Nuclear Free Local Authorities

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Model response to the Sizewell C – Stage 2 Pre-Application Local Consultation

i. Overview of Policy Briefing

This edition of New Nuclear Monitor provides the NFLA response to the second stage of local consultation by EDF on developing a new EPR nuclear reactor for the Sizewell site in Suffolk. These local consultations are part of the development process for new nuclear power stations. There will be a final third stage of local consultation before the project is taken into the national infrastructure planning process and links in with the National Policy Statement on Nuclear Power Generation. This stage of local consultation closes on ***February 3rd 2017***. The NFLA Secretariat is content for its member authorities to use this response for their own purposes and it will go on the NFLA website.

Comments can be sent to:

The EDF Sizewell C consultation response page - http://www.info@sizewellc.co.uk

Or post to: **FREEPOST SZC Consultation** (no stamp or further address required).

1. Introduction

> **Professor Keith Barnham** author of "The Burning Answer" proposes "*a two-pronged investment programme … cancel the subsidy for new nuclear reactors … Part of the savings could be used to boost renewables; they can generate more electric power and jobs … more quickly and cheaply than nuclear. The remainder of the savings could create new jobs … to boost its vital work in finding a safe, secure and politically acceptable solution to the nuclear waste problem.*" (1)

In the pre-consultation document EDF Energy says that future consultations will include preliminary environmental information (PEI), including the findings of initial impact assessments. According to the Department for Communities and Local Government:

"*Where alternative approaches to development have been considered, the Environmental Statement should include an outline of the main alternatives studied and the main reasons for the choice made, taking into account the environmental effects*". (2)

The Department for Communities and Local Government's '*Environmental Impact Assessment: Guide to procedures'* states that:

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"It should be noted that developers are now required to include in the environmental statement an outline of the main alternative approaches to the proposed development that they may have considered, and the main reasons for their choice. It is widely regarded as good practice to consider alternatives…" (3)

It is our view that a key part of the environmental impact assessment process should be an assessment of the 'likely significant effects on the environment' of 'reasonable alternatives'. Given that the National Policy Statement on Energy is now completely out of date NFLA believes that EDF Energy should carry out a thorough assessment of the alternatives to building Sizewell C, and include this assessment in the next stage of public consultation.

2. National Policy Statement for Energy Generation is out of date

The Overarching National Policy Statement (NPS) on Energy (July 2011) (4), which said that demand for electricity could double by 2050 because of the "*need to electrify large parts of the industrial and domestic heat and transport sectors"*, is in urgent need of review before any further moves are made towards building Sizewell C.

Total UK electricity demand was about 360TWh in 2014. Despite the fact that the NPS says that this could reach around 720TWh - by 2050, the latest Government scenarios only envisage increases in demand of between 29.6% and 52.9% by 2050 – taking demand to between 467TWh and 550TWh. (5) A nuclear power station of the size of Sizewell C might be expected to produce up to 25TWh of electricity, so clearly with a fall of at least 170TWh in predicted demand in 2050, we don't need Sizewell C.

Britain is consuming ***17% less energy than it was in 1998***, (6) and ***15% less in 2014 than it was in 2000.*** (7) Official projections in 2006 were that today's electricity consumption levels would be more than 25% higher than they currently are. Despite our GDP having increased by 18% over the decade, demand for electricity has consistently fallen year on year, largely due to far more efficient usage. (8)

Germany, which is planning an entirely non-nuclear route, even with the same 2050 objective of an 80% reduction in greenhouse gases, expects electricity demand to be 25% below present levels by 2050 – compared with our doubling – by implementing energy efficiency programmes. (9) If, instead of planning for increases in electricity demand by 2050, the UK Government was planning for a reduction of 25%, as in Germany, then the capacity required by 2025 would fall by around 15%, removing the need for new reactors.

