power Plant

From: [redacted]
Sent: 23 January 2019 23:05
To: Planning Counter
Subject: Transboundary environmental public consultation -Newydd Nuclear Power Plant

To whom it concerns.

I, Lorna Maher, [redacted] am opposed to the proposed development in Newydd.

I am opposed this development for a number of reasons -

I feel there are too many serious incidents in nuclear plants worldwide to allow the construction of this project.

I feel it is a high risk venture with a risk of accidents or release of radioactive material at any point in the future, this would have a huge impact on people on the east coast of Ireland and potentially the Irish Sea. Lethal levels of radiation are still being detected 7 years after the Fukushima incident.

I don't think Ireland is in any way prepared to deal with a nuclear accident. I suspect a plan is not even in place for such an event. This would need major investment in safety equipment and drills to deal with any future issues.
It is possible that up to 100,000 people would have to be evacuated.

My primary reason of opposition is the potential health implications of any accident or release of radioactive materials. It is established that this can lead to thyroid cancer and many other complications. I don't think enough research had been completed about effects of radioactive material carried long distances. Most research is carried out close to the site of accidents.

Please make not of my submission and forward it to the relevant authorities.

I am very disappointed at the level of knowledge locally in this project. I feel that Wexford County Council should be a lot more vocal about this project. None of your councillors seem to have spoken out of their opposition to this. It was only due to an article in the guardian newspaper that I became aware of the project. I would like to be informed of any nuclear projects in the future.

Yours sincerely,
Lorna Maher

Tony Nolan

From: Planning Counter
Sent: 24 January 2019 12:39
To: Tony Nolan
Subject: FW: Submission - Planning Wylfa Newydd power plant Wales

From: [redacted]
Sent: 24 January 2019 12:36
To: Planning Counter
Subject: Submission - Planning Wylfa Newydd power plant Wales

Hello,

I would like to submit my concerns for consideration towards the proposed Wylfa Newydd nuclear power plant, in Anglesey north Wales.

I wish to object to the proposed plans for Wylfa due to the environmental impact and safety of a nuclear power plant so close to the east coast of ireland. Nuclear power is a non renewable energy source which creates harmful radioactive waste. There is currently a movement over the next 12 years for climate change to renewable energy resources. Nuclear power plants are non renewable so should not be considered as an energy source over renewable energy.

I also have concerns regarding the toxic waste and how it will be disposed of and also the impact it will have on us if there is an accident at the plant like Fukushima. We are trying to save our environment for the next generations and nuclear power is not part of that.

Please put forward my objection to the proposed plans for Wylfa power plant to the relevant department.

[redacted]

Kind regards
Siobhan McCann

Submissions Received Wylfa Newydd Anglesea Wales				
Name	Address	E-mail Address		Content
Carmel McCabe		[redacted]		Lack of publicity
Margaret Sanders		[redacted]		Proximity and risk of accidents
Jessica du Bois	[redacted]			Voicing opposition to construction of Nuclear power plant in North Wales
Mrs. SJ Teahan & John Teahan	[redacted]			Risk of accident. Issues of storage and disposal of Radioactive waste.Safety, danger from leaks and radioactive water. No need for a further nuclear installation. Potential as terrorist target and decommissioning issues.

Lorna Maher	[redacted]	[redacted]		Risk of accident. And release of radioactive materials into theirish sea. In the venet of a nuclear accident Ireland would not be propared. Health implications of any accident or release of radioactive materials - Thyroid cancer.
Catherine Murphy		[redacted]		Opposed due to detrimental consequences on environment
Bernadette Lacey		[redacted]		Opposed on environmental, safety and health and moral grounds
Cllr Kathleen Codd Nolan	[redacted]	[redacted]		Is Council making a submission?
Siobhan McCann	[redacted]	[redacted]		Nuclear is a non renewable energy source which creates harmful radioactive waste. Concerns also about the disposal of toxic waste

A Uí Bhroin Environmental Law Implementation Group Facilitator at the IEN				Submission With Department

Theresa O'Brien

From: Hugh Meagher [redacted]
Sent: 18 February 2019 19:45
To: WYLSA Consultation
Subject: Wylfa Newydd nuclear Power Plant

Dear Sir/Madam,

I am in favour of the proposed Wylfa Newydd nuclear Power Plant. I am in favour as I believe we need significant base load CO2 free generating capacity and I believe modern Nuclear power is safe.

