

Nuclear Free Local Authorities new nuclear monitor



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NFLA Welsh Forum response to the Welsh Affairs Select Committee inquiry into 'The future for nuclear power in Wales'

i. Overview of Policy Briefing

This Nuclear Free Local Authorities (NFLA) edition of New Nuclear Monitor provides its response to the UK Parliament's Welsh Affairs Select Committee inquiry into the 'Future of Nuclear in Wales'. The Committee is examining the construction of Wylfa Newydd, the economic and environmental impact of Wylfa Newydd, the decommissioning of existing nuclear power stations in Wales, the introduction of small modular reactors in Wales, and how the Welsh Government and UK Government are working together on policy in this area.

The inquiry reflects the changing support of the Welsh Government to strongly support new nuclear build in Wales, and mirror its policy with that of the UK Government. The closing date for submissions was the 4th March via the Welsh Affairs Committee website –

<http://www.parliament.uk/business/committees/committees-a-z/commons-select/welsh-affairs-committee/inquiries/parliament-2015/nuclear-power-15-16/>

The Welsh Affairs Committee asked for specific comments on the following:

- Will Wylfa Newydd be built on schedule?
- What will the cost of Wylfa Newydd be and does it represent value for money?
- What is the strike price (the guaranteed price per kilowatt hour for electricity for the owners of Wylfa Newydd) from Wylfa Newydd likely to be and what impact will it have on energy prices in Wales?
- What impact will Wylfa Newydd have on the economy of Anglesey and Wales?
- What will the environmental impact of Wylfa Newydd be?
- How well is the decommissioning of Wylfa and Trawsfynydd being carried out?
- What will the economic impact of the decommissioning of Trawsfynydd be?
- What potential is there for small modular reactors to be built at Trawsfynydd and how will that impact on decommissioning and future planning?
- Are the Welsh Government and UK Government co-ordinating their policy effectively in this area?

Welsh Affairs Select Committee chairman David T.C. Davies MP said of the inquiry:

"The future of nuclear power at the Wylfa site is a perfect microcosm for the many issues surrounding this controversial source of energy, both in Wales and the rest of the United Kingdom. As the old generators are shut down we need to examine how the decommissioning process is carried out and what the environmental impact will be.

This will provide a useful background as we evaluate plans to develop new reactors on the site. As we face a radical rethink of how we provide energy security in a world with reduced capacity for carbon emissions, we will ask if nuclear energy is a good option for Wales. Will it provide value for money for the country and will it help the local economy, both in terms of job creation and providing power to support industry."

35 YEARS AS THE LOCAL GOVERNMENT VOICE ON NUCLEAR ISSUES

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NFLA submission to the Welsh Select Committee inquiry into the future of nuclear power in Wales:

1. Introduction – the key reasons why new nuclear is not required

NFLA has consistently opposed the development of new nuclear reactors in Wales, as well as in England.

There are several reasons as to why NFLA have come to this conclusion, which can be summarised as follows:

- **New nuclear power stations are overly expensive** – the cost of developing new nuclear reactors at Hinkley Point is put now at £24 billion, a 300% increase from the original cost projection 8 years ago. This would make it the most expensive power station ever built in engineering history.
- **New nuclear reactors would divert resources from better ways of tackling climate change** - replacing existing nuclear power stations would displace only around 5% of the UK's carbon dioxide emissions. Such emissions reductions could be made easily, more quickly and much more cost effectively by implementing energy efficiency measures.
- **New nuclear power would generate increased levels of high activity radioactive waste, for which there is currently no long-term solution** - the UK's radioactive waste legacy is very expensive to manage and will be with us for hundreds of thousands of years.
- **Nuclear power is overly risky** – a study by American academics Wheatley, Sovacool and Sornette published in the journal 'Physics and Society' analyses 174 nuclear accidents around the world between 1946 and 2014 that resulted in the loss of human life and / or cost more than US \$50,000 of property damage. Based on their statistical calculations, the authors estimate a 50% chance of a Fukushima event (or larger) in the next 50 years, a Chernobyl event (or larger) in the next 27 years, and a Three Mile Island event (or larger) in the next 10 years. The authors argue that statistical or empirical analyses of nuclear accidents have "almost universally" found that probabilistic risk assessment (PRAs) in the nuclear industry "dramatically underestimates the risk of accidents". They also point to research demonstrating that PRAs are "fraught with unrealistic assumptions, severely underestimating the probability of accidents".
- **Studies suggest exposure to low level radiation from nuclear power stations can have an effect in human health** - NFLA notes that there have been over 60 scientific studies carried out around the world on increased childhood cancers near nuclear facilities. Most of these have found cancer increases. The findings of all these studies have been discussed by Dr Ian Fairlie and Dr Alfred Körblein who concluded that "*the copious evidence indicating increased leukaemia rates near nuclear facilities, specifically in young children, is quite convincing, at least to independent observers.*"
- **New nuclear power stations are not needed** - There are several scenarios which demonstrate that the 80% reduction in carbon dioxide emissions (compared with 1990 levels) needed in the UK by 2050 can come from renewables, with a combination of wind, wave, tidal, hydro, photovoltaic and biomass supplying nearly all UK electricity. Energy battery storage and energy conservation could play a crucial part in tempering demand and this would require acceptable changes in travel behaviour, a greater take-up of home insulation, widespread use of LED lighting, and other changes in energy use. Localised power systems, including combined heat and power, will help to avoid wasting the output from power systems. (Ref 1 -3)

