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An Comhchoiste um Thithíocht, Pleanáil agus Rialtas Áitiúil

Comhchomhairliúchán poiblí comhshaoil trasteorann - Stáisiún Cumhachta
Núicléach Hinkley Point C

Bealtaine 2018

Houses of the Oireachtas

Joint Committee on Housing, Planning & Local Government

Transboundary environmental public consultation - Hinkley Point C Nuclear
Power Plant

May 2018

32/HPLG/10

Introduction -

This is the contribution of the Joint Oireachtas Committee on Housing, Planning and Local Government in response to the Transboundary public consultation in respect of environmental information relating to Hinkley Point C Nuclear Power Plant. In engaging in this consultation process, the Committee acknowledges the sovereign right of the UK to pursue its own energy mix.

Transboundary consultation obligations arise pursuant to the requirements 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 Assessment in a Transboundary Context (the Espoo Convention). The Committee welcomes this necessary consultation in particular given the nature of the project and its proximity to Ireland.

The Joint Committee engaged with Emeritus Professor John Sweeney, Emeritus Professor Stephen Thomas, Ms. Attracta Uí Bhroin & Mr. Charles Stanley Smith from the Environmental Pillar and Mr. Justin Byrne from the Irish Environmental Network on 1 May 2018. In examining this issue the Committee has presented its views and observations under the following headings –

1. Impact on Ireland & Preparedness
2. Consultation Process
3. Meteorological & Manufacturing Concerns

The Committee has also set out a series of recommendations.

Impact on Ireland & Preparedness -

Ireland has two legislative bans on the production of nuclear energy, reflecting its concerns on the risks and impacts of this technology. Therefore, in considering the issue of nuclear power and its impact on Ireland, Ireland's analysis centers on radioactive contamination from other countries' nuclear activities. Ireland is the nearest EEA state to the Hinkley Power Point plant with the plant situated just 242km off the Irish coast and therefore transboundary impacts on Ireland of any radioactive contamination is a real concern. The impact on Ireland of a radioactive contamination was outlined in a 2016 ESRI

report¹ in a scenario where there's a nuclear incident but no radioactive contamination actually reaches Ireland. It still estimated the losses to the Irish 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. 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 be avoided.

This is the context of the vigilance of the Committee in respect of normal operations, avoidance and mitigation in relation to an accident or terrorist attack, at Hinkley, be they minor or of catastrophic proportions, and the appropriate preparedness. Accidents by their very nature are accidental, no one planned the events of Three Mile Island, Chernobyl or Fukushima Daiichi but accidents can, and do, happen.

In the event of an incident where there is a risk of contamination, there are no detailed plans in place to protect Irish people. As indicated by the Health Service Executive (HSE) to the Irish Government it has virtually no capacity to deal with any nuclear incident. Irish Water have acknowledged to this Committee at a hearing examining emergency response plans as recently on April 25th 2018 that there is no way they could stop the water systems in Ireland from being contaminated in the event of a nuclear incident. The Committee is concerned at the lack of preparedness to deal with any incident which may occur and would urge both the UK and Irish authorities to engage on this matter. Certain of the potential impacts on Ireland of an unplanned release of radioactive material from a nearby country were outlined in the 2016 ESRI report.

In a scenario where there's a nuclear incident but no radioactive contamination actually reaches Ireland it estimated the losses to the Irish economy at €4 billion, including reputational impacts to tourism and the Agri-Food industry.

Consultation Process -

In relation to the consultation process in respect of Hinkley Point C Power Plant,

¹ The Potential Economic Impact of a Nuclear Accident - An Irish Case Study, ESRI
<https://www.esri.ie/pubs/BKMNEXT313.pdf>

the UK and Ireland has obligations on such matters, and the public and Ireland have certain rights under EU and International law. These applicable rights and obligations flow from two International Conventions of the United Nations Economic Commission for Europe, known generally as the Espoo and Aarhus Conventions and associated protocols and to which the UK, Ireland and the EU are all parties in their own rights creating obligations under International Law. Obligations also arise additionally consequent on certain EU Directives implementing those conventions.