Energy source	Mortality rate (in deaths/PWh)	Percentage of energy type	Year
Coal (global)	100,000[6]	41% (electricity)	2012
Coal (China)	170,000[6]	75% (electricity)	2012
Coal (US)	10,000[6]	32% (electricity)	2012
Oil	36,000[6]	33% (total energy)	2012
		8% (electricity)	
Natural Gas	4,000[6]	22% (electricity)	2012
Biofuel/biomass	24,000[6]	21% (total energy)	2012
Solar – rooftop	440[6]	<1% (electricity)	2012
Wind	150[6]	2% (electricity)	2012
Wind (UK)	<1,000[7]	3.81% (electricity)[8]	2011
Hydro (global)	1,400[6]	16% (electricity)	2012
Hydro (US)	5[6]	6% (electricity)	2012

Energy source	Mortality rate (in deaths/PWh)	Percentage of energy type	Year
Nuclear (global)	90[6]	11% (electricity)	2012
Nuclear (US)	0.1[6]	19% (electricity)	2012

I have included a factual table which shows the number of deaths per KWH by electricity generation source.

Regards

Hugh Meagher

Theresa O'Brien

From: Hugh Meagher [redacted]
Sent: 18 February 2019 13:12
To: WYLSA Consultation
Subject: Nuclear Plant

I would like to go on record as supporting the building of a new nuclear plant in Wales.
There is a requirement for a base load electricity generation that does not create CO2. Modern nuclear plants are a safe source of CO2 free electricity.

Hugh Meagher

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Transboundary Environmental Public Consultation - Wylfa Newydd Nuclear Power Plant, Anglesey, North Wales, UK

The members of Wicklow County Council, at their meeting held on 14th January discussed the above proposed development and the possible transboundary environmental implications arising from its operation and had regard in particular to publications by the Radiological Protection Institute of Ireland (Proposed nuclear power plants in the UK – potential radiological implications for Ireland) and the Economic & Social Research Institute of Ireland (The Potential Economic Impact of a Nuclear Accident - An Irish Case Study).

Having regard to the proximity of the Wylfa Newydd site in Anglesea to the coastline of County Wicklow (approximately 100km) and the possible effects of a nuclear accident on the residents of the county, it was agreed that a submission would be made setting out the concerns of the Council.

Environmental Screening:
Whilst it is noted that the second transboundary screening undertaken in July 2018 indicated that "no area under the jurisdiction of another EEA state will be significantly affected" the UK planning inspectorate concluded that the proposed development "is likely to have a significant effect on the environment of the Republic of Ireland due to the potential effects on birds and marine mammals" which could be affected by disturbance, displacement and/or loss of habitats or species during both construction and operation. Clearly this is a matter of serious concern to the residents of county Wicklow and the Council as their representatives particularly having regard to migratory birds that nest in Wicklow and marine mammals living in the relatively short expanse of the Irish Sea between the proposed plant and the county's coastline.

Nuclear Accident:
The Council is also concerned that the effects of a nuclear accident which, depending on severity, could result, at the lower levels, in the introduction of food controls and agricultural protective actions on a short or long term basis and at the higher levels, to possible health effects if these actions are not implemented.

Loss of power through flooding was the primary cause of the Fukushima nuclear accident. There are concerns that projections of extreme low and high water fail to take adequate consideration of ongoing climate change and are highly relevant to accident potential especially for stored spent fuel. It is virtually certain that global sea level rise will continue for many centuries with ultimate rises of up to 3m possible thereby increasing the risk of flooding and the possibility of a nuclear accident.

