

# NFLA New Nuclear Monitor Policy Briefing



Edition Number 63, October 2020

## The proposed development of Sizewell C – Irish transboundary response to

### i. Overview of Policy Briefing

This edition of the NFLA New Nuclear Monitor has been developed by the NFLA Secretariat. We have also sought comments on the response from Attracta Uí Bhroin, the Environmental Law Officer with the Irish Environmental Network and thank her for them. This report is developed in response to a call from the Irish Government for views in Ireland on the proposed development of the Sizewell C nuclear reactor site in Suffolk, England.

Under the terms of the 1991 United Nations Convention on Environmental Impact Assessment 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), EU 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 major development. As the UK is still in the transition period of leaving the EU, it is bound by the EU Directive, as well as the wider Espoo Convention.

All planning authorities in Ireland have recently received information in the form of a letter of notification dated 8 July 2020 from the United Kingdom's Planning Inspectorate (PINS) to the Irish Government Department of Housing, Planning and Local Government (DHPLG) relating to an application for development consent (planning application) for the proposed Sizewell C Nuclear Power Station, which is to be constructed in Suffolk, England, UK.

Submissions or observations on the proposed Sizewell development are open now, which should be made by e-mail to the relevant local County / City Council planning authority to be titled "**Transboundary environmental public consultation – Sizewell C Nuclear Power Station**" by no later than the **28<sup>th</sup> October**. The planning authorities will then send these responses to the Irish Government, who will pass them on to the UK Planning Inspectorate.

The NFLA provides below a model response to the proposed Sizewell C development to assist individual councillors, full Councils, regional assemblies, environmental groups and interested individuals to this consultation. In the past, NFLA have worked with other Irish environmental groups on holding local events with Councils on this issue, but the Covid-19 outbreak precludes such meetings taking place.

## 40 YEARS AS THE LOCAL GOVERNMENT VOICE ON NUCLEAR ISSUES

### Councils working for a renewable, safe and peaceful future

UK & Ireland Nuclear Free Local Authorities Secretariat, c/o City Policy,  
Level 3, Town Hall Extension, Library Walk, Manchester, M60 2LA.

Tel: 0161 234 3244

Email: [s.morris4@manchester.gov.uk](mailto:s.morris4@manchester.gov.uk) Website: <http://www.nuclearpolicy.info>

## **Model response for Irish Councils to the Transboundary Consultation on the environmental impacts of the proposed Sizewell C nuclear reactor**

### **1. Resolution passed by Irish Regional Assemblies in reference to the transboundary consultation on Sizewell C**

As part of encouraging Irish Councils to consider developing a local response to this consultation, the NFLA has, on the request of a number of councillors, issued a model resolution to a number of Regional Assemblies. It has now, for example, been passed by the Northern and Western Regional Assembly. The resolution summarises our core concern with the transboundary environmental impacts of the proposed Sizewell C nuclear reactor, which is developed further in the coming sections of this model response. It is the core summary of the concerns Irish Councils should express through the consultation.

The resolution passed by the Regional Assembly is as follows:

“This Assembly calls upon the Government’s Minister for Housing, Planning and Local Government and the Minister for Communications, Climate Action and Environment to object in the strongest possible terms to the proposed construction of two EPR-type nuclear reactors at Sizewell in Suffolk in the UK on the grounds that a severe accident, however remote the possibility, could have a devastating impact on the island of Ireland, and such a possibility has not been properly considered.

This Assembly also calls on the Government to seek a full Environmental Impact Assessment (EIA) to be conducted by the UK Government under national regulations informed by EU law. This includes a full invocation of Ireland's call to be fully consulted and for Irish public input to be included in the EIA and Appropriate Assessment. This Assembly calls in addition for an EIA to be undertaken as part of the UNECE Espoo Convention, ensuring that transboundary impacts cannot be excluded.