The State where the project originates is required to determine if there are likely to be significant environmental effects on other countries, in what is referred to as a screening decision, and if so, to consult accordingly. The consultations have to be considered as part of the decision making process. Despite the screening statement acknowledging that Ireland was the nearest State to the plant, Ireland was omitted from the consideration of the severe accident scenario examined in the Article 37 of the Euratom Treaty submission, on which the UK relied in making its screening determination of 11 April 2012, as did the Secretary of State in granting Development Consent to the Project in March 2013.

The UK's transboundary screening decision determined: *"On the basis that licensing and monitoring conditions are effective, impacts will not be significant."*

Additionally, in a reply to concerns expressed by the Austrian Government, the Secretary of State stated *"...such accidents are so unlikely to occur it would not be reasonable to "scope in" such an issue for environmental impact assessment purposes"*. The Committee strongly disagrees with this assessment as accidents by their very nature are accidental and impact assessments are to assess adverse impacts and mitigate against them. Therefore the Committee is of the opinion that Ireland should have been considered as part of the consultation process especially in the context of adverse impacts.

The Committee believes that lessons need to be learned from the failures and experiences on the assessment of the transboundary impact. In particular, the Committee is of the opinion that the manner in which information flows to and is assessed in Ireland, how notifications and consultations are addressed and conducted needs to be reviewed especially in the context of Brexit.

Meteorological & Manufacturing Concerns -

The Committee believes that the Article 37 submission raises serious issues regarding potential transboundary impacts on Ireland which are inadequately considered and gives cause for concern. The meteorological environment at Hinkley is inadequately described. For instance, three years of data is insufficient to characterise the wind climate at an individual location and any modelling based on this is highly suspect. The World Meteorological Organisation recommends that climate averages are computed over a 30 year period of consecutive records to smooth out year to year variations.

Estimates of extreme high and low water levels fail to take account of climate change. In relation to water levels, the ability to estimate a 1:10,000 year return period from even several years of data is statistically highly suspect. Firstly, it is based on an assumption of stationarity in the sea level and storm surge regimes which is patently not occurring. Secondly, the statistical extension of frequencies beyond about a century is of dubious validity.

The unsound nature of the estimates provided is further exemplified by the fact that the difference between the annual return period and the once in 10,000 years return period for high water is stated to be 1.3m. This does not take account of ongoing or projected sea level rise. The high-water levels risk table (table 1.7 in the submission attached in annex I) cannot be considered credible.

A known flood risk at the Hinkley Point C site is also not acknowledged in the UK Government submission. A flood risk has been identified as existing from 2010 onwards, becoming high by the 2080s according to unpublished Government reports accessed through Freedom of Information Requests. These confirmed flood risks have serious implications in particular for the safety of spent fuel at Hinkley, which is intended to be stored on site for up to a century from when it is produced. This means the flood risk needs to be considered over a very long period of time given the plant is intended to operate for circa 60 years.

The risk posed by a tsunami in the macro tidal environment of the Bristol Channel is also not adequately considered. It is noted that the 1607 flood in the Bristol Channel and Severn Estuary is considered one of the worst ever recorded in the British Isles. In February 2018 an earthquake of 4.4 magnitude, thought

to be Britain's largest for 10 years, was felt across Wales and South-west England.

The additional seismic and tsunami risks associated with further fracking or unconventional gas exploration licenses being granted in the area from 2015 have not been adequately considered.

Additionally, the models employed for assessing potential atmospheric transport of hazardous material to Ireland did not represent state of the art science in dispersion modelling at the times of the 2012 transboundary screening and 2013 development consent decisions. The atmospheric model used to evaluate the dispersion of planned or unplanned release of radioactive material into the atmosphere was based on an assumption that effluent would disperse vertically and horizontally downwind according to a conical (Gaussian) pattern. This model was developed in 1981 and subsequent caveats to its use were published by its author 5 years later. Many of these caveats would apply to the Hinkley situation and would render the model suspect for evaluating long range transport of radioactive material to Ireland.

