

From: [REDACTED]
To: [Wylfa Newydd](#)
Subject: Evidence to Planning Inspectorate
Date: 16 January 2019 21:01:23
Attachments: [Wylfa Newydd Written Evidence ENO10007.doc](#)
[6. Forum Paper on Climate Change and Siting.doc](#)

Dear Planning Inspectorate,
PAWB is a registered interested party in your assessing of Horizon's Wylfa B DCO application. Soon after I appeared before your panel of inspectors in an evening session at the Mona Anglesey Show Ground on October 25, I [REDACTED] [REDACTED] which meant I was out of action for 6 weeks and I missed submitting Neil Crumpton's paper for PAWB based on his presentation to your inspectors in the daytime session on October 25 at the same venue. It is a matter of better late than never, and I hope you will accept Neil's paper on behalf of PAWB. Please find attached Neil's written version of what he presented to the inspectors.

Also, following last Friday's session at the Trearddur Bay Hotel, and following on from oral submissions by Mag Richards representing the Welsh Anti-Nuclear Alliance (WANA) and comments and questions from Linda Rogers and Neil Crumpton from PAWB, we have received a paper by Professor Andrew Blowers which is very relevant to the points raised last Friday about sea level rises, climate change and nuclear station siting. Professor Blowers has kindly agreed for his paper to be submitted to you as evidence to reinforce the PAWB and WANA presentations last Friday and for it to be submitted in the name of PAWB and WANA. I look forward to hearing from you.

Yours sincerely,
Dylan Morgan
Co-ordinator PAWB
Pobl Atal Wylfa B/People Against Wylfa B

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Planning Act 2008

Application by Horizon Nuclear Power Limited for an Order Granting Development Consent for the Wylfa Newydd Nuclear Power Station

Written response from PAWB representative Neil Crumpton (expanding on oral evidence given at the PI Examination at Mona on 25th Oct 2018)

Summary

The response below is about 3,150 words so to summarise the evidence covers four planning-related issues listed below which may fall within the PI's remit. It should be noted that PAWB has campaigned for over 30 years against the building of any type of nuclear Wylfa B for various local, regional national and global reasons which lie outside, or mostly outside, the Planning Inspectorate's remit.

- 1 Planning policy to 2025 including Regulatory Justification
- 2 Horizon's public consultations
- 3 Threats to local bio-diversity including possible Habitat Directive implications
- 4 Additional stresses to local public services

Introduction

The community-based campaign group People Against Wylfa B (Pobol Atal Wylfa B) or PAWB is opposed to the building of any Wylfa B nuclear power station, for a range of local, regional and global reasons. I have been a member of (PAWB) for over 30 years. I represent the group on the BEIS-NGO nuclear Forum (I am the Forum's leading discussion paper writer over the last few years) and I represent the group on the ONR's stakeholder group. Between 1994 and 2010 I was an energy campaigner at Friends of the Earth Cymru (FOE Cymru) specialising in renewable energy scenarios and nuclear energy issues.

As FOE's (England, Wales & Northern Ireland) lead nuclear campaigner around 2004-2010 I attended the BERR's nuclear stakeholder consultations around 2006-7, and was a speaker at numerous energy conferences. I also served on BERR's ACCTs stakeholder group (Advisory Committee of Carbon Abatement Technologies) between 2007-2009 before becoming a DECC-NGO Forum rep in about 2011.

I have a degree in electrical engineering (Liverpool University 1977) and some experience in naval missile radar systems (Marconi Radar Systems). I am essentially recently retired and campaigning voluntarily for PAWB and I'm an active contributor to UK based energy discussion groups (email) which range over, on a daily basis, any and all aspects of energy and related environmental issues.

Set out below is a written representation of the points I made in oral evidence on 25th October 2018 at the Inspectorate's Mona Examination. I was one of two PAWB reps who gave evidence on different aspects of the group's opposition to Horizon's DCO application.

While I think most of PAWB's concerns relate to matters outside the remit of the PI Examination (ie affordability to future consumer and taxpayer, avoidable WMD technology proliferation, inter-generational waste storage, avoidable National Defence/terrorism disbenefits, design issues / accident potential /health issues) some PAWB concerns might or do overlap within the PI's remit. For this reason, I have expanded on and referenced the points I made in oral evidence in case any aspect does fall within the PI's remit.