A severe accident scenario, such as the one suggested by the Radiological Protection Institute of Ireland, (1) would involve a loss of coolant with a release of fission products to the environment. This Assembly notes that impacts from the Chernobyl severe accident impacted on Ireland, and it notes an ESRI report that has indicated that, even in a severe accident scenario of no radioactive fallout hitting Ireland, the discounted economic losses were €4 billion, due to reputational impacts to tourism & agriculture. (2)

Nuclear engineer, the late John Large, expanded on this type of scenario pointing out that the fuel core would completely melt after about 16 hours. This could cause an explosion and a scenario very similar to the events at Fukushima. (3) Although EDF Energy’s Environmental Statement for a similar plant to Sizewell C being built at Hinkley Point C (HPC) says the likely impacts of an accident do not extend beyond the county of Somerset and the Severn Estuary, a report for the Austrian Environment Agency says severe accidents at HPC with considerable releases of radioactive caesium-137 cannot be ruled out, although their probability may be low. There is no convincing rationale why such accidents should not be addressed in the Environmental Statement (ES); quite to the contrary, it would appear rather evident that they should be included in the assessment since their effects can be widespread and long-lasting. (4)

This Assembly also calls on cooperation with the All Ireland Nuclear Free Local Authorities (NFLA) Sustainable Energy Forum, potentially in collaboration with the Irish Environment Network, to developing a detailed report on this matter with facilitation of a local workshop webinar on this matter, should the Assembly wish it.”

(1) Proposed nuclear power plants in the UK – potential radiological implications for Ireland, RPII, May 2013

[http://www.epa.ie/pubs/reports/radiation/RPII\\_Proposed\\_Nuc\\_Power\\_Plants\\_UK\\_13.pdf](http://www.epa.ie/pubs/reports/radiation/RPII_Proposed_Nuc_Power_Plants_UK_13.pdf)

(2) The Potential Impact of a Nuclear Impact – An Irish Case Study, ESRI, December 2012  
<https://www.esri.ie/system/files?file=media/file-uploads/2016-12/BKMNEXT313.pdf>

- (3) John Large Witness Statement in THE QUEEN (on the application of AN TAISCE) Claimant -and-SECRETARY OF STATE FOR ENERGY AND CLIMATE CHANGE Defendant -and- NNB GENERATION COMPANY LIMITED, 12th Nov 2013, <http://www.largeassociates.com/cz3222/R3122-B-12-11-13.pdf>
- (4) Oda Becker, Hinkley Point C: Expert Statement to the EIA. Austrian Environment Agency, 2013 <http://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0413.pdf>

## 2. Specific Irish concerns on the proposed Sizewell development

The NFLA All Ireland Sustainable Energy Forum want to make Councils aware of the various practical considerations that come out of the UK Government's transboundary consultation on Sizewell C. NFLA thanks Attracta Ui Bhroin, Environmental Law Officer of the Irish Environmental Network for her helpful comments on this model response.

Ireland naturally respects the UK has the right to pursue its own energy mix, but Irish citizens and some public representatives are also conscious of the UK's legal obligations to consult on the transboundary impacts of the project and indeed its future operation and decommissioning.

In this regard it is of serious concern that there has been such a limited and inadequate consideration by the UK of the potential for transboundary impacts on Ireland. The overall messaging from the UK has been there is a very low likelihood of potential for transboundary impacts, and this was expressed clearly in the letter of 8<sup>th</sup> July 2020 from the UK Planning Inspectorate (PINS) to DHPLG and in the published transboundary screenings undertaken on behalf of the UK Secretary of State. This has been without clearly establishing how unacceptably narrow its consideration has been of the risks on us here in Ireland, and in particular the failure by the UK to adequately or at all, consider airborne transport of radiation from the UK to Ireland. These matters are set out in more detail below with reference to the application documentation.

The failure to consider potential airborne passage of radioactive fallout impacting Ireland is entirely unacceptable in both the Sizewell application documents, and in the screening of them on behalf of the Secretary of State. Radioactive fallout from Chernobyl impacted Ireland, and Chernobyl is of course much further east than Sizewell is from Ireland. It is worth remembering 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 given the effects the effects of airborne radiation. 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 movements were only lifted in 2012, some 26 years later. The consideration of potential greater levels of radiation which might result from Sizewell are also of concern as is highlighted elsewhere in this submission, and indeed the very significant impacts arising for Ireland in the event of a nuclear incident – even where no radioactive contamination impacts Ireland – and in the event it does.

It is regrettable that this message of 'no significant impacts' has been allowed to dominate the limited discourse there has been around this consultation in Ireland and to disperse any concerted focus on it here. The messaging from the UK authorities has been unchallenged or unqualified by the Irish authorities in publicising the consultation with the Irish public in both the newspaper notice advertising the consultation and in the text of the Department of Housing, Local Government and Heritage webpage for the consultation.