The Committee are therefore of the opinion that several aspects of the Environmental assessment submitted by the UK authorities under Article 37 do not provide an adequate risk assessment for flooding and atmospheric dispersion of radioactive effluent particularly in the unlikely event of a worst case scenario occurring.

The Committee was also concerned regarding problems outlined in relation to the two European Pressurised Water Reactors (EPRs). No EPR is in service and completion of all four under construction globally is significantly delayed. The Committee are also concerned regarding the possibility of quality control issues relating to parts of the reactor.

The Committee noted issues at formerly Areva's, now Framatome's Creusot Forge had been known about as far back as 2005, and how parts for Hinkley Point C had been ordered and manufactured from the Creusot Forge at a time when the French Regulatory Authorities, Autorité de Sûreté Nucléaire, ASN, had prohibited it from producing parts for French Nuclear Plants. It also noted the ASN's requirement to replace elements of the Reactor Pressure Vessel in Flamaville III within seven years, this being the earliest a replacement can be

provided. The Committee noted the extent to which the UK Government's credit guarantees necessary to advance the development of Hinkley Point C are reliant on the assessment of performance of Flamanville III. The committee was concerned how the issues and the delays encountered in Flamanville III may also compromise the ability to establish the previously envisaged outstanding assurance on manufacturing and design issues necessary for Hinkley Point C, in addition to the assurances necessary for the credit guarantee. The Committee was therefore concerned about pending decisions on the credit guarantee and the considerations of the performance of Flamanville III, and the pressures pertaining to all the stakeholders involved.

Recommendations of the Joint Committee -

- ❖ The Committee believes that it is essential that a full and thorough Environmental Impact Assessment be carried out in relation to the Hinkley Point C Power Plant development and recommends that an assessment is carried out without delay.
- ❖ The Committee recommends that clear emergency planning procedures and practices be put in place in relation to how and when the UK notifies Ireland in the event of a nuclear incident and the steps that will be taken to mitigate any impact on Ireland.
- ❖ The Committee recommends that clear procedures and practices should be set out in relation to how the UK will operate nuclear facilities and the way in which they will conduct transboundary consultations prior to and before the UK's departure from the European Union.
- ❖ The Committee has been advised of the earlier assurance by the UK Government to the Espoo Implementation Committee, as noted in its report² of its 38th session in February 2017 that it will provide notification of accepted applications for Development Consent / Planning Permissions for all new Nuclear Power Plants, and the Committee urges full transboundary impact assessment as part of such consents. The

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https://www.unece.org/fileadmin/DAM/env/documents/2017/EIA/IC/1_ic_ece.mp.eia.ic.2017.2_e.pdf

Committee also urges the UK to consult at early stages when all options are open on activities, plans and policies, including life time extensions of nuclear power plants as these may impact upon Ireland, and are of concern to the Irish public. Such will clearly be in the best interests of our ongoing good relations as two good and close neighbouring nations. The Committee recommends that the UK authorities consider the role of national Parliaments and other relevant stakeholders on such matters.

- ❖ The Committee is concerned in relation to the storage and disposal of nuclear waste. The geological disposal of nuclear waste could have huge implications for Ireland and therefore the Committee recommends that the UK authorities consult with Ireland in relation to any proposals, policies and plans for the storage or disposal of nuclear waste which is to be located in close proximity to Ireland.

Conclusion -

The Committee request that the observations and recommendations as outlined in this submission be taken into account by the relevant authorities and that a response to the issues outlined above be provided to the Committee.