1) Planning policy by 2025 will have timed-out before a Wylfa B could start to supply electricity, so there is no Regulatory Justification under EU policy and adherence to carbon reductions under UK climate law would be compromised

It is very unlikely that a Wylfa B (and highly unlikely that any other of the planned 'first-tranche' nuclear power stations) would be supplying any electricity to the Grid by the end of 2025, let alone a significant quantity, due to consent, construction timescales and various other delays and realities. Yet UK (nuclear) energy policy set out in policy EN1 and EN6 is predicated on about 16 GW on nuclear new-build capacity, including a Wylfa B, to '*start generating as soon as possible and significantly earlier than 2025*' (see Annex A below).

Ministers, past and present, based their new-build nuclear decisions on an overriding need (described as 'crucial', 'key', 'absolute') for early low-carbon electricity delivery (ramping up from Xmas 2017 to end of 2025) as a 'Regulatory Justification' for promoting new practices which result in ionising radiation under the EU Basic Safety Standards Directive (see Annex B).

The Justification was based on the then and current Government assumptions (described as essentially 'assertions' by many energy specialists as far back as 2007) that no other ways of achieving the then low-carbon energy policy were available or could be built in time. It is now abundantly clear to any rational, informed and reasonable objective observer that the Government's policy has spectacularly failed, not only to deliver low-carbon electricity earlier than by other means (ie then PV and offshore wind technologies) but also at lower cost (eg offshore wind cost estimates for 2025 delivery range from £ 50-60 per MWh).

The reverse is true, renewables could, and still can, deliver low-carbon electricity faster and at relatively lower consumer cost including the additional system back-up costs (hydrogen / multi-fuel gas-turbines, electrolysers, etc) required for the additional intermittent renewable capacity.

Indeed, the Hinkley Point C scheme under construction is expected to start generating between 2066 to 2027 may well cost future UK consumers (our children) about £ 30 billion more over 35 years to the early 2060s than an equivalent output of renewable electricity (mainly offshore wind and PV / PVT) based on current forecasts and estimates of decreasing costs of RE technology. It would be cheaper to invest some or all the excess consumer costs (or equity stakes / other nuclear subsidy) on additional low-carbon energy and energy efficiency to significantly better achieve the UK's GHG emissions reductions required in the Climate Change Act 2008.

Given that the 'time-limited' policies EN1 and EN6 will time-out before any nuclear generation is likely, and that the key assumptions underpinning the 2008-2011 policy formulation and Regulatory Justification have manifestly significantly changed, the policy cannot be described as fit for purpose if valid at all.

Even IF a Wylfa B were still deemed to have Regulatory Justification under the NPS policies, or not require any justification on EU ionising radiation grounds, a DCO for a Wylfa B could still be rejected on Climate Act grounds that it would '*result in adverse impacts of the development*

outweighing its benefits' (see Section 2, page 8, Planning for NSIPs HoC Briefing paper July 2017 : <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2013/04/Advice-note-16.pdf>).

The BEIS Secretary of State, currently Greg Clark, should attempt to re-justify the case for a Wylfa B (for post 2025 delivery) in case the UK possibly remains within the EU, and even if it does not, before even considering Horizon's Wylfa B DCO application. The SoS should also assess the UK's adherence to its own carbon-reduction policies and duties under the Climate Change Act 2008, if it does consider Horizon's DCO application.

2) Horizon's public consultations - inadequate information for informed decision-making : long-term radio-active waste accumulations and energy security issues (National Defence)

As a proposer of a NSIP, a developer (in this case Horizon) has to carry out some pre-application consultation, publicity and notification duties as advised in this PI document : <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2013/04/Advice-note-16.pdf>. The document (page 4) states :

*'The SOCC [Statement of Community Consultation] should provide sufficient detail of the project, referring to both positive benefits to the local community that would result from the development **and to the issues which could be considered negative elements of the NSIP** so as to encourage participation in the process. The scale of the proposal should be described.'*

The large increase in scale of the radio-toxic 'waste' (Spent Fuel and Intermediate wastes) arising over 60 years on each new-build nuclear site, compared to the UK's existing nuclear power stations, was not and has never been made clear to the public, either by Horizon or any other nuclear developer, any Government or department or any other related body (eg NDA, EA, NRW, ONR) either in public consultations or by other means. Indeed, the opposite impression has been given, to Parliament by a mis-advised PM Tony Blair and by others to media.

A false impression has been made (very deliberately in my view) by comparing the VOLUME (in m3) of new-build Spent Fuel arisings to the UK's 'legacy' waste volumes (which were significantly increased by reprocessing) rather than comparing RADIO-ACTIVITY (measured in Becquerels - ie ionising radiation of all types) of the Spent Fuel and ILW arisings.