However by stark comparison the text of the Irish EPA in its screening assessment is buried in the Department's website, compounding the concerns over its handling of successive consultations in recent years on such matters. The EPA's screening assessment has the following contrary conclusion to that of the UK authorities – which highlights that risks, albeit unlikely, cannot be discounted:

***“Therefore, while there is no measurable radiological impact expected from the expected routine environmental releases from Sizewell C, given the potential transboundary effects in Ireland of a severe (albeit unlikely) nuclear accident at the***

***Sizewell C site it is recommended that Ireland register as an interested party in the in the examination process”.***

Furthermore, although it is doing little to engage or alert people to the consultation, the fact the consultation has been extended to all Irish Local Authorities also confirms that the Irish Government cannot exclude such effects. Because when considering its obligations under the Planning and Development Act, and associated regulations, the Irish Government felt obliged to extend the consultation to all Irish Local Authorities and the public in these counties on the basis it could not exclude those counties being effected by Sizewell C.

While it is welcome that the EPA and Irish Authorities have not discounted the risk – the potential for the risk to arise is arguably under-stated, and is certainly inadequately assessed for 6 main reasons:

**a) Duration:**

Firstly, while the EPA at least addresses the risk of airborne transport of radiation, it was also arguably very optimistic in its report back in 2013 (see sections 5 and 7 below) in what it considered as the most severe scenario in its impact assessment. This was in respect how long the release of radiation would last for before containment is achieved. In short, as is set out further below with references to analysis by the late nuclear engineering consultant John Large – the EPA’s worst case scenario and the duration of radioactive release falls far short of what is a credible worst case scenario set out by this independent nuclear expert.

In its more recent screening the EPA does not shy away from the chilling and openly acknowledged conservative assessment by the ESRI of the effect on our economy (noted in section 8 of this response), but the EPA still fails to consider our ability to sustain the necessary extent of sheltering needed to avoid impacts in the context of the potential duration of impacts.

As will be seen later below, when considering the Sizewell application document – the UK authorities do not even include any view on durations when considering a severe accident scenario. Instead, the application merely relies on UK nuclear regulation to discount the need for consideration and the ability to manage the risk down to an acceptable level of remote probability, in as much as such management is deemed to be reasonably practicable – all encompassed by the acronym “TifALARP”.

**b) Brexit impacts and the UK’s withdrawal from Euratom**

It is also notable and very disappointing then that, in relying on its previous report from 2013 in assessing the risk as being “unlikely”, the EPA clearly has not considered the wider implications for risk consequent on Brexit. Further risk to Ireland has arisen since the UK referendum in 2016 nearly some 3 years after the report was done. Brexit means the UK’s departure not just from the EU environmental acquis, and independent oversight by the EU Commission and the EU Court of Justice in the conduct of environmental assessment, but it also departs from Euratom, the treaty for the community of nuclear states.

In departing from Euratom, the UK leaves the independent oversight of its nuclear operations, including inspection of nuclear facilities, oversight of the separation of military and civilian nuclear inventories and over of movements of nuclear inventories including in and out of the UK, bearing in mind those movements may arise as close as 12 miles off our shores, the limit of our territorial waters.

As a result of Brexit, the Euratom regime is to be replaced by the UK’s Office of Nuclear Regulation. The funding for this function and the level of independence it can exercise on this matters and the adequacy of the new regime solution specified are not adequately considered.

The further pressures and risks which may arise consequent on the impact to the UK economy in the context of both Brexit are addressed elsewhere in this submission where the

experience of the issues which arose previously at times of difficulty in the running of the UK's nuclear plants and Sellafield in particular.

**c) Covid-19 pandemic and risks consequent on the economic situation**

The further consequential risks which arise consequent on the impact to the UK economy because of the Covid-19 pandemic are also not reflected in the EPA's assessment and determination of likelihood. They are however also considered further in this submission, and most particularly in the context of the economics and practicalities for the running and maintenance of nuclear operations, and the issues which have arisen previously in the running of UK nuclear facilities at times of internal difficulties. The recent experience of the choices and approaches made by UK authorities in recent years in the context of Brexit and in the management of the pandemic and associated approach to issues impacting on public health also warrant some serious consideration in the context – given the implications such an approach has for the consideration and management of nuclear risk.