Maria Bailey T.D.
Chair
09 May 2018

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)

Appendix II – Submissions to Joint Committee on Housing, Planning & Local Government

Hinkley Point C, Nuclear Power Plant, Transboundary Consultation Joint Oireachtas Committee Statement, May 1st 2018

Attracta Uí Bhroin,

Facilitator Environmental Law Implementation Group at the Irish Environmental Network

I wish here to set some overall context and some insight on our concerns on the approach adopted by the UK and Ireland to this project thus far, and to invite your further consideration on what may be appropriate as next steps as a consequence.

Hinkley Point C – is one of 8 new nuclear power plants proposed as part of the UK’s expansion of its nuclear programme, 5 of which are planned on the west coast of the UK, facing Ireland, The UK has of course pursued nuclear energy for many decades now, and a nuclear military programme.

Ireland has legislative bans on the production of nuclear energy reflecting its concerns on the risks and impacts of this technology. However we acknowledge the sovereign right of the UK to pursue its own energy mix. Equally, we acknowledge the UK and Ireland has obligations on such matters, and the public and Ireland have certain rights under EU and International Law.

Our concerns in relation to projects like Hinkley Point C – are not about panicking people, or causing unnecessary concern. It is about ensuring the legal rights of the Irish public are upheld - and ensuring we engage proactively and collectively do all that is necessary to ensure the health of our citizens, our environment, and our economic interests are best protected. That is in the context of our vigilance in respect of normal operations, avoidance and mitigation in relation to an accident or terrorist attack - be they minor or of catastrophic proportions, and appropriate preparedness.

To give some context to concerns arising: A 2016 ESRI report³ – 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 be avoided. In considering the impacts to people, a Radiological Protection Institute of Ireland, report⁴ refers to mitigating the impacts of radioactive fallout by sheltering indoors. But it

³ 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

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

So what then are the applicable rights and obligations on such matters? They flow from two International Conventions of the United Nations Economic Commission for Europe, known generally as the Espoo⁶ and Aarhus⁷ Conventions, and associated protocols, and to which the UK, Ireland and the EU are all party. The EU has addressed these obligations in key Directives,

- One of these is typically referred to as the Strategic Environmental Assessment or SEA Directive⁸ is concerned with assessing high level plans and macro-level programmes – such as an overall energy programme.
- The second the Environmental Impact Assessment or EIA Directive⁹ is concerned with the consent and impact assessment of individual projects – like Hinkley Point C.

Ireland and the UK are required to implement these directives. Simplifying the transboundary obligations - the state where the project originates is required to determine if there are likely significant environmental effects on other countries, in what is referred to as a screening decision, and if so to consult accordingly. The consultations have to be considered as part of the decision making process. Alternatively, even if for example the UK determines there are no trans-national/boundary impacts – another state can require to be consulted regardless. This is in fact what Austria did in relation to Hinkley Point C – 5 years ago, when the UK was processing the consent required under the EIA Directive. Austria was proactive in asserting its rights, as the UK had made screening decisions which determined no transboundary impacts. The second screening relied in particular on the UK's submission for Article 37 of the Euratom Treaty concerned with radioactive emissions and waste. Professor Sweeney will set out serious issues in relation to the analysis in that report, raising in our view serious questions about the adequacy of the UK's assessment of impacts on Ireland and the complacency of Ireland in this regard.

I wish here only to add to his analysis at this point by highlighting – that

- Despite the screening statement acknowledging that Ireland was the nearest state to the plant – Ireland was entirely omitted from the consideration of the severe accident scenario examined in the Article 37 submission; and
- The additional risks associated with further fracking licenses from 2015 been not been considered in the context of earthquake and tsunami risks, to which Professor Sweeney will refer.

⁵ <https://www.irishtimes.com/news/ireland/irish-news/hse-has-no-capacity-to-deal-with-nuclear-or-biological-incident-1.3363111> , January 22nd 2018

⁶ UNECE Convention on Environmental Impact Assessment in a Transboundary Context, 1991, “The Espoo Convention”

⁷ UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, 1998, “The Aarhus Convention”

⁸ Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment

⁹ Directive 2011/92/EU, (codified) on the assessment of the effects of certain public and private projects on the environment”, amended by 2014/52/EU

The UK's transboundary screening decision determined: *"On the basis that licensing and monitoring conditions are effective, impacts will not be significant."* – so reliance on the UK's regulatory regime and bodies such as the Office of Nuclear Regulation, ONR to avoid accidents is absolute.