And there appears to be plenty of opportunity in the UK to continue reducing energy demand. The Government's own Energy Efficiency Strategy says 196TWh could be saved by in 2020, equivalent to 22 power stations (or 8 nuclear stations the size of Sizewell C) (10) There are 100 TWh of electricity savings available for which there are currently no plans to capture which are detailed in a report for the Government by McKinsey. (11) A crash programme just on lighting efficiency which replaced all the lights in the UK with LEDs could cut peak electricity demand by about 8GW, a saving of about 15% of all power consumption. (12) These are the kinds of cost effective efficiency improvements which drove consultancy Utilitywise to describe Hinkley Point C as an "*unnecessary expense*". In fact energy efficiency improvements could save £12 billion compared to the cost of building Hinkley Point C. (13)

There are good reasons why in the UK there is benefit in using investment in energy efficiency as a vehicle to stimulate the economy – the macroeconomic benefits of public energy efficiency programmes have been illustrated by economists time and time again. For instance, Verco and Cambridge Econometrics estimate that if delivered as part of a major infrastructure investment programme for £1 invested by government £3.20 is returned through increased GDP resulting in increased employment of up to 108,000 net jobs per annum. A recent study by Frontier Economics calculates that an energy efficiency infrastructure programme could generate £8.7 billion of net benefits to the economy. We know from the German KfW loan scheme that public subsidies for

energy efficiency are more than offset by the increase in tax revenues and savings in welfare spending due to lower unemployment.

Now is the time to do this in the UK, according to Jan Resnow at the Science Policy Research Unit at Sussex University. The economic uncertainty caused by the Brexit vote will prevail for some time until Britain's new status becomes clearer. At the same time, there will be no energy efficiency programme for the able-to-pay sector after 2017 and funds for fuel poverty alleviation are falling short of what is required to achieve the target. In their and the NFLA's view, the economic evidence is clear – energy efficiency provides a golden opportunity for an economic stimulus in the UK. (14)

3. Cost of Renewables is falling

The other big change since the NPS was published in July 2011 is that the cost of renewable energy has fallen much more quickly than expected. The Government needs to deliver new low carbon generation capacity as cheaply as possible around 150TWh (terawatt hours = 1,000 million kWh) per year of electricity will be needed by 2030 – around half of all current output. All plausible scenarios imply that this can best be achieved by deploying a significantly increased volume of renewable generation – likely to be around 50GW, predominantly from a combination of onshore and offshore wind and solar PV. A recent study by the think-tank E3G shows this would be the cheapest way to deliver it as well even when taking system integration costs into account. (15)

Even the government expects solar and wind power to be cheaper than new nuclear power by the time Hinkley Point C is completed according to its own projections. An unpublished report by the energy department shows that it expects onshore wind power and large-scale solar to cost around £50-75 per megawatt hour of power generated in 2025. New nuclear is anticipated to be around £85-125/MWh. On previous forecasts, made in 2010 and 2013, the two renewable technologies were expected to be more expensive than nuclear or around the same cost. Now the government expects them to be a cheaper option - onshore wind and solar will be significantly better value than all other large scale sources of power in the UK by 2025. (16)

4. Solar Costs

According to the latest data from Bloomberg New Energy Finance (BNEF), *unsubsidized* large-scale solar is beginning to beat not only wind but also coal and natural gas at current prices. As the same begins to apply elsewhere, it will be a turning point in global electricity markets making solar-generated power the cheapest form of electricity generation. (17)

Solar power is expected to be the cheapest form of energy (not just electricity) everywhere in the world by around 2030. Cheap solar panels and advances in storage technology are transforming the world. By 2030 or 2040 solar will be the cheapest way to generate electricity, indeed any form of energy EVERYWHERE. The proportion of global electricity provided by solar is likely to grow from 2% now to at least 50% by 2030. (18) In Britain the dramatic fall in the cost of solar PV has already pushed the cost almost to cost parity with planned gas-fired power stations. And solar farms can be financed at far lower rates of interest than other sources of electricity because they are so reliable and almost maintenance-free – a perfect investment for pension funds. (19)

5. Onshore Wind

In Europe onshore wind has become one of the most competitive sources of new electricity. Mott MacDonald estimated in 2011 that costs would fall to around £52-55/MWh by 2040 compared with £83-90/MWh in 2011. (20) But according to Bloomberg New Energy Finance (BNEF) new onshore windfarms were the cheapest way for a power company to produce electricity in Britain by 2015 with costs dropping to £55/MWh. (21) The trade body, Scottish Renewables, has shown that costs could be cut by a further 20% if government, industry and regulators work together to make sure we can use the latest generation of turbines on suitable sites, reduce grid charges, and deploy energy storage technologies. (22)

