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## NFLA Welsh Forum response to the latest round of public consultation on Horizon Nuclear application to develop a new nuclear power station at Wylfa, Anglesey

### i. Overview of Policy Briefing

This Nuclear Free Local Authorities (NFLA) edition of New Nuclear Monitor provides its response to the latest round of public consultation by the developers of a proposed new nuclear reactor at Wylfa, Horizon Nuclear. The response was developed by the NFLA SC Policy Advisor and submitted on behalf of the NFLA Steering Committee on the 24th March. Horizon are undertaking a number of local consultations with the local community and interested parties as they seek to move forward with the application. A separate process of generic design assessment of its reactor design is currently being considered by the Office for Nuclear Regulation, Natural Resources Wales and the Environment Agency.

NFLA has already responded to an earlier public consultation on Wylfa Newydd, which closed on 8th December 2014. That response is available here: http://www.nuclearpolicy.info/docs/nuclearmonitor/NFLA_New_Nuclear_Monitor_No36.pdf

More recently NFLA made a submission to the House of Commons Welsh Affairs Select Committee. That submission is available here: http://www.nuclearpolicy.info/wp/wp-content/uploads/2016/03/NFLA_New_Nuclear_Monitor_No40.pdf

### 1. Focus of NFLA submission

The NFLA submission focuses on the following issues:

1. The need for a new nuclear power station: the Project Update document says Wylfa Newydd would generate 2,700 megawatts of electricity, providing secure low carbon power for around five million homes for decades to come. This submission provides evidence that large centralised power stations are obsolete, and that there are far better ways of providing energy services to five million homes.

2. The ABWR reactor could be just as problematic to build as EDF's EPR technology planned for Hinkley Point. This was the contention in earlier submissions. Here we update the evidence.

3. Radioactive waste: We note that spent fuel could be stored on the site for up to 140 years after the end of power generation. That means Anglesey could play host to waste with a radioactive content equivalent to almost 70% of the UK's existing radioactive waste inventory.

Apart from the third issue – radioactive waste – the NFLA note that none of these issues appear to be covered in the Summary of Pre-Application Consultation Stage One Feedback Document.



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## 2. The need for a new nuclear power station

Because the Government's National Policy Statement (NPS) on Energy has decreed that "new nuclear power should be able to contribute as much as possible to the UK's need for new capacity" and it expects industry to bring forward proposals for around 16GW of new nuclear capacity, the idea of building a nuclear power station at Wylfa is not up for discussion unless there are likely to be "adverse impacts" from this particular development which outweigh the benefits.

The first consultation said "…*the principle of nuclear power generation at the Wylfa NPS Site is settled*."

The NPS was finally published in July 2011, but contained provision for a review should the Secretary of State decide it would be appropriate. In the almost five years since, various real world events and issues have occurred which suggest a complete re-evaluation of it is now required. (1)

For instance, according to a document called 'Nuclear Power: New Evidence' published by Together Against Sizewell C (TASC) there was no assessment of the potential for energy efficiency and energy saving before the NPS was published which the government itself says is the cheapest and most cost effective way of delivering its energy policy objectives. (2)

More importantly the NPS is based on the premise that electricity demand is likely to double by 2050 thus requiring new nuclear power stations. But the latest information from DECC itself suggests otherwise. Circumstances have changed radically since 2010 and the four latest government scenarios suggest increases in demand will only be around 29.6% to 52.9%.

TASC has drawn up eight non-nuclear pathways, using DECC's model, all of which are cheaper than the cheapest of the four Government scenarios. The total savings to the UK economy could be very large indeed. A non-nuclear, more demand-side-led energy policy would save money and more successfully achieve other government energy policy objective. In fact new nuclear power stations will hamper the achievement of government energy policy objectives.

The non-nuclear pathways rely on less imported energy, than the government's proposed pathways, they achieve a greater diversity of energy supply and more successfully balance supply and demand of electricity at peak times and in cold, windless weather than the government's proposed pathways.
In short non-nuclear pathways ensure warmer homes at less cost. They will rely on less fossil fuel than the nuclear pathways and provide a cleaner atmosphere.

Energy efficiency is increasingly being recognised as profitable without the kind of subsidies offered to new nuclear reactors and capable of delivering multiple other non-energy benefits such as better productivity, job creation, reduced fuel poverty and improved public health. A recent report from the United National Environment Programme (UNEP) shows that the potential for energy policy to increase energy efficiency in industry alone is massive. (3)

Another report from the University of Cambridge says that 73% of energy used in industry could be saved using currently available technical know-how and technology. (4) Up to 25% of energy used in industry could be saved without major capital expenditure or changes to business practices. As such, NFLA believes there is a large scope to save energy and avoid building new nuclear power stations altogether. (5)

## 3. Large centralised power stations are obsolete

A main argument used to justify the need for new nuclear reactors is that it's the only low carbon power source that can supply 'reliable, baseload electricity'. But not only can renewables supply baseload power, they can do something far more valuable: supply power flexibly according to demand. Now nuclear power really is redundant. (6)

The heads of both the UK's (7) and China's (8) national grids have said, the era of baseload generation may rapidly be coming to an end, which makes the government's plan to secure 19GW (16GW + Bradwell B) of baseload nuclear electricity until 2085 suspect at best.

Michael Liebreich, CEO of Bloomberg New Energy Finance says: "…*there are plenty of ways of managing intermittency in renewables without resorting to expensive backup power*." (9) In fact, the more we look at how technology and energy markets are likely to develop over the next decade or so, the more we can see that in reality the idea of 'baseload' power is fast becoming obsolete.