Ministers were advised by officials, and then advised the public, that the waste arisings would be 'ABOUT TEN TIMES LESS' from the 'replacement' new high efficiency reactors (compared to legacy wastes after reprocessing). In actuality, it is s probably 3-4 times MORE by radioactivity (ie Spent Fuel / ILW arisings from a 16 GW new-build programme after 60 years operation) compared to legacy arisings. Furthermore, the waste would be stored ON SITE in 'Interim Stores', not transported out, for probably 40 years AFTER the reactors have been decommissioned following 60 years (or more) of operation ie possible removal to Geological Disposal Facility (GDF), IF built, from around 2035.

According to CoWRM the UK's legacy nuclear wastes (mostly stored at Sellafield), including some military risings peaked at about 87 mTBq. In comparison, the estimated arisings from a '16 GW new-build programme' (ie five 3+ GW coastal schemes) would amount to over 200 mTBq, possibly much more, according to (my understanding of a confusing) July 2015 document by the RWM (now 'page not found') : <http://www.nda.gov.uk/publication/2013-derived-inventory/>

Para 6.9.2 on page 49 states : '*At 2040, the total activity associated with the new build SF [Spent Fuel] has been estimated to be 127,000,000 TBq a significant fraction of the waste (approximately 75% arose after 2040.)*'

That statement indicates 127 mTBq of new-build waste at 2040 ie 15 to 20 years after assumed programme delivery by end of 2025.

This would indicate (a competent authority could calculate and publish a detailed figure) that Spent Fuel arising at each of five 3 GW sites would peak at about 40 mTBq or more ie approaching half the peak level of radioactivity from all legacy UK nuclear operations. It has been stated that the Spent Fuel would after a period of cooling would be dry-cask stored and relatively safe inside a concrete store - yet there are technical issues still unresolved and of on-going debate and testing.

There would also be a significant quantity of Spent Fuel would accumulate in the High Level cooling ponds next to the planned ABWR reactors during operation (five -ten years worth ? which would amount to maybe 3-6 mTBq ie 40 x 5/60 to 40 x 10/60) and these tanks would be vulnerable to accidental or malicious events. I have asked BEIS officials, and previously DECC, more than once to state what level of radioactive Spent Fuel would accumulate at each new-build site but no response has been forthcoming to date.

A serious breach of a Wylfa B's cooling ponds could be on par with a Chernobyl scale radio-active release : <http://www.no2nuclearpower.org.uk/old-reactors/nuclear-security/> (assuming a fairly major Sellafield cooling pond event (ie significantly less than 87 mTBq peak) may be equivalent in some respects to 40 times the release during the Chernobyl disaster. Presumably, one of the various authorities could calculate the likely scale of figures so the public are informed about the scale of risk.

In terms of risks, a serious or major accident could be caused by component failure irrespective of the (unproven UK-ABWR) GDA design approval given by the ONR. It should not be forgotten that there has been recent well-documented cases of faulty nuclear reactor component forgings and safety case falsification. Accidents are not the only serious risks to workers and the public. The relatively vulnerable cooling ponds may or may not withstand attack by suicidal terrorists (eg armed with shaped demolition charges) or other malicious containment failure. Such risks are difficult to quantify but so were the chances of 9/11.

Indeed, the public have not been informed about all the security issues and risks (beyond the security remit of the EA, NRW, and ONR). Future threats include precision-guided hypersonic (traveling 1.5+ miles per second) high-impact missiles and (rail-gun) projectiles which are likely to be able to penetrate through several metres of reinforced concrete. Such weapons are already appearing on some navies warships and could be widespread by 2030 let alone 2085. Such malicious or accident events could result in a major radio-toxic release with devastating regional consequences for decades or centuries. All the risks are avoidable by building renewable energy systems instead.

In terms of 'energy security' (a core stated new-build rationale) neither Horizon or HMG have given reasons how the asserted energy security benefits of the scheme could outweigh the resulting National Defence detriment (a nation's defence being claimed a top priority of any government). The National Defence detriment being an avoidable critical infrastructure (ie nuclear) vulnerability compared to a renewable energy systems equivalent comprising widely geographically dispersed, and relatively very low-toxic / low-value offshore wind turbines and PV panels / schemes plus their high-redundancy (hence high resilience) gas-fired back-up systems - with unstoppable indigenous free fuel delivery. The taking out 7% of UK electricity instantaneously and permanently, causing

mass public evacuation and toxifying up to region for centuries, in one malicious act is risk worth not taking.