**d) Delayed delivery of new plants and consequential pressure to continue existing old nuclear operations to maintain a place for nuclear in the UK's energy mix.**

The EPA considers the risk and likelihood of an accident solely in the context of risks from the new plant. The EPA fails to consider the consequential risks arising from the new build programme in its assessment of nuclear impacts arising from the pressure to keep old plants running until the new builds are on stream. This creates an associated, albeit indirect risk from the new build given the increased risk potentially arising from the old plants running past their sell-by date so to speak.

The development of the UK's new nuclear build programme for these new generation nuclear power plants are all running significantly over schedule. The continued expectation that the UK will be develop new nuclear power solutions means it is staying vested in a significant nuclear element to meeting its energy needs. This is instead of bringing in alternative renewable energy sources and transitioning away from nuclear. This in turn means that pressure continues to maintain the nuclear component of its energy supply, and existing plants are being forced to run past their original period of operation, and indeed in circumstances where previous safety standards are now being revised in order to allow them continue their operations, as has been seen most recently in the context of Hunterston B in Scotland. Thus, associated with the new build there is the associated risk which arises from the associated consequential pressure to keep the old plants running to keep the nuclear slot in the UK's energy supply mix open.

**e) Radioactive waste disposal risks**

There has also been a complete failure in respect of the assessment of risk associated with the disposal of the nuclear waste arising. This must be a concern given the UK has not completely excluded consideration of Northern Ireland as a site for the geological disposal of waste, and indeed precipitated a consultation to assess the receptiveness of communities to such proposals. Though it should be noted that almost every Northern Irish Council passed a resolution opposing the hosting of such a facility. It has additionally not ruled out such sites being partially under the Irish Sea. Indeed the only Council that has so far expressed an interest in hosting such a repository, Copeland Borough Council (where Sellafield is situated), has expressly suggested a partial under-sea site may be a possible solution for it. In the context of an as yet undefined and unspecified solution and location for the waste, and the lack of clarity on the technologies for storage and the transport mechanisms to be employed and associated risks – it is not appropriate to discount transboundary risks for Ireland, where such solutions may arise on this island or in the seas surrounding us, and/or involve transport close to our shores.

Furthermore, Sizewell C will produce the equivalent of about 80% of the total radioactivity already created in the UK by existing nuclear sites. If all the proposed new nuclear reactors get built this will at least quadruple the amount of radioactive waste the country will have to deal with. (1) After three years of deliberation, the Committee on Radioactive Waste Management (CoRWM) decided that geological disposal is the best available approach for the long-term management of higher level waste, but lots of caveats and important

recommendations were ignored by the Government. CoRWM specifically said it did not want its recommendations seized upon as providing a green light to build new nuclear reactors which raise different political and ethical issues when compared with wastes which already exist. In other words it might be morally defensible to look for the 'least-worst option' to bury dangerous waste already created, but we really shouldn't be creating any more. NFLA remain concerned about the real technical and scientific issues around 'deep geological disposal' for existing waste, but the potential levels of highly radioactive new build waste add a greater level of concern that alone should see a new nuclear programme halted.

**f) Flood Risk**

The implications of climate change and sea level risk are regrettably becoming even clearer. In 2012 'The Guardian' reported on an unpublished UK Government report assessing flood risk at the sites of the new nuclear programme builds. Sizewell C does not perform well. It was assessed as a "high" flood risk in 2010, and is high in 2020s, 2050s and 2080s. (2)

There is in summary no place for complacency by Irish Local Authorities in turning to examine the potential risks to their counties, and to this state and its citizens. Further consideration is given the adequacy of the assessment on the potential scale of impacts elsewhere in this submission, given the potential significance of the radioactive fallout which could result in the event of a severe accident.