6. Offshore wind

The cost of electricity produced by offshore wind turbines has fallen by a third in just four years, according to an analysis, by Dong Energy of Denmark, the world's largest offshore wind company. The average cost during 2015/16 was £97/MWh. In 2012, the industry was asked by the UK Government to reduce prices to £100/MWh within eight years, but the target has been reached in about half that time. The Hinkley Point C guaranteed 'strike price' of £92.50/MWh is at 2012 prices over a period of 35 years. Inflation means this price is worth over £100 today. (23)

In 2016 Dong won a bid to build two wind farms 22 kilometres off the Dutch coast. The company says power will be produced for less than any other offshore scheme to date. It is estimated that when the scheme is fully operational, electricity will cost €72.70 per megawatt hour (MWh) and €87 MWh when transmission costs are included. (24) At the time this was described as the cheapest offshore wind electricity in the world: "*beyond even the most optimistic expectations in the market*." (25) Since then Swedish utility Vattenfall has agreed to build a giant offshore wind farm in Denmark that would sell power for €49.50 per MWh. Vattenfall has broken its own previous record of €60 per MWh.

The UK's cheapest offshore windfarm so far will produce power at roughly £120 per MWh, which is far more than the projects being built in Denmark and the Netherlands. Part of the reason for that is that those governments cover transmission costs, which costs about £25 per MWh. And then to address offshore wind's intermittency, you've got to add another £7.6 per MWh — according to the UK government's top climate advisers - to cover the cost of the 'balancing' the system. (26) So it can be seen that the latest Vattenfall bid is coming in at £75.50/MWh.

7. Energy Storage

The Government argues that the UK needs nuclear to provide non-intermittent, low carbon electricity. It says whether or not the sun is shining or the wind is blowing nuclear will provide a secure base load. (27) In fact, what a renewable system needs is not baseload but flexible back-up which can be turned on and off quickly to provide electricity at peak times when renewables are not producing much.

Michael Liebreich, CEO of Bloomberg New Energy Finance agrees "…*there are plenty of ways of managing intermittency in renewables without resorting to expensive backup power*." (28)

He says renewable energy has clearly achieved the long-awaited goal of grid competitiveness. More than that, in many countries it now undercuts every other source of new generating capacity, sometimes by very considerable margins. "*The old rules were all about locking in cheap base-load power, generally from coal or hydro plants, then supplementing it with more expensive capacity, generally gas, to meet the peaks. The new way of doing things will be about locking in as much locally-available base-cost renewable power as possible, and then supplementing it with more expensive flexible capacity from demand response, storage and gas, and then importing the remaining needs from neighbouring grids*." (29)

There are at least five ways green energy can be balanced:

(1) By using the right mix of renewables intermittency can be reduced – it's about more than just wind and solar;
(2) By increasing grid connections to other countries so that electricity can be imported at peak times when indigenous renewable production is low, and so that surpluses can be exported;
(3) By storing surplus renewable electricity which can be called upon when wind and solar production is low. This can be done by expanding pumped hydro electric storage or by using batteries;
(4) Demand management – using various techniques to reduce demand at peak times;

(5) By calling on combined heat and power stations working in conjunction with heat storage to generate electricity at peak times. (30)

One recent development illustrates the potential role of combined heat and power in balancing variable renewables. An arms-length council-owed district heating company in Gateshead is set to boost its projected life-time income by nearly £1 million after signing up to a power demand-response scheme run by Flextricity based in Edinburgh. The Gateshead District Energy Scheme, which is currently being commissioned, and will be fully operational by mid-2017, has become part of Flexitricity's demand response network netting the company more than £60,000 per year over the next 15 years for smoothing out peaks and troughs in national electricity demand. (31)

Another possible solution to the energy storage problem is Power to Gas (or P2G) which generates hydrogen from surplus renewable energy and then combines it with carbon dioxide to make methane. There is a P2G plant which is already being operated by Audi in Lower Saxony. The CO_2 comes from a neighbouring anaerobic digestion plant. The resultant methane can then either be injected into the gas grid to provide green gas, or it can be used to generate electricity when renewables are not producing sufficient electricity. (32)

According to a report by Energy Brainpool for Greenpeace Energy, surplus wind power could be used in wind-to-gas facilities to produce hydrogen (H_2) and methane (CH_4) which is then fed into the conventional gas distribution system or stored in already existing gas storage facilities and later reconverted into electricity in combined-cycle gas turbine (CCGT) power plants when the need arises. Comparing this system with Hinkley Point C, Energy Brainpool showed that savings of €7.2 billion over 35 years are available. (33)

In the NFLA's view, what the Government should be asking is not "*how are we going to provide baseload power in future*" but what are we going to do with the expensive electricity from nuclear and other centralised power stations when renewables are supplying lots of electricity at very low or zero marginal cost?