Note that, in 2016, DECC SoS Amber Rudd enacted policies which decreased the speedy deployment of onshore wind and PV capacity across the UK at around the same time as Centrica increased gas imports to the UK from Russian energy firm Gazprom (only two years after the shooting down of an airliner by a Russian built missile fired from a Ukrainian war zone). So much for reducing reliance on imported Russian gas which was an oft-stated rationale for the crucial new-build nuclear programme since 2006. Yet there has been essentially no public or Parliamentary debate about such energy security issues.

Even IF there were no malicious event potential (or the risk is deemed highly unlikely, remote or unconceivable) there is still the issue of handing our children the inter-generational management of long-term radio-active waste, either in a GDF or GDFs somewhere in England or Wales or on the Wylfa B site by default if a GDF is not built for any reason. There are still numerous intractable questions and technical unknowns and costs about the long-term storage / disposal of High Level radio-active wastes - avoidable by choosing non-nuclear low-carbon energy solutions.

So, have the various public consultations provided relevant information for informed debate and response ?

Questions which may test the effectiveness of public consultations

Does a substantive minority or majority of the adult public on Ynys Mon, North Wales, Wales, UK or Ireland understand that :

- a) nuclear energy (ie HMGs planned new-build nuclear programme) is a low-carbon energy systems OPTION as distinct to being a 'crucial', 'key', 'vital' (terms used by various ministers) low-carbon infrastructure necessity 'of absolute need' (Amber Rudd) ?
- b) the radioactive waste arisings from the new-build programme would be about THREE to four times MORE rather than TEN times LESS than all the radio-active waste arising from the UK past and existing (legacy) nuclear programmes ?
- c) the radio-active waste may have to be stored on site (with rising sea levels) for centuries by default if a geological disposal facility is not built for any reason ?
- d) has the local, regional or national (Wales) media (print and broadcast) covered public debate of the Wylfa B scheme to the extent which could be considered proportionate for a scheme that would be the most expensive in Welsh history (ie £ 15 billion including possibly several £ billion equity UK public stake) with effects lasting hundreds of years - eg compared to a debate about a proposed housing scheme, a £ 10 million road bypass scheme, a general rise in electricity prices, or the collapse of a garden wall and shed in south Wales due to a landslip ?

On the last question I would suggest that outside the reporting and repeating of basic statements about the planned scheme (eg interviews with the developers or ministers) there has been minimal coverage of opposition concerns let alone structured media debate (the collapse of a garden wall and shed in Merthyr reported on Tuesday 3rd December may have had slightly more seconds of prime TV coverage in Wales than all PAWBs and other opposition eNGO TV interviewees over the past two years).

I did have a short public debate with a senior member of the Horizon staff at an energy conference in Cardiff in Dec 2017 (audience 150+ delegates). The Horizon staff member was a speaker and I was a delegate questioner from the floor. I asked about the likely additional cost of Wylfa B

electricity primarily and Horizon's response indicated that nuclear energy could provide reliable electricity (implying that intermittent wind / PV etc could not).

However, no one is proposing that intermittent sources would not be backed-up by low-carbon gas-fired and other systems to reliably match supply to instantaneous demand - and still cost significantly less than any likely Wylfa B deal. That question and (poor and uninforming) response took a couple of minutes and personally cost me £ 400 in conference attendance costs. I asked the conference organisers if I could be invited to speak at this year's conference (Horizon speaking again) but I was not invited.

For the above reasons and numerous more, I would suggest that the public consultations have NOT informed the public about the relative scale of the proposal and its significant processes or covered issues which could be considered negative elements of the NSIP so as to encourage participation in the process.

Note : in my oral evidence at Mona I tried to balance my criticism of the consultation processes by mentioning that as a member of the BEIS-NGO nuclear Forum that I was due to meet with BEIS energy specialists on the Monday (four days later) to discuss a recent discussion document I wrote about counter-factual energy scenarios and the fiscal assessment methodology (for due diligence purposes, as clearly set out by SoS Greg Clark in the HoC when announcing negotiations with Hitachi some months ago).

I think that it is relevant to report that on the following afternoon my meeting was unexpectedly 'postponed' due to 'unforeseen circumstances' which were and have not since been disclosed by BEIS. It was proposed that the meeting be arranged in the New Year (ie at least 2.5 months later). This was a significant blow to the years of effort I have contributed to the Forum because negotiations between SoS Clark and Hitachi will be progressing in these very few months and a Wylfa B 'deal offer' could be announced in the Spring or earlier.