Anglesey is prone to earthquakes the most recent being 26 May 2015 measuring point 3 on the scale and on 19 July 1984 measuring 5.4 on the scale. Earthquakes could lead to a nuclear accident

The RPII report concluded that a nuclear accident, however unlikely, "could lead to significant releases of radioactivity to the environment. Due to the immense heat and pressure under which nuclear power plants operate, as compared to other nuclear facilities such as reprocessing plants, a severe accident at a nuclear power plant, particularly if combined with a loss of the containment structures around the reactor core, can result in a high-energy release of radioactivity. The higher the energy associated with the release, the further the radioactivity can be dispersed and, thus, the

larger area and distance from the site that can be contaminated. If such an event were to occur at any of the proposed nuclear power plants and if the weather conditions at the time were such that the radioactivity was transported in the direction of Ireland, this could lead to contamination of the Irish environment and to radiation doses to people living in Ireland."

Additionally any environmental contamination is also likely to affect food protection and prices, food exports and tourism all of which are of the highest importance to the residents of county Wicklow and Ireland. In the aftermath of Chernobyl in 1986, almost 10,000 upland sheep farms in Wales, Cumbria, Scotland and Northern Ireland had restrictions put on animal movement. The curbs, which were put in place on food safety grounds, meant that sheep had to be tested for radiation if taken to market. The last remaining post-Chernobyl restrictions on sheep movement were only lifted in 2012.
The economic impact nationally estimated by the ESRI could range from €4 billion to €161 billion.

Having regard to the above concerns, the members of Wicklow County Council wish to object to the siting of the proposed Wylfa Newydd Nuclear Power Plant at Anglesea and urge that the proposed development be refused on the grounds of potential environmental impacts to county Wicklow.

X-Gm-Message-State: AJcUukcvL1cR8pFvtbqYZf/C1IvHSNYB/LbgCX3PoqgtK+SuJ8MLum62
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X-Received: by 2002:a67:3d92:: with SMTP id p18mr4567396vsi.51.1548416494078;
Fri, 25 Jan 2019 03:41:34 -0800 (PST)
MIME-Version: 1.0
From: Roy Gleeson [redacted]
Date: Fri, 25 Jan 2019 11:41:44 +0000
Message-ID: <CALzNgNR-pgyD7CyVZ-5AHGTUO=ev4UmTAC0b4fCx5HA1j72UDw@mail.gmail.com>
Subject: Re: Wyfla
To: <wylfaconsultation@wicklowcoco.ie>
Content-Type: multipart/alternative; boundary="000000000000180ee7058046cffd"
Return-Path: [redacted]

Submission

---------- Forwarded message ----------
From: [redacted]
To: <wylfaconsultation@wicklowcoco.ie>
Cc:
Bcc:
Date: Fri, 25 Jan 2019 11:41:44 +0000
Subject: Re: Wyfla
Hello,

I trust you are well.

I have been asked by my parents to lodge an objection to the Wylfa Nuclear Power Plant planning process which hopefully may be got to close soon as Hitachi are no longer expressing any interest, as far as I believe.

I'd be grateful if you could lodge and pass on this complaint or advise if any additional steps need to be taken to ensure a stop to construction.

I trust this is OK.

Kind appreciations,

Roy Gleeson
on behalf of Michael and Maureen Gleeson
[redacted]

[redacted]

Crehelp,
Dunlavin,
Co. Wicklow

To whom it concerns,

re notice in Irish Indo. on 22/11/18 a new Nuclear Power Station is to be built in north Wales, this is a scandal. They are a lot of N. Power stations on The coast of Wales, only a short distance from East coast of Ireland, a very short distance from you in Wicklow town, I object most strongly, to This project. That area is very unstable re earthquakes. Notice in paper invited objections To Local Co. Co. On behalf of my grandchildren & those to come I object,

Thanking you,

Sheila Kelly

[redacted]

Ireland
22/1/19

To whom it concerns,

I refer to public consultation notice that I read in the Irish Times.

I wish to indicate my grave concern that there is the possibility of a Nuclear Power Plant in Anglesey in the U.K. My concerns relate to the health and wellbeing of my family and my community and their safety in the event of an accident or terrorist attack.