Vigilance must be exercised when calling for a full environmental impact assessment to be conducted under both:

- i) The UNECE Convention on Environmental Impact Assessment in a transboundary Context, "the Espoo Convention" and also
- ii) Under whatever UK regulations implement the EU Environmental Impact Assessment Directive or which apply post Brexit to replace them

Matters are clearly complicated by the fact the UK is departing the EU Environmental acquis, and the extent to which the EIA for Sizewell will fall to be fully assessed under regulations reflecting the EU EIA Directive. International law obligations should continue to apply but clearly even that has become a controversial matter in recent months. However under the Espoo Convention – the UK's position on Sizewell has complicated matters further. The UK has a position that no likely effects arise and it has merely notified Ireland and other countries as a courtesy. Therefore it does not automatically fall that a consultation and a full EIA assessment under the Espoo Convention will happen. It is thus essential that Ireland and all Local Authorities must be vigilant in an unequivocal position that:

- a) Effects on Ireland cannot be ruled out
- b) A full Impact Assessment needs to be conducted, including under the Espoo Convention.

Local Authorities are urged to make this clear to both the Irish and the UK Authorities.

**3. Airborne transport of radioactive fallout in the event of a severe accident at Sizewell**

As indicated above, it is clear from a close scrutiny not just of the summary screening assessments pointed to in the letter from the UK authorities, but in particular of a review of the underlying materials – that the UK's assessment of transboundary risk fails to fully consider airborne transport of radiation in the event of a severe nuclear incident. It also includes significant reliance on UK regulation to avoid accidents, and to argue for a very low probability.

The first screening conducted by the UK Planning Inspectorate (3) on behalf of the UK Secretary of State in October 2019 indicates as follows:

"Radiological exposure - The Scoping Report acknowledges the potential for exposure to radiation from discharges of aerial and liquid radioactive emissions and direct radiation from radioactive sources."

6.19.26 The following documents will also be used to inform the assessment: • project risk registers; • Outline Construction Environmental Management Plan (OCEMP); • Flood Risk

Assessments; • Euratom Treaty Article 37 submission; • Cabinet Office National Risk Register of Civil Emergencies; and • European Commission's Major Accident Reporting System (eMARS) (Ref 6.77).

The scoping document relied on the Euratom report and assessment process to consider this, but it does not appear to have been done.

The second screening assessment done refers to Chapter 27 of the application documents. In respect of receptors – which are effectively pathways to transmit radioactive effects chapter 27 says the following in respect of major accidents and hazards, (MA&D): (emphasis added):

“27.3.10 Each identified MA&D hazard and threat has been assigned an individual study area taking consideration of hazard or threat source, any identified impact pathways, potential receptors, and the reasonably foreseeable worst-case environmental consequence, if the event occurred. The study area for the identification of potential receptors differs depending on the specific hazard or threat and is determined on the basis of a worst-case impact area of a similar incident that has previously occurred, if information on this is available, or on the basis of professional judgement, if not available. The study areas are identified within the Environmental Risk Record included as Appendix 27A of this volume and range from the area within the site boundary to the catchment area modelled for flood risk (as set out in the relevant Flood Risk Assessments, Doc Ref. 5.2-5.9).”

From this it is clear that the study areas do not include consideration for airborne transport to Ireland.

Turning to the referred to appendix 27A to examine the receptors considered even in the context of a major nuclear incident at Sizewell C – it is notable that for MA&D Id O14 – described as: “Civil nuclear incident or major accident at Sizewell C” the only receptors considered are:

“On site: Sizewell C workers  
Off-site: General public  
Agricultural land  
Sensitive environmental receptors (ecological, heritage sites, groundwater, surface water, marine receptors)”

Furthermore, the associated columns for this scenario on “Maximum study area”, “Worst case severity of Harm”, “Duration”, “Category of Consequence” are not completed – instead the following incomplete text is inserted:

“Separate regulatory processes are in place to assess and control the safety of UK EPR reactors for the operation of the Sizewell C nuclear power station, a detailed risk assessment is therefore not presented as part of the EIA. These hazards would be assessed in detail as part of the Nuclear Site Licensing requirements. For example, as part of Nuclear Site Licensing Regime, EDF will need to ensure the safe operation of the Sizewell C Project and protection of the workers, public and environment. This includes providing the Office for Nuclear Regulation with a robust Safety Case demonstrating that all hazards associated with the development or that may impact the development are well understood and adequate arrangements are in place to reduce these risks to an acceptable level. In addition, it requires appropriate emergency plans and arrangements to be established and agreed with the local authority, for the range of accidents and incidents that could occur. These processes will ensure that risks relating to Nuclear Safety are reduced to TifALARP. Furthermore the assessment of risks associated with the use and storage of....”

The remainder of the text is obscured and cannot be read.