3) Threats to local bio-diversity (various designations SPA, pSPC, SAC, pSAC) including the Cemlyn Tern Colony and other biodiversity such as adders - possible breach of IROPI / Habitats Directive

I will leave others, who are specialists in the relevant bio-diversity issues, to detail the concerns and objections. However, I have heard about a plan to relocate adders found around the extensive Horizon site to a much smaller site (with fencing partially enclosing certain areas). Such a plan needs to be examined for its effectiveness and sustainability, as adders and their habitat are under threat (a point mentioned on the BBC one, One Show programme the day before the oral hearing).

My main point on such bio-diversity and related Heritage Coast / AONB issues - nuclear energy is an (relatively expensive and slow to deliver) low-carbon electricity option (plan) NOT 'crucial', 'key' or 'vital' as regularly asserted by the succession of energy ministers (typically about one a year all badly advised about a 'need for baseload' to bio-diversity).

Consequently, as is now arguably clear, in 2018 there are cheaper and quicker non-nuclear solutions which meet the 'plan' (to supply affordable, low-carbon energy securely before 2025), so there is no IROPI (Imperative Reasons of Overriding Public Interest) regarding the Habitat's Directive (see Annex C). Only in his most recent Wylfa B announcement and written statement has SoS Greg Clark stated that nuclear energy is 'important' (as distinct to crucial, key etc). The term 'important' rather than 'crucial', 'key', 'vital' suggests that the SoS now believes that there are important reasons but **not overriding (crucial) reasons** for a Wylfa B.

4) Additional stresses to local public services (eg GPs and Police/Emergency services)

I will leave others, who are specialists in the relevant public services, to detail their concerns about the large influx of upto thousands of construction workers over a number of years to what is a relatively remote rural area. I raised the matter at the oral sessions to show that local PAWB members too are aware of, and concerned about, such potential social issues across the north of the island and potentially with knock-on effects across Ynys Mon and beyond.

Annex A

The relevant planning policy is set out in EN1 sections 3.5.9 to 3.5.11 (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf)

The urgency of the need for new nuclear power

3.5.9 Given the urgent need for low carbon forms of electricity to contribute to the UK's energy mix and enhance the UK's energy security and diversity of supply, it is important that new nuclear power stations are constructed and start generating as soon as possible and significantly earlier than 2025 (see Section 2.2 of EN-6, which sets out policy in respect of the IPC's consideration of early deployment of new nuclear power stations). Based on the availability of – amongst other things – construction materials, skills, investment, the timescale for licensing, and related investment in transmission and distribution infrastructure, the Government believes that it is realistic for new nuclear power stations to be operational in the UK from 2018, with deployment increasing as we move towards 2025.

3.5.10 For these reasons, the Government's assessment of sites potentially suitable for new nuclear development (see Part 4 of EN-6) only included sites that were shown to be capable of deployment by the end of 2025; 2025 also represents a realistic timeframe for the construction of new nuclear power stations and avoids an unnecessarily long list of potential sites which may not come on stream for some years. Nuclear power stations have an estimated design lifetime of 60 years so any new nuclear power stations operational by the end of 2025 will play a vitally important role in the decarbonisation of the electricity system and will therefore directly contribute towards our 2050 targets and objectives.

3.5.11 France has already demonstrated that it is technically feasible to build nuclear power stations at the rate that would be needed in the UK if new nuclear power stations were to be constructed on all of the sites listed in this NPS before the end of 2025.

Annex B

Regulatory

Justification

: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47859/2009-nps-for-nuclear-volumeI.pdf

2.6 The Regulatory Justification process and the planning regime

2.6.1 The Basic Safety Standards Directive requires European Member States to ensure that all new classes or types of practice resulting in exposure to ionising radiation are “justified” (by their economic, social or other benefits in relation to the health detriment they may cause) in advance of being first adopted or first approved. 2.6.2 This process has been implemented in UK law by the Justification of Practices Involving Ionising Radiation Regulations 2004 (the Justification Regulations) and is known as Regulatory Justification. In relation to nuclear power in the UK, the Justifying Authority for the implementation of the Regulatory Justification aspects of the Basic Safety Standards Directive is the Secretary of State for Energy and Climate Change.

2.6.3 In October 2010 the Secretary of State published his decisions²⁷ that two nuclear reactor designs, Westinghouse’s AP1000 and Areva’s EPR, are justified.