The Secretary of State's decision agreed with this view, and in respect of concerns of the Austrian Government about the impacts on Austria in the event of an accident he replied: *"...such accidents are so unlikely to occur it would not be reasonable to "scope in" such an issue for environmental impact assessment purposes"*. Thus making it clear – the environmental impact of accidents was **not** assessed as part of the original decision - as they were considered too unlikely.

Accidents however by their very nature are accidental – no one planned the events of Three Mile Island, Chernobyl or Fukushima Dacchi. The convergence of events resulting in the catastrophe of Fukushima and its relevance for further deficits in the UK's approach are set out in an expert statement from John Large in Annex III of our submission to the UK Government in the Hinkley Consultation

However permission¹⁰ was granted to the plant back in 2013. Following intense legal arguments in various fora, finally the Irish public were consulted this year– some 5 years late and after further escalation given the failure of Ireland and the UK to ensure the Irish public were consulted alongside other nations last year in a remedial consultation exercise.

Yes the consultation is five years late, but it's not too late, highlighting issues with the approach taken and the project is essential:

- As Ireland and the UK needs to consider appropriate next steps given the deficits in the impact assessment undertaken to date on Hinkley Point C under both the Espoo Convention and the EU EIA Directive; and the very real concerns in relation to impacts, and our level of preparedness. Your input and concerns on the steps and decisions will be absolutely critical as members of this committee.
- Professor Thomas's statement will highlight serious project issues including technical design and manufacturing issues, spiralling costs and delays, and concerns on regulatory oversight. These are specific areas where we will now need to exercise particular vigilance, if proposed safeguards and assurances are not to be compromised given other extraordinary pressures to advance Hinkley Point C.
- Additionally, specific consideration is needed for new initiatives on the disposal of radioactive waste – which includes consideration of sites on the island of Ireland – in Northern Ireland. The issue and risks of onsite waste and geological disposal are intrinsically linked to the transboundary impact assessment of the Hinkley Project, and will be even more complex in the context of Brexit.

Key lessons also have to be learned and applied to Hinkley Point and other projects in terms of:

- Failures and experiences on the assessment of transboundary impacts, to ensure they are not repeated;
- The manner in which information flows to and is assessed in Ireland, and how notifications and consultations are addressed and conducted;

¹⁰ Development Consent under the EIA Directive – effectively planning permission.

- Clarity on responsibilities and accountabilities across Irish Government Departments.

We look forward to considering these further with you following our further presentation of just some of the issues.

Hinkley Point C Nuclear Power Plant Project

Comments on Article 37 Submission

*Professor John Sweeney,
Emeritus Professor of Geography, Maynooth University*

Article 37 of the EURATOM Treaty stipulates that:

“Each Member State shall provide the Commission with such General Data relating to any plan for the disposal of radioactive waste in whatever form as will make it possible to determine whether the implementation of such plan is liable to result in the radioactive contamination of the water, soil or airspace of another Member State.

Within the meaning of Article 37, a *plan for the disposal of radioactive waste* covers any planned discharge or accidental release of radioactive substances, in gaseous, liquid or solid form into the environment.

A review of the Article 37 submission by Her Majesty’s Government raises several serious issues concerning potential transboundary impacts on Ireland which are inadequately considered and give cause for concern.

1. The meteorological environment at Hinkley is inadequately described.

Table 1.4 purports to characterise the wind environment for 1999-2002 from Hinkley Point. Three years of data, even 10 years of data, is insufficient to characterise the wind climate at an individual location and any modelling based on this is highly suspect. The World Meteorological Organisation recommends that climate averages are computed over a 30 year period of consecutive records to smooth out year to year variations.