I would much prefer to see wind farms producing electricity or Solar energy. I travel through Holyhead at least 4 or 5 times a year as my husband is from Shrewsbury and the proximity of Anglesey to the Irish Coast is alarming in relation to the possibilty of a nuclear power plant. The prevailing westerly wind would also be disasterous for the people of Wales and western England.

Sincerely, Sinéad Gulliver
on behalf of my four children aged 6 – 15

A Chara,

I am writing to you to express My concern at the proposed Wylfa Newdd Nuclear Power Plant in Anglesey, North Wales.

As a mother of [redacted] I would not like to see any nuclear developments in Anglesey, North Wales or any part of western England or anywhere in Wales. From an environmental point of view regarding pollution and increased risk of developing Cancer to fears of a terrorist attack on the Nuclear Power Plant or an accident, I do not want any

development of this kind in such close proximity to Co. Wicklow.

I am a teacher [redacted] and I look out onto the Irish Sea everyday.

My husband is from Shrewsbury and we regularly travel through Anglesey. It is very very close to the Irish Shore. I think it would be better and in the interests of the population in Wales also, if Tidal power or wind power were used to produce electricity for the region.

I sincerely hope you take my very serious and real concerns to heart and make the right decision. I am also very concerned that Horizon have pulled out of the project.

Is mise le meas [redacted]

Sinéad Gulliver Ní Fhlanagáin

[redacted]

Summary of Submissions Received
Transboundary Environmental Public Consultation 2019

Submission Number	Submission Received From	Summary of Submission
1	Sinead Sullivan on behalf of her 4 children aged 6 – 15	• Grave Concerns • Concerns relate to health & well being of family & community & their safety in the event of an accident or terrorist attack • Would prefer to see wind farms providing electricity or solar energy • Proximity of Anglesey to the Irish coast is alarming in relation to the possibility of a nuclear power plant • Prevailing westerly wind would be disastrous for the people of Wales and western England
2	Sinead Sullivan Ni Fhlanagain	• Grave concerns – would not like to see any nuclear developments in Anglesey, North Wales or any part of western England or anywhere in Wales • Concerns relating to pollution and increased risk of developing cancer • Concerns relating to close proximity to Co. Wicklow • Would prefer to see tidal power or wind power to produce electricity for the region. • Concerned that Horizon have pulled out of the project
3	Roy Gleeson on behalf of Michael & Maureen Gleeson	• Object to Wylfa Nuclear Power Plant
4	Sheila Kelly	• This is a scandal. A lot of nuclear power stations on the coast of Wales, only a short distance from Wicklow Town • Object most strongly • Area very unstable re. earthquakes
5	Hugh Meagher	• Support the building of a new nuclear plant in Wales • There is a requirement for a base load electricity generation that does not create CO2. • Modern nuclear plants are a safe source of CO2 free electricity. • Believes nuclear power is safe
6	Attracta Ui Bhroin, Facilitator of the Environmental Law Implementation Group	Submission addresses; • The Implications of Brexit • Issues arising consequent on suspension

		of the project and the Uk's conflict of interest • Inadequacies with the Application • Failures in respect of Article 5 of the EIA Directive and the Espoo Convention, most particularly in respect of the analysis of severe accidents, and omission of basic information required • Failures in respect of the habitats Directive • The submission adopts in full the submissions made by the Austrian Government on the project • The submission adopts in full the submission made by Nuclear Free Local Authorities, (NFLA) to the Irish Transboundary Consultation, included here as Appendix B, and also the NFLA submission to the UK authorities. • The submission adopts any additional arguments raised in the an Taisce submission, and all concerns raised in relation to the inadequacy of the application and Transboundary impact assessment raised by any interested party in the context of all the consultations conducted on this project, and including all technical and legal arguments made regarding the application.
7	Members of Wicklow County Council	Submission addresses, **Environmental Screening** • Matter of serious concern to the residents of County Wicklow and the Council as their representatives particularly having regard to migratory birds that nest in Wicklow and marine mammals living in the relatively short expanse of the Irish Sea between the proposed plant and the county's coastline. **Nuclear Accident** • Council is concerned that the effects of a nuclear accident which, depending on severity, could result, at the lower levels, in the introduction of food controls and agricultural protective