2.6.4 Given that Justification is a separate regulatory process a decision regarding the grant of development consent should not be delayed in the event that a Regulatory Justification decision is subject to legal challenge. **If there are concerns about a challenge to, or the validity of, a Regulatory Justification decision, the IPC should consider whether requirements should be attached to the Development Consent Order to the effect that the order is conditional on the existence of a valid Regulatory Justification decision.**

Annex C

Habitat's	Directive	(page	5)
: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47859/2009-nps-for-nuclear-volumeI.pdf :			

1.8 Interaction with the Habitats Directive 1.8.1 EN-6 is a “plan” for the purposes of the Habitats Directive. Its objective is to facilitate the delivery of new nuclear power electricity generation on some or all of the sites listed in this NPS by the end of 2025

1.8.2 The Government has assessed this NPS (by conducting an HRA) and has concluded that it cannot rule out the potential for adverse effects on the integrity of European Sites adjacent to or at a distance from each site listed in this NPS. In line with the requirements set out in Article 6(4) of the Habitats Directive the Government considered potential alternatives to the plan and nominated sites, and concluded that there were no alternatives that would better respect the integrity of European Sites and deliver the objectives of this plan.

BEIS/NGO Forum January 24 2019

Consultation on the Siting Criteria and Process for a New National Policy Statement for Nuclear Power with Single Reactor Capacity over 1 Gigawatt beyond 2025

Climate Change and Siting – the implications of sea level rise and time-scales for coastal sites

Overview

The Government's programme for new nuclear power has been substantially focused on overarching strategic issues of foreign investment, finance, technological safety and national security. For one reason and another the programme has proved faltering. Hinkley Point, though approved and under development, remains controversial and its future still insecure. The Moorside project has collapsed as foreign investment has withdrawn and Wylfa has also become a doubtful project presumably dependent on Government intervention to proceed. Oldbury is not yet on the starting blocks. Of the two eastern sites, Sizewell is mired in the final stages of consultation prior to development consent. Finally, Bradwell, once an outlier has come more into the reckoning but remains far behind in the crawl to the finishing line, its prospects speculative at best.

In all the convolutions and contradictions in what passes for a nuclear programme, a key constraint, the availability, suitability and acceptability of the sites themselves has received only passing attention at the strategic level, though it has certainly consumed attention among the affected local communities. There may be two reasons for this. One is that in the early stages the discussions about finance, design and security are at a generic level as projects materialise and become tied to specific sites. The other reason is that there is a general assumption at government, developer and media level that objections and problems with sites can, ultimately, be overcome. It must be said that this complacency is fed by the tendentious approach of the NPS which is clearly designed to legitimate sites to ensure development whatever the costs to environments, communities and security.

This is evident from the criteria for site selection which have changed but little during the decade since they were first developed. The sites were allegedly the only sites available before 2025, yet the self same sites are being recycled with no further site identification until the 2020s. The present Consultation on siting criteria disingenuously asserts the Government's preliminary view that 'the sites listed in EN-6 are likely to be those which can deploy the soonest and are the only sites capable of deploying a nuclear power station by 2035' (DBEIS, 2017, p.12).

The siting criteria remain overwhelmingly discretionary suggesting the sites will again easily pass the thresholds for acceptability. The premise that nuclear energy is needed in whatever amounts that can be financed by overseas investors remains the *idée fixe* of the Government's energy strategy. The illusion that nothing much has changed persists in the NPS – yet, it is evident that everything has changed.

Changing Circumstances, Unchanging Proposals

The concern here is with siting and more especially with the issue of climate change and the related siting criteria of flooding, storm surges and coastal processes. In the light of recent evidence and changing circumstances it is considered that these criteria must be further reviewed, revised and be made exclusionary. There are three parameters which indicate the need to revisit these criteria. They are: need for nuclear energy; sea level change; time-scales.

Need for nuclear

The arguments are well known and have been rehearsed at the Forum on several occasions, notably through the Crumpton/Blowers papers on Energy Policy Issues of Concern. In short, the argument in EN-1 that nuclear energy is a necessary part of the energy mix that underpinned the justification for the sites nominated in 2011 is not sustainable. It was questionable at the time and is untenable now, certainly not on the scale envisaged. In any case, new nuclear power stations are unlikely to be available until the 2030s, by which time any residual justification for civil nuclear energy will have all but vanished. The National Infrastructure Commission has proclaimed that ‘a renewable based system looks like a safer bet than constructing multiple new nuclear power plants’ and recommends a ‘one by one’ approach rather than developing a large fleet. It appears that this will be the situation by default with possibly only Hinkley Point reaching start-up.