A system powered 100% by renewables supported by a backbone of electricity storage, smart grid technology, demand management, energy efficiency, and 21st century technology is feasible now. In fact, not only is it feasible, but strong market and social forces are moving our energy systems in the decentralised direction very rapidly. As Rainier Baake, Germany's minister in charge of the Energiewende, points out, solar and wind have already won the technology race. (34)

Large centralised power stations are fast becoming the dinosaurs of the energy system. If EDF Energy continues to cling to the old large-scale, centralised utility business model which is fast becoming obsolete it will put at risk the very existence of the company.

8. 2nd Stage Sizewell C Consultation – Local Planning Issues

EDF Energy's latest consultation has much that is wrong with it. It is taking place four years after the first consultation - over the Christmas period, just as the first consultation did. NFLA notes that both Suffolk County Council and Suffolk Coastal District Council have been frustrated by the short period of the Stage 2 consultation, which they say made it challenging for the councils to coordinate their response. This could even lead to Council leaders withholding their full backing for Sizewell C because EDF Energy has not done enough work to reassure the public.

Councillors and officials are voicing "deep concerns" over some aspects of the latest consultation and how the impacts of the massive development will be mitigated. There were many areas of concern flagged up during the woefully inadequate 1st stage consultation which should have been addressed in this second consultation, but have not been by EDF. NFLA notes that the consultation document for stage 2 consists of 321 pages, but the bulk of the document contains the same information as the stage 1 document. Questions raised by many respondents during stage 1 have simply not been answered. Originally EDF's intention was to have only 2 stages of consultation before applying to build the new reactors, but NFLA now learns there will be a stage 3

consultation. In the NFLA's view, this consultation appears to have been called simply because EDF felt it needed to do something because it had been so long since the first consultation.

Suffolk County Council and Suffolk Coastal District Council describe the Stage 2 Consultation document as "*disappointing in that it fails to recognise or truly acknowledge the environmental challenge that development at this site faces, nor the likelihood of residual impacts in a number of areas*". The Councils say there is a "lack of information" on a range of vital issues, including traffic and transport, the environment, and design of the plant. They say it is unclear how social and economic benefits will be delivered to communities, and some areas of concern have not been covered at all. Councillors are not yet fully convinced that the benefits of EDF's proposals outweigh the impacts on the community.

The two local Councils say: "*Some environmental issues are hardly covered at all, for example – some ecological surveys appear to have been overlooked. There needs to be further significant work to seek to survey, understand, quantify and qualify these impacts*." Though these Councils are not in the NFLA, it shares these and other related environmental concerns.

NFLA notes that, at Hinkley Point C, EDF is spending £92million on compensation and mitigation – just 0.6% of the total cost of the project – but as yet the benefits from Sizewell C have not been costed, despite two consultations.

The two local councils say: "*Sizewell C is, in comparison with Hinkley Point, a much more complex site with more demanding mitigation requirements for its impacts on the AONB*. [Area of Outstanding Natural Beauty]" Serious concerns are also raised by Suffolk County and Suffolk Coastal District councils over the effects the huge scheme would have on the Suffolk Coast & Heaths Area of Outstanding Natural Beauty (AONB), the economically important tourism that the designated beauty attracts and the area's internationally acknowledged natural habitats and rare and protected wildlife.

Among a wide range of other environmental concerns, the councils say the area of the Sizewell Marshes Site of Special Scientific Interest (SSSI) expected to be permanently lost had increased from 4.6 hectares in Stage 1 to 5.55ha, and some habitat now proposed to be lost was "*much harder to replace*" elsewhere.

Both Suffolk County Council and Suffolk Coastal District Council are urging EDF to allow significantly more time for the Stage 3 consultation, the final stage, given the large amount of material expected to be released at that point. (35)

The Suffolk Preservation Society (SPS) also believes that the project will have major implications for the special qualities of the AONB and a permanent road crossing over the Sizewell Marshes and the workers' campus will destroy the tranquillity and remote character of the area. It believes the construction phase will threaten environmental damage on an unprecedented scale across a wide range of highly sensitive locations. (36)

9. Radioactive waste

The consultation document (summary) states that the EPR design reduces the amount of spent fuel produced. The spent fuel and intermediate level radioactive waste would be kept on-site until a national geological disposal facility becomes available. This is seriously misleading. Spent nuclear waste fuel could be stored in wet storage ponds on-site for 160 years.