Variable renewables combined with stronger grids, energy storage and responsive demand can do a better job for less money. The old grid, beholden to massive, polluting baseload power plants, is being replaced by a nimbler, high-tech 21st century system oriented toward variable renewable energy. A grid based on smaller, distributed variable power sources can be just as reliable, and even more resilient and secure, than a grid reliant on baseload power. (10)

According to UBS Bank "*Large-scale power generation … will be the dinosaur of the future energy system: Too big, too inflexible, not even relevant for backup power in the long run*." Centralised power stations could be obsolete within 10 to 20 years. (11) And HSBC Bank predicts that conventional generators will be the biggest losers from an upcoming energy storage boom. (12)

What an energy system with an increasing proportion of renewable capacity needs is not large baseload power stations, but flexible back-up which can be turned on and off quickly to provide electricity at peak times when renewables are not producing much. (13) Large baseload power stations, such as nuclear and large coal-fired power stations are not flexible because they are hard to turn on and off – they need to operate continuously 24/7. (14)

In fact building more baseload power stations undermines renewable energy by limiting the proportion of demand it can provide. During peak times when renewables are supplying lots of electricity, some of that power is likely to go to waste because the baseload power stations can't be turned off. There is also a tendency amongst centralised utilities to think they need to provide fossil fuel power stations which can be turned on quickly to provide power when renewables aren't operating, limiting our ability to move to cut out fossil fuels altogether. So old fashioned baseload plants are not merely a problem, they are an obstruction - preventing us moving to a more sustainable system based on 100% renewables.

NFLA believe 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. (15)

## 4. ABWRs – one of the least reliable reactor-types in the world

According to World Nuclear News (WNN) there are four operable Advanced Boiling Water Reactors (ABWR) in Japan while two more are under construction (Ohma and Shimane 3). Another two are being built in Taiwan and two planned for Lithuania, although another two have been shelved in the USA. The design is already licensed in Japan and the USA. WNN points out, disturbingly that ABWRs can run on a full core of mixed oxide (MOX) nuclear fuel, raising the prospect of armed plutonium shipments travelling from Sellafield to Anglesey and Gloucestershire. (16)

New Civil Engineer says the four Japanese ABWRs were built to time and budget. (17) But none of these have had an energy availability factor (EAF) above 50% for the period 2007 to 2011 (18) An EAF is the amount a plant generates compared to the amount that would be generated if it was operating at full power all of the time. Nuclear power plants are costed on the basis that they will

achieve an EAF of around 80 – 90%. With an EAF of less than 50% any nuclear power project comes out needing twice the power price to be an economic proposition.

This makes the ABWR one of the least reliable reactors in the world.

The ABWR at Longmen in Taiwan is still under construction and is over budget and subject to large delays. There are also serious concerns over the safety of the plant both from the risk of earthquakes and Tsunami as well as poor construction and design. These concerns have given a rise to a large number of people opposing nuclear power in Taiwan with the BBC reporting over 200,000 people taking part in anti-nuclear protests. (19)

| | **Construction Start** | **Commercial Operation** | **Energy Availability Factor EAF % 2007-11** |
|---|---|---|---|
| Hamaoka-5 | July 2000 | Jan 2005 | 49.2% |
| Kashiwazaki – Kariwa-6 | November 1992 | November 1996 | 47.2% |
| Kashiwazaki – Kariwa-7 | July 1993 | July 1997 | 47.9% |
| Shika-2 | August 2001 | March 2006 | 42.7% |

## 5. Radioactive waste

Another argument used to support the construction of new nuclear reactors is that the volume of waste produced will be small, with a 16GW programme producing only approximately 10% of the volume of existing wastes. (20) 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.

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. (21)

However, we can see from 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 2.7GW Wylfa B would be around 3.2 million TBq – roughly equivalent to 67% of the waste from existing facilities.

NFLA note that spent fuel could be stored on the Wylfa site for up to 140 years after the end of power generation (i.e. until around 2225). That means Anglesey could play host to waste with a radioactive content equivalent to almost 70% of the UK's existing radioactive waste inventory for the next two hundred years.

## 6. 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). (22) 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 (23):-

| | **Baseline Inventory** | **Maximum Inventory** | **Wylfa B responsible for** |
|---|---|---|---|
| High strength rock | 5.6km$^2$ | 12.3km$^2$ | 1.1 km$^2$ |
| Lower strength rock | 10.3km$^2$ | 25.0km$^2$ | 2.5 km$^2$ |
| Evaportite | 8.8km$^2$ | 24.1km$^2$ | 2.6 km$^2$ |

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

Thus, it can be seen that Wylfa B alone could require anywhere between about 20 and 30% of the underground space required by existing waste.

## 7. Conclusion

Even the Government no longer expects electricity demand to double by 2050. The expectation now is that it will only increase by around 30-50%. A new National Policy Statement on Energy is urgently required. A non-nuclear, more demand-side-led energy policy would be much cheaper than a new reactor building programme and would achieve other government energy policy objectives much more effectively. There is a large scope to implement extensive energy efficiency savings and avoid building new power stations altogether.

The so far limited experience with the ABWR reactor has shown it to be one of the least reliable reactors in the world.

Horizon's current proposals would see Anglesey playing host for 140 years to the equivalent in terms of radioactivity to around 70% of the waste already created by all of the UK's existing nuclear facilities.

Over the past few years an avalanche of reports from financial and energy analysts have concluded that conventional utility models are no longer fit for purpose. These reports highlight the changes to the old centralised utility model which are expected and the importance of new technologies. They suggest that a smart, energy efficient, renewable and decentralised energy system is likely to emerge in the near future. NFLA argue that Hitachi and Horizon nuclear should give up on Wylfa and Oldbury and adapt their business model to this new paradigm.

## 8. References


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