It is no longer credible to claim that the necessity for nuclear power is an imperative reason of overriding public interest that should have preference over other public interests in environment, public health or security. This must be reflected both in a review of EN-1 explaining the diminished need for nuclear energy and also in the justification process which evaluates the benefits of new (nuclear) practices in terms of security of supply and carbon reduction in relation to health detriments.

The need for nuclear energy should no longer be taken as a given in the process of site assessment and selection. There should be a review of whether any sites are required for the period 2025-35 with a view to abandoning the strategic site selection process forthwith.

Sea-level change

Over recent months global warming and the consequences for climate change and its impacts have been a prominent international issue arising from the IPCC COP24 in Krakow and, in the UK, the UKCP18 sea level predictions. More specifically, there has been increasing concern about the vulnerability of nuclear sites in conditions of sea level rise, storm surges and coastal processes. Around a quarter of nuclear plants world-wide are in coastal locations; all the sites under consideration for new nuclear plants in the UK are on the coast or estuaries. Some, like Hinkley, Sizewell and Bradwell are already ‘high risk’ especially vulnerable locations (Vidal, 2018).

The tendency for forecasts of sea level rise, risk of flooding, erosion, storm surges to increase is empirically undeniable. Experience of the rise has been measurable over the past decade and the forecast is upwards. EN-6 was based on the UKCP09 forecasts and these have recently been revised with the UKCP18 forecasts. Overall

sea level projections are consistently larger even with lower emissions scenarios and higher mitigation measures. The further forward the prediction, the greater the uncertainty given the variables such as glacier melt, emissions levels, storm tracks and so on. For instance, 'we don't yet know whether storm surges will become more severe, less severe or remain the same' (Met. Office, 2018, p.2). In addition, there is considerable local variability related to coastal processes and land rise. Thus, eastern England has a low-lying coastline, eroding in places with the land falling in postglacial isostatic adjustment thereby contributing to rising sea levels. It must be said that forecasting up to the end of the century is fraught with uncertainties but that global warming and sea level rise will continue is incontestable.

The IPCC's report on global warming of 1.5⁰C indicates the measures that must be taken to avoid a rise of global temperature above 1.5⁰C, a level likely to be reached between 2030 and 2052. Action is required immediately at global and international level to prevent a continuing rise to 2⁰C and probably more by the end of this century. At such a level adaptation becomes more problematic. 'A slower rate of sea level rise enables greater opportunities for adaptation in the human and ecological systems of small islands, low-lying coastal areas and deltas.' (IPCC, 2018, p.9). The problems of protecting major infrastructures at coastal sites might become more manageable but the prospects of slowing sea level rise appears minimal. If present trends continue a rise in global temperatures of 2⁰C and more is inevitable and the consequences for sea level rise and consequent flooding and storm surge at coastal infrastructures could be catastrophic.

Two of the NPS criteria relate to climate change and sea level rise. They are: flooding, tsunami and storm surge; and coastal processes. Both are discretionary criteria which may make a site unsuitable for a nuclear station 'but which need to be carefully considered in order to come to a conclusion as to the site's strategic suitability' (p.18). (Note the preemptive assumption of priority for nuclear energy implied in this statement). This means that, for instance, sites should be in areas with low probability of flooding 'unless there is no reasonable alternative appropriate for the proposed development'. Thus, development might be permitted in flood zone 3 (highest probability of flooding) which, at Bradwell, covers most of the site. The developer must demonstrate that they can avoid, mitigate or minimise impacts on sites. Two points might be made here. One is that, ultimately such a demonstration would be impossible, even futile, providing false assurance to gain a permit. The other is that where there is no alternative site for the development (a matter of assertion rather than empirical fact) a unique environment of international significance can be disrupted, damaged or even destroyed in the effort to secure a site for an unnecessary nuclear power station.

The problems of *Managing the Coast in a Changing Climate* have recently been set out by the UK Committee on Climate Change (2018). In areas like the East Coast natural protection from saltmarshes, mudflats, shingle beaches, sand dunes and sea cliffs has been rapidly declining. The problems of managing such coasts through adaptive measures such as managed realignment and hard defences may be insuperable in the uncertain circumstances of climate change over the next century. It seems imprudent and irresponsible to contemplate development of new nuclear power stations in conditions which may become intolerable.