There is additionally an over-reliance on the UK's regulatory regime to ensure accidents will not happen. Accidents by their very nature are accidental. Furthermore, there is an over-reliance on what are estimated as very low probabilities for major accidents to dismiss the

need for adequate consideration and assessment of impacts and preparedness of other states which might be impacted. No one recollects the probabilities associated with Fukushima Daichi or Chernobyl or Three Mile Island – all most remember about them is that they happened.

In the application documents, document ref 6.11: Volume 10 Project-wide, Cumulative and Transboundary Effects, Chapter 5 Transboundary Effects, Appendix 5A: Long Form Transboundary Screening Matrix, (Revision: 1.0 Applicable Regulation: Regulation 5(2) (a) PINS Reference Number: EN010012) the following is stated (4):

“The UK Government believes that new nuclear power stations would pose very small risks to safety, security, health and proliferation (of nuclear materials). Government also believes that the UK has an effective regulatory framework that ensures that these risks are minimised and sensibly managed by industry (Source: White Paper on Nuclear Power, January 2008 (Ref. 1.2)). Nuclear safety is regulated by the Office for Nuclear Regulation (ONR) through a Nuclear Site Licence which places conditions on the Licensee to assure the safety of all aspects of power station construction, operation and decommissioning. This Licence must be in place ahead of construction of safety critical parts of the plant. The risk of accidents and possible radiological impacts on the airspace, land, water and humans in other EU member states is also covered by the Euratom Treaty obligations. The proposed UK EPR design of reactor has been the subject of a regulatory justification process. The Secretary of State (SoS) decided that the generation of electricity using the UK EPR is justified under the Justification of Practices Involving Ionising Radiation Regulations 2004. The SoS considers that the likelihood of an accident or other incident occurring at an UK EPR giving rise to a release of radioactivity is very small. The Major Accidents and Disasters assessment assesses the risk associated with hazards and threat from on-site and offsite sources during the construction and operation of the Sizewell C Project. This assessment provides details of the mitigation measures that are in place to reduce the likelihood of a risk event occurring. Further details of this assessment are provided within Volume 2, Chapter 27 of the ES.”

It is entirely unclear whether the Euratom Treaty obligations relied upon in the above, have been discharged. It must also be remembered how inadequate the Euratom Article 37 submissions made by the UK have been in the past and the serious deficiencies there were in considering the impacts on Ireland in the context of Hinkley Point C in the Article 37 submission on that part.

So in summary it is clear even in the context of the most severe accident considered – there has been a complete failure to consider the potential transport to Ireland of airborne radioactive fallout in the key chapter 27 assessments.

## **5. Sizewell C and severe nuclear accident scenarios**

A severe accident scenario, such as the one suggested by the Radiological Protection Institute of Ireland (now part of the Environmental Protection Agency), (5) would involve a loss of coolant combined with a bypass of the containment. In this scenario core damage would be initially delayed by actions of the plant operators, but eventually take place after 12.75 hours. The release of fission products to the environment starts 12.8 hours after reactor shutdown, and lasts for 35.2 hours eventually stopping 48 hour after reactor shutdown.

Nuclear engineer, the late John Large, expanded on this type of scenario pointing out that the fuel core would completely melt after about 16 hours and the corium mass slumps to the bottom of the Reactor Pressure Bessel (RPV), thereafter burning through the RPV steel shell to fall and slump onto the primary containment floor. At this point in time, the hydrogen gas in the RPV circuit is released into the primary containment whereupon it reacts with the air in the containment, deflagrating and exploding with sufficient might to breach the containment surety and, with this, the first phase release of radioactivity to the atmosphere for dispersion and deposition further afield commences. He said this scenario is very similar to the events at Fukushima. (6)

According to EDF Energy’s Environmental Statement for Hinkley Point C (Appendix 7E “Assessment of Transboundary impacts”), the likely impacts of an accident do not extend beyond the county of Somerset and the Severn Estuary. In contrast a report for the Austrian Environment Agency says severe accidents at HPC with considerable releases of caesium-137 cannot be ruled out, although their probability may be low. There is no convincing rationale why such accidents should not be addressed in the Environmental Statement (ES) for the proposed Sizewell C reactor; quite to the contrary, it would appear rather evident that they should be included in the assessment since their effects can be widespread and long-lasting. (7)

The EPA / RPII Severe Accident Scenario suggests a radioactive release of I-131 and Cs-137 amounting to 610,000TBq which is quite a bit larger than Fukushima. Cs-137 has a half-life of 30 years, whereas I-131 only has a half- life of 8 days. So Cs-137 is much more important in the longer term. With its longer half-life Cs-137 is around for much longer. Having said that I-131 distribution after an accident is important when looking at the incidence of thyroid cancer. 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).