		actions on a short or long term basis and at the higher levels, to possible health effects if these actions are not implemented. • Concerns that the projections of extreme low and high water fail to take adequate consideration of ongoing climate change and are highly relevant to accident potential especially for stored spent fuel. • Anglesey is prone to earthquakes – earthquakes could lead to a nuclear accident. • If an event were to occur at any of the proposed nuclear power plants and if the weather conditions at the time were such that the radioactivity was transported in the direction of Ireland, this could lead to contamination of the Irish Environment and to radiation doses to people living in Ireland. • Any environmentally contamination is also likely to affect food protection and prices, food exports and tourism, all of which are of the highest importance to the residents of county Wicklow and Ireland. • Having regard to these concerns, the members of Wicklow County Council wish to object to the sitting of the proposed Wylfa Newdd Nuclear Power Plant at Anglesea and urge that the proposed development be refused on the grounds of potential environmental impacts to County Wicklow

Summary of Submissions Received from Prescribed Bodies
Transboundary Environmental Public Consultation 2019

Submission Number	Submission Received From	Summary of Submission
1.	Environmental Law Implementation Group at the IEN	1. Issues with regard to the legislative framework pertaining to the application and the uncertain implications for this arising consequent on the manner of the UK's withdrawal from the EU and Euratom. 2. Issues with regard to the very particular additional dimension of transboundary risks which arises for the development and operation of the project consequent on Brexit.
2.	An Claiomh Glas	1. Supports submission from IEN 2. Concerns with the emergency response plan

TERESA CONWAY

From: planning mailbox
Sent: 24 January 2019 16:48
To: TERESA CONWAY; PAUL KELLY
Subject: FW: Transboundary environmental public consultation – Wylfa Newydd Nuclear Power Plan

From: caroline kuyper [redacted]
Sent: 23 January 2019 19:20
To: planning mailbox
Subject: Transboundary environmental public consultation – Wylfa Newydd Nuclear Power Plan

dear Madam/Sir,

It is with great concern&dismay that I have followed the plans for a new nuclear facility in Wales.
I am a resident of Donegal, who was also living here in 1986 at the time of the Chernobyl nuclear power plant accident;the damage&fall out from that, including a radioactive cloud that rained down on the hills of Donegal, has been well documented.This has remained a worry for many concerning possible long term health impacts.For your information&to jog your memory I attach an article from the Irish Times from 1996 on this here:
https://www.irishtimes.com/news/chernobyl-radiation-persists-in-ireland-1.41399.

As a direct result I have been a long standing supporter of the project to give children in the Chernobyl and wider area a much needed health recovery boost to fresher cleaner air in Ireland than their gravely polluted environment in the Ukraine as a result since that time:https://www.chernobyl-international.com/

Nuclear power has clearly proven to be NOT a safe option and I would like to register here my strong opposition to any further future developments of the Nuclear Power plant Wylfa Newydd in Wales.Human error can never be ruled out, and in a climate increasingly unstable due to global warming, unforeseen floods,rising sea levels,shifting wind patterns&directions, droughts,hurricanes etc all pose real and serious threats to the workings of such a plant.Its location on the isle of Anglesea makes these risks particularly acute.
The people of Ireland do not wish to be exposed to nuclear radiation from across the irish sea or indeed from anywhere else,nature knows no borders!
The people of Ireland can not be put at risk in case of a possible terrible nuclear accident such as have happened in Chernobyl,Fukushima and to a lesser degree with other plants globally or even a smaller malfunctioning of the proposed plant resulting in radiation leaks into the irish sea as has happened repeatedly with the Sellafield plant,see:
https://www.theguardian.com/society/2005/jun/13/environment.nuclearindustry

The way forward for energy production is through renewable sources in sustainable and environmentally responsible ways!

Please acknowledge receipt of this email and confirmation that you have sent on this email to the Minister The Department for Housing, Planning and Local Government after the 25th of January as is the proper procedure i understand.Thank you.

yours respectfully,
Caroline Kuyper