In terms of sea level change and related processes it is concluded that:

- **The assessment of potential suitability of sites for new nuclear energy should be informed by the most recent detailed and site-specific data on climate change and consequences for sea levels, flooding, storm surges and coastal processes.**
- **Risk assessment should be based on the highest projections of global warming and sea level rise bearing in mind increasing uncertainty over time.**
- **Criteria for flooding, tsunami and storm surge and for coastal processes should be exclusionary, that, if breached, will categorically exclude a site from further consideration.**
- **Sites in Flood Zone 3 should be automatically eliminated.**

Time-scales

Development and planning for new nuclear power involves decision making that will affect environments and human health over very long, sometimes unimaginable, time-scales. Take an example like Bradwell, where the process from consideration through decision, to development, operation and the later stages of decommissioning and clean-up could span around 200 years and, far beyond if the long-term management of radioactive wastes is taken into account (see Box). Decision-making over such time-scales is subject to increasing uncertainty. Reliance must be placed on forecasts and predictions which, over time, rely on probabilistic assessments of increasing range as variables inevitably involve inaccuracies of measurement and ignorance of information and experiment. Ultimately, it becomes a matter of indeterminacy, where the unknowable is a subject of speculation and fantasy. In a phrase it is the realm of unknown unknowns.

Box Time-scales of nuclear development

Time-scales might be considered in terms of six phases:

Phase 1: Proposal under consideration. 10 years.

Phase 2: Decision Phase including GDA, planning and permitting. 10 – 12 years.

Phase 3: Development phase. Up to 10 years.

Phase 4: Operational phase. Around 60 years.

Phase 5: Decommissioning and Clean-up. Up to 100 years.

Phase 6: Indeterminate and indefinite period of continuing storage or disposal.

This progression from uncertainty to indeterminacy is the case with new nuclear power. In the early stages, uncertainties over design, cost and construction dominate and may be solved over time. The operational period lasting around sixty years is subject to broader, less predictable uncertainties, notably climate change. It is noticeable that statistical predictions of global warming, sea level rise and climate

changes are confined to the period up to the end of the century and, even then, the uncertainties introduce a speculative element into decision making (for instance, on measures to protect a power station against the risks of sea level rise, flooding and coastal processes).

Beyond 2100 major instabilities such as the possible substantial melting of the Greenland and Antarctic ice sheets make it impossible to present anything beyond vague, provisional and exploratory scenarios. UKCP18 comments that, 'Based on exploratory results to 2300, sea levels continue to increase beyond 2100 even with large reductions in greenhouse gas emissions.' (UKCP, p.1). In short, beyond 2100 is unknown territory, not only in terms of natural processes but also in terms of institutional continuity and societal stability. Yet, new nuclear power stations will scarcely have ceased operating at this point while it is intended spent fuel and other high active wastes will be stored on site for an unknown period, certainly well into the second half of the 22nd. century. It is assumed that these wastes will ultimately be disposed in the GDF which acts as a kind of Holy Grail for the end stage of the nuclear cycle. Given there is neither concept, nor site available it is surely premature to rely on the GDF which, in any case, might be too late to deal with wastes on deteriorating coastal sites.

In terms of intergenerational equity it should be inadmissible to establish long-term spent fuel and other radioactive waste stores at vulnerable coastal sites without community consent, as is being sought for the GDF. It must also be unethical and irresponsible to permit development which will persist into the far future where physical and social conditions are unknowable, the viability of protective systems untestable and a deep disposal facility unreliable.

On the question of time-scales we make the following observations:

- **Long time-scales lead to increasing uncertainty in planning and implementing hazardous facilities such as nuclear plants.**
- **Beyond the end of this century predictions and forecasts concerning both natural and social systems are speculative, unreliable and indeterminable.**
- **In such circumstances storage of dangerous radioactive wastes on vulnerable sea coasts and estuaries is unviable, unethical and unmanageable.**
- **For this reason alone no new nuclear power stations should be built on coastal locations.**

Conclusion

Over recent months it has become evident beyond any reasonable doubt that the Government's nuclear ambitions, if not its whole strategy, have been fatally undermined. The premises on which EN-6 were based, the need for nuclear, the attraction of foreign investors have disappeared with the availability of cheaper alternatives and the high risks of nuclear investment. The availability of sites has not been a significant issue except at local level. There is a danger that as sites are withdrawn by default, pressure will mount to secure development at those sites where potential developers are still active. In practical terms that means Sizewell and Bradwell, two sites on the fragile east coast where long term viability must be in

serious doubt. Any pressure by government or foreign (Chinese and French) interests to ensure these sites are redesignated must be firmly resisted. The wise course would be to acknowledge the sites are unsatisfactory and to halt the process for a new national policy statement for nuclear power forthwith. Therefore,

In light of the diminished need for nuclear energy, the impacts of climate change on coastal sites and the long time-scales involved, the programme of new nuclear power stations should be abandoned.

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