**Table 1 Comparison of Source Terms for Cs-137**

Largest release from HPC suggested in UK Article 37 Submission	0.0447TBq (8)
EIA for the planning Dukovany NPP (Czech Republic)	30TBq (9)
EIA for the planned Hanhikivi NPP (Finland)	100TBq (10)
RPII ST4 severe accident scenario	10,000TBq (11)
Austrian analysis severe accident at Hinkley Point C	53,180TBq (12)
Severe accident in the HPC spent fuel pool	1,780,000TBq (13)
Fukushima disaster, 2011	12,000TBq (14)
Chernobyl disaster, 1986	80 – 85,000TBq (15)

## 6. Spent Fuel Storage

Unlike spent fuel generated by existing UK nuclear reactors, it is not the intention of future reactor operators to reprocess spent fuel from new nuclear reactors. As a result, spent fuel will almost certainly remain on-site for decades, rather than being transported off-site to Sellafield as it is at the moment at most sites, apart from Sizewell B. Although it is possible that spent fuel might start to be transported off site during the 60 year lifetime of new reactors, prospective operators generally take the view that it is prudent to plan to store all of the lifetime arisings of the planned reactors on-site probably in spent fuel storage ponds. At Hinkley Point C, EDF is planning to be able to extend the life of the storage ponds for up to 100 years after the reactors close. (16)

A recent study in the US detailed how a major fire in a spent fuel pond “could dwarf the horrific consequences of the Fukushima accident.” The author Frank von Hippel, a nuclear security expert at Princeton University, who teamed with Princeton’s Michael Schoeppner on the modelling exercise said “We’re talking about trillion-dollar consequences.” (17) This would clearly involve major transboundary radioactive releases much larger than those suggested in the RPII scenario, because the spent fuel store could contain up to 60 years’ worth of spent fuel.

According to the Austrian Analysis PSA 2 results (in the Pres-Construction Safety Reports by EDF and Areva) show that a possible severe accident in the spent fuel pool could result in a release of 1,780,000 TBq of Cs-137. (18)

In other words, the greatest risk is one that could remain in place until at least 2130.

## 7. EPA / RPII Severe Accident Scenario (ST4)

According to the UK Government’s Article 37 submission to the European Commission on Hinkley Point C, a severe accident would only release 0.0447TBq of radioactive caesium-

137. Given the proposed Sizewell C reactor would be a carbon copy of the Hinkley Point C reactor, the figure for it will be comparative.

The RPII (now the EPA) looked at the impact of a severe accident at a new nuclear station at Wylfa on Anglesey. This concluded that up to 10,000TBq could be released. The EPA should consider conducting a similar report for Sizewell C.

**Doses to adult inhabitants of Dublin:**

<b>Total radiation dose to an adult in Dublin from inhalation, cloudshine and groundshine</b>	<b>Amount in sieverts</b>
After the plume passage	18,084 $\mu$ Sv
Cumulative after a week	19,834 $\mu$ Sv
Cumulative after a year	43,794 $\mu$ Sv

Intervention levels have been established for emergencies by the International Atomic Energy Agency. These suggest that sheltering should be recommended if the dose is expected to reach over 10,000  $\mu$ Sv over a two day period.

In the scenario the radiation dose during plume passage is predicted to exceed the intervention level for sheltering, thus people would be advised to remain indoors during the passage of the plume (approximately 24 hours in a particular weather scenario). The intervention levels for iodine prophylaxis (iodine tablets) or evacuation is not exceeded. A radiation dose of just over 9000  $\mu$ Sv (9mSv) from inhalation of iodine-131 was predicted. While this is below the intervention level of 50,000  $\mu$ Sv (50mSv) for administration of iodine tablets (and was based on the assumption that people were outside during the passage of the plume), the RPII notes that staying indoors could reduce this radiation dose significantly. However the 50,000  $\mu$ Sv intervention level is very high. It would certainly be worth taking potassium iodate tablets if a 9,000  $\mu$ Sv was in prospect and these tablets will not do you any harm. (19)

The radiation doses from the table above do not include ingestion doses. The reason given by RPII for this is:

“These radiation doses were treated separately as in an emergency this pathway is extremely amenable to significant reduction. Indeed, the appropriate use of food controls and agricultural measures can substantially reduce the transfer of radioactivity to the food-chain.”