2. Estimates of Extreme high and low water levels fail to take account of climate change.

Table 1.6 purports to show estimates of extreme low water level for 2002. It is not clear whether the mean values listed are relative to 2002 or whether the dataset was that of 2002. In any event the ability to estimate a 1:10,000 year return period from even several years of data is statistically highly suspect. Firstly, it based on an assumption of stationarity in the sea level and storm surge regimes which is patently not occurring. Secondly the statistical extension of frequencies beyond about a century are of dubious validity.

Table 1.7 purports to show extreme high water levels with return periods of 1 to 10,000 years. Similar comments to Table 1.6 apply. The unsound nature of the estimates provided is further exemplified by the fact that the difference between the annual return period and the once in 10,000 years return period for high water is stated to be 1.3m. This does not take account of ongoing or projected sea level rise. The UK’s principal tide gauge is located relatively close by at Newlyn in Cornwall where sea level rise is presently occurring at 3.8mm/year. Furthermore, the IPCC report that it is virtually certain that global sea level rise will continue for many centuries, with ultimate rises of up to 3m possible. This means that the high-water levels risk table 1.7 cannot be

considered credible in its estimates of an increase of 1.3m as a one-in-10,000-year occurrence.

3. A known flood risk is not acknowledged in the UK Government Submission.

The table below, published in a UK national newspaper in 2012, following a Freedom of Information request, confirms that knowledge concerning the flood risk at Hinkley (and other projected new nuclear sites) has been available to the UK government for some time. A flood risk is identified by this UK report as existing from 2010 onwards, becoming high by the 2080s. These confirmed flood risks have serious implications for the safety of spent fuel at Hinkley, which is intended to be stored on site for up to a century.

Nuclear power generation, waste and decommissioning sites – Summary of data

Site	New site?	Waste Store?	NDA site?	In IFP? ¹	Elev. ²	HAT? ³	Flood Risk 2010	Flood Risk 2020s	Flood Risk 2050s	Flood Risk 2080s	Comment
Berkeley				Edge	0 to 10	8.6	Yes (low)	Yes	Yes	Yes (medium)	Coast. Sea wall 9.72m AOD
Bradwell				Edge	0 to 5.5	3.0	Yes (low)	Yes	Yes	Yes (high)	Coast. Sea wall 4.6 to 5m AOD
Capenhurst				No	High		No	No	No	No	
Chapelcross				No	High		No	No	No	No	
Culham				No	High		No	No	No	No	
Downreav				Small	9 to 15	3.0	No	No	No	No	Coast. Long term erosion risk
Drigg				No	High	5.3	No	No	No	No	
Dungeness				Part	2 to 6	4.2	Yes (high)	Yes	Yes	Yes	Coast. Flood and erosion risk. Relies on defences
Hartlepool				Yes		3.3	Yes (high)	Yes	Yes	Yes	Coast
Harwell				No	High		No	No	No	No	
Heysham				No		5.6	Yes (low)	Yes	Yes	Yes	Coast
Hinkley Point				Edge	10 to 14	6.8	Yes (low)	Yes	Yes	Yes (high)	Coast. Relies on defences. Flood and erosion risk.
Hunterston				No	5 to 21	2.0	No	No	No	No	Coast. Erosion risk
Oldbury				Edge	4 to 10	8.4	Yes (medium)	Yes	Yes	Yes (high)	Coast. Relies on defences
Sellafield				No	5 to 30	5.3	Yes (medium)	Yes	Yes	Yes (medium)	Coast. Flood and erosion risk to part of the site.
Sizewell				Edge	3 to 10	1.7	Yes (high)	Yes	Yes	Yes	Coast. Flood and erosion risk. Relies on defences
Trawsfynydd				No	High		No	No	No	No	
Winfrith				No	High	1.5	No	No	No	No	
Wylfa				No	9 to 13	3.8	No	No	No	No	Coast

¹ Indicative flood plain

² Elevation in m Above Ordnance Datum (AOD)

³ Highest Astronomical Tide

The risk posed by a tsunami in the macrotidal environment (maximum range 13m) of the Bristol Channel is not adequately considered. It is noted that the 1607 flood in the Bristol Channel and Severn Estuary is considered the worst ever recorded in the British Isles. Some 570km of coast were affected and 500 deaths occurred. The water level at nearby Kingston Seymour, Somerset was estimated as 7.74m AOD.