The Government says all legacy wastes may not be emplaced until 2130 – 90 years after the GDF is expected to be available. (37). New reactors will use high-burn up fuel which could require up to 100 years of cooling before it can start to be disposed of. (38) So assuming Sizewell C comes on stream around 2030, disposal could not start until 2130 in any case.

The Government and nuclear industry have argued that the volume of waste produced which will be generated by an 18GW new nuclear programme will be small - only approximately 10% of the volume of existing wastes. (39) This implies that the additional amount will not make a significant difference to finding an underground dump for the wastes the UK's nuclear industry has already created. The use of volume as a measure of the impact of radioactive waste is, however, highly misleading.

NFLA notes that volume is not the best measure to use to assess the likely impact of wastes and spent fuel from a new reactor programme, in terms of its management and disposal. New reactors will use so-called 'high burn-up fuel' which will be much more radioactive than the spent fuel produced by existing reactors. So rather than using volume as a yardstick, the amount of radioactivity in the waste – and the space required in a deep geological repository to deal with it - are more appropriate ways of measuring the impact of nuclear waste from new reactors.

Radioactive Waste Management Ltd (RWM) has developed a detailed inventory of radioactive waste for disposal in its proposed geological disposal facility (GDF) which it calls the 'Derived Inventory'. This inventory is subject to uncertainty due to a range of factors such as uncertainty about the life of the AGR reactors and what happens to the UK's plutonium inventory, and, of course proposals for new reactors. (40)

However, NFLA note RWM figures that the radioactivity of waste from existing nuclear facilities is expected to be 4.77 million TBq in 2200. Yet the radioactivity in spent fuel alone from a 16GW new reactor programme is expected to be 19 million TBq. Thus, the radioactivity in spent fuel from a 3.2GW Sizewell would be around 3.8 million TBq – ***roughly equivalent to 80% of the waste from existing facilities.*** (41)

NFLA note that spent fuel could be stored on the Sizewell site for ***up to 140 years*** after the end of power generation (i.e. until around 2225). That means Suffolk could play host to waste with a radioactive content equivalent to 80% of the UK's existing radioactive waste inventory for the next two hundred years.

10. Waste Footprint

Another way of looking at the impact of radioactive waste produced by new reactors is the estimate the area of space required by the wastes if emplaced in a deep geological repository in various different rock types.

The NDA has looked at the repository footprint of a baseline inventory (total waste expected to be created by the existing programme). (42) Using NDA figures this can be compared with the repository footprint of an upper inventory which estimates that the repository footprint for a 16GW new reactor programme (43):-

	Baseline Inventory	**Maximum Inventory**	**Sizewell C responsible for**
High strength rock	5.6km^2	12.3km^2	1.3 km^2
Lower strength rock	10.3km^2	25.0km^2	2.9 km^2
Evaportite	8.8km^2	24.1km^2	3.1 km^2

Table 3: Repository Footprint for Maximum Inventory (which includes a 16GW New Build programme)

Thus, it can be seen that Sizewell C alone could require anywhere between about 20 and 35% of the underground space required by existing waste.

11. Conclusion

It is widely regarded as good practice when carrying out an Environmental Impact Assessment to consider the alternatives to a project. If this were done for Sizewell C, NFLA believe it would be

seen that there are plenty of opportunities to reduce energy demand instead. For instance, a crash programme just on lighting efficiency which replaced all the lights in the UK with LEDs could cut peak electricity demand by about 8GW, a saving of about 15% of all power consumption. The cost of renewable energy has fallen much more quickly than expected with solar, onshore wind and offshore wind now cheaper that nuclear power. And intermittency need not be a problem – there are plenty of ways to manage it.

In addition, NFLA note that a major impact of building Sizewell C will be the production of nuclear waste with a radioactive content equivalent to 80% of the UK's existing radioactive waste inventory. This could require anywhere between 20% and 35% of the underground space required by existing waste in a deep geological disposal facility.

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