If no action is taken the ingestion dose resulting from the accident scenario could be as high as 275,000  $\mu$ Sv, bringing the total dose to almost 320,000  $\mu$ Sv. RPII comments:

“If no protective actions were taken, a dose of this magnitude might be expected to result in an observable increase in cancers in the decades following the accident. For comparison, the annual average radiation dose from all sources of radiation received by members of the Irish public is estimated to be 3950  $\mu$ Sv.”

RPII also notes that:

“In the absence of any protective actions having been taken to reduce or eliminate the contamination of food and animal feed, all of the food types would exceed the Maximum Permitted Levels for a period of at least two months (for meat and root vegetables even after one year, the radioactivity concentrations were predicted to be significantly higher than the permitted levels in the scenario studied).”

RPII notes in passing that while the protective actions could be highly effective in reducing radiation doses, their implementation may not always be straightforward. Obviously the disruption to the Irish agricultural industry could be considerable. In addition, experience of food contamination issues elsewhere suggests that, even in cases where the EU Maximum Permitted Levels are not exceeded, the economic consequences from loss of market due to the ‘perception’ that food is contaminated can be considerable.

Obviously for the people of central England, an accident at Sizewell C would have a much greater impact in comparison to the impact of an accident at Wylfa on Dublin. With Sizewell we do not have the benefit of 100 kilometres of sea between the accident and the nearest centre of population.

By superimposing the fallout map from Chernobyl onto a map of the area around Sizewell it is possible to get an idea of what the impact a severe accident might look like, depending on the wind direction. The red shading represents the area which would have required compulsory resettlement in Belarus and Russia and the pink are where additionally compulsory resettlement would be compulsory in the Ukraine.





## 8. Economic costs of a nuclear accident to Ireland

Finally, NFLA notes an important report by the Economic and Social Research Institute – ‘The Potential Economic Impact of a Nuclear Accident – an Irish cast study’. (20) NFLA had pushed for this report to be developed through its representative to the Environment Protection Agency Radiation Issues Committee, Dr Paul Dorfman from the UCL Energy Institute.

Core headline figures from this study include:

- In the worse-case scenario, a nuclear disaster from a nuclear reactor in northwest Europe could cost Ireland **€161 billion**.
- Agricultural production would grind to a halt, with the tourism industry and exports also incurring substantial financial damage.
- Even under the most benign scenario considered by ESRI, where no radioactive contamination occurs - total loss is estimated at **€4 billion**.
- The report analysis may actually underestimate the true extent of its cost to the Irish economy.
- Health risks from high levels of contamination could put a significant strain on the health service.
- Total cost of a low-level contamination scenario, which requires the imposition of food controls to reassure the public, would cause restrictions on food imports from Ireland, would be €18 billion.
- The impact on tourism would also be significant, with long-term reputational damage resulting in an economic cost of as much as €80 billion.
- 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 from the island.

Such costs should be of alarm to all Irish Councils and the Irish Government and needs to be fully taken into account when considering transboundary impacts to Ireland in the event of a nuclear accident from any UK or French nuclear reactor.

## 9. Conclusion

This response outlines some of the core concerns of the NFLA All Ireland Sustainable Energy Forum around trans-boundary impacts to Ireland should there be an accident at the Sizewell C, or for that matter any UK new or existing nuclear reactor.

New nuclear reactors, like the one being put forward by EDF Energy for Sizewell C, have many serious local impacts to the population of the south east of England. They also though have alarming impacts in the event of a severe accident taking place. Whilst that may remain a low risk, in the event it happens, there are clear risks and damage to Ireland should a severe accident take place.

Those issues are multi-faceted – environmental, reputational and economic. They are serious enough for Irish respondents to fairly object to the development of the proposed Sizewell C reactor, or any new nuclear reactor developed across the Irish Sea.

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See also Chapter 6 Spent Fuel and Radioactive Waste Management Para 6.39.32

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