4. Models employed for assessing potential atmospheric transport of hazardous material to Ireland do not represent state of the art science in dispersion modelling

The atmospheric model used to evaluate the dispersion of planned or unplanned release of radioactive material into the atmosphere was based on an assumption that effluent would disperse vertically and horizontally downwind according to a conical (Gaussian) pattern. This model was developed in 1981 and subsequent caveats to its use were published by its author 5 years later. Many of these caveats would apply to the Hinkley situation and would render the model suspect for evaluating long range transport of radioactive material to Ireland.

The Arrival of Chernobyl radiation to Ireland would not have been foreseen by such a simplistic model and much more sophisticated models were subsequently developed. These were available to the UK authorities 20 years before the Article 37 submission

was made. The Met Office Nuclear Accident Model (abbreviated to NAME) was in use by 1988 with a major upgrade (NAME II) operational from 1994.

It may be concluded that several aspects of the Environmental assessment submitted by the UK authorities under Article 37 do not provide an adequate risk assessment for flooding and atmospheric dispersion of radioactive effluent in the unlikely event of a worst case scenario occurring. Combinations of rare events do occur as was demonstrated by Fukushima where total atmospheric releases from are now estimated to be between 5.6 and 8.1 times that of Chernobyl. For Ireland questionable reliance must exist regarding the then UK's Secretary of State's contention regarding Hinkley that:

"..such accidents are so unlikely to occur it would not be reasonable to "scope in" such an issue for environmental impact assessment purposes".

The Hinkley Point C nuclear power plant project

Professor Steve Thomas
Emeritus Professor of Energy Policy
University of Greenwich

[My name is Stephen Thomas and I am Emeritus Professor of Energy Policy at the University of Greenwich. I have worked as an energy policy researcher, specialising in nuclear power economics and policy since 1979, until 2000 at the University of Sussex and since then till my retirement in 2015 at the University of Greenwich]

The Hinkley Point C project will be built and operated by a company 33.5% owned by China General Nuclear and 66.5% by **Électricité de France S.A**, EDF. The plant will have two European Pressurised Water Reactors (EPRs), 3.2GW, supplied by the French company, Framatome, previously Areva. EDF took a majority stake in Framatome in January 2018

In 2008, the UK government forecast that the cost of two EPRs would be £4bn and EDF claimed first power from Hinkley Point C would be in late 2017. However, by 2017:

- The estimated cost was £19.6-20.3bn, (5 times the original figure). Interest during construction is expected to cost an additional £10bn; and
- Completion was 2025-27, 10 years late.

A key plank to the 2008 nuclear policy was that new nuclear plants would receive no public subsidy, but as problems have mounted this promise has been repeatedly broken. For example, to allow EDF to finance its share of the project, the UK Government has offered to guarantee the loans EDF will require. In addition, EDF sought and has been given guarantees on lost profits if the project is halted before the end of its 35-year contract.

EPR problems

The EPR is an unproven design. No EPR is in service, completion of all four under construction globally is significantly delayed and costs have overrun. Olkiluoto in Finland is 10 years late and three times over budget, two reactors at Taishan in China are 5 years late. Flamanville on the north coast of France, a key reference point for the UK authorities, is 7 years late and more than three times over budget.

Regulatory issues

The UK safety regulator, ONR, carries out 'Generic Design Assessments' (GDA) for new designs intended to resolve all design issues before construction is allowed to start. An approved reactor design can be built at any site. This process was completed for the EPR in December 2012. However, the ONR final report makes it clear major design issues could not

be resolved then and the detailed design will only be completed and evaluated during the construction phase, contradicting the rationale for the GDA.¹¹

Quality control issues

In 2015, it emerged that parts of the safety-critical reactor vessel supplied by Framatome's Le Creusot Forge did not meet specification. These parts were already installed at Flamanville and Taishan. Those which had been advance ordered for Hinkley were subject to destructive testing to determine whether the sub-standard parts were strong enough. Given that the French nuclear safety regulator, ASN, had known in 2005 that Areva was using a forging process not approved by it and that the parts were installed by 2012, this issue should have been identified before the parts became hard to access and check. ASN has decided to allow the start-up of Flamanville, expected in 2019, but requires that the reactor pressure vessel lid be replaced in 2024. ASN has acknowledged that a key factor in choosing this date is that it is the earliest a replacement part can be available.

ASN ordered the company to review its quality control procedures and it has emerged that quality control documentation had been **falsified** at Creusot for up to 50 years. This has created major concerns about parts manufactured there for nuclear plants in France and elsewhere. The investigation is on-going. In March 2017, ASN ordered that production of parts at Creusot **for French reactors** be suspended because: "The tools at its disposal are not adequate to manufacture such huge components." "The inspection brought to light the fact that the safety culture in the plant is not sufficient to produce nuclear components."¹² The restriction was lifted in January 2018 even though there is no suggestion there had been any significant new production equipment installed. ASN has no role in supervising production of parts for Hinkley, which is the responsibility of ONR. Despite the ban by ASN, parts for Hinkley were being made at the Creusot Forge from July 2017 onwards.¹³ It is not clear whether ONR approved or was even aware that parts for Hinkley were being made.

Separately, in April 2018, EDF announced that up to 150 welds in key parts of Flamanville did not meet the required specification.¹⁴ It remains to be seen what remedial action will be needed and what further delays will be incurred. This places the completion of Flamanville by end 2020 in serious doubt. Completion by then was a condition imposed by the UK government on its offer of loan guarantees to ensure UK taxpayer money was not being risked on untested technology. Without loan guarantees it is hard to see how the project could be financed unless the UK government chooses to compromise again and withdraw the condition.

Conclusion

The Hinkley project is unpopular with a wide range of UK interests including many nuclear supporters because of the cost to consumers. EPR technology is suspect and the reputation of its supplier is in tatters. Yet as these problems have emerged the UK government has chosen

¹¹ See for example <http://www.onr.org.uk/new-reactors/reports/step-four/close-out/gi-ukepr-ci-01-close-out.pdf> (Accessed April 29, 2018)

¹² <https://uk.reuters.com/article/uk-areva-safety-creusot/areva-factory-ill-equipped-to-make-nuclear-parts-french-watchdog-idUKKBN16N1SL> (Accessed April 29, 2018)

¹³ Platts Nuclear News Flash, 26 January 2018.

¹⁴ <http://inpublic.globenewswire.com/releaseDetails.faces?rId=2182962> (Accessed April 29, 2018)

to compromise and offer further subsidies rather than reconsider Hinkley. Mounting evidence that options such as renewables and energy efficiency measures would be a much more cost-effective way of meeting the UK's climate change goals has been ignored imposing huge extra costs on future UK electricity consumers. The contract price agreed for Hinkley's output is £92.5 per MWh (in 2012 money), inflation indexed for 35 years. This is significantly above the September 2017 bids for off-shore wind projects of £57.5/MWh, and the current UK wholesale market price of £40/MWh. Formal construction will not start before 2019 and construction will provide large scope for further delays and cost increases.

There appears to be a worrying pattern with both ONR and ASN of inadequate supervision and an apparent willingness to make decisions that appear to favour the companies they supervise damaging confidence in the independence of these bodies in carrying out their crucial role.