2. Can Wylfa Newydd be built on schedule?

The current experience by which EDF is trying to deliver just a final investment decision for Hinkley Point C is indicative of how difficult it will be to build a new nuclear power station at Wylfa to a reasonably short schedule. EDF Chief Executive Vincent de Rivaz confidently asserted in 2008 that Hinkley Point C will be powering our Christmas dinners in 2017, and yet construction has not even started in 2016. (4) This is due to many factors, but key amongst them is the delays to building similar new nuclear reactors at Olkiluoto in Finland and Flamanville in France, which are already many years behind schedule due to the complexity of the construction process. (5)

In terms of the ABWR (Advanced Boiler Water Reactor) technology being planned by Horizon for Wylfa Newydd, increasing evidence suggests it could be just as problematic to build as EDF's technology planned for Hinkley Point. Though the journal 'New Civil Engineer' noted there were four ABWRs which had been in operation in Japan, built largely to time and budget, there were key failings with them. (19) None of these reactors had a capacity factor (before they were closed down after the Fukushima disaster) above 73%, and two had capacity factors of less than 40%. A capacity factor 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 capacity factors of 80-90 per cent. With a capacity factor of 40 per cent any nuclear power project comes out needing twice the power price to be an economic proposition.

Reactor	Started construction	Commercial Operation	Capacity Factor
Kashiwazaki-Kariwa-6	3rd November 1992	7th November 1996	69.7%
Kashiwazaki-Kariwa-7	1st July 1993	2nd July 1997	63.8%
Hamaoka-5	12th July 2000	18th Jan 2005	38.7%
Shika-2	20th August 2001	15th March 2006	37.9%

In Japan, two further ABWRs – Shimane-3 and Ohma-1 - had started construction when the Fukushima crisis happened, so construction has been suspended on them. Nine other proposed ABWRs in Japan have had to be deferred or suspended.

There were two 1350 MWe Advanced Boiling Water Reactors under construction at Lungmen, near Taipei. Construction began in 1999 with the intention of starting operation in 2004, but due to various problems, both political and technical, neither reactor has opened. In April 2014, after 15 years, unit 1 was mothballed and unit 2 was cancelled.

Plans to build two Toshiba ABWRs in South Texas are at the centre of a dispute over foreign ownership, and their prospects look poor. (6)

In the NFLA's view it is therefore important to note to the Welsh Affairs Committee that **there are no ABWR reactors operating currently anywhere in the world.** The previous efficiency of those that had been built in Japan also does not engender confidence in the ABWR design.

3. What will be the financial cost of Wylfa Newydd will be and does it represent value for money? What is the strike price (the guaranteed price per kilowatt hour for electricity for the owners of Wylfa Newydd) from Wylfa Newydd likely to be and what impact will it have on energy prices in Wales?

NFLA notes that the UK Government has previously guaranteed EDF would be able to sell its nuclear power from Hinkley Point C at a strike price of £89.50 per MWh (assuming that Sizewell C is also built), which compares to a current wholesale power price of around £50 per MWh. The £89.50 is in 2012 money: and will be inflated by the Consumer Price Index (CPI). Assuming CPI inflation averages 2.5 per cent over the next decade, the price ABWRs might expect at opening for their output would be around £121 - £130 per MWh. the indexing continues throughout the 35 years of the contract. So by 2030 the guaranteed price would be about £150 per MWh.

NFLA note that Amory Lovins, Chief Scientist at the Colorado-based Rocky Mountain Institute says "*Britain's plan for a fleet of new nuclear power stations is ... economically daft.*" The guaranteed price is over seven times the unsubsidised price of new wind in the US, four or five times the unsubsidised price of new solar power in the US. Nuclear prices only go up. Renewable energy prices come down. There is absolutely no business case for nuclear.

As NFLA sees it, the real problem lies with the UK Government's Levy Control Framework, which sets annual limits on the overall costs of levy funded policies. Levy funded policies include the Renewables Obligation (RO), small scale Feed-in Tariffs (ss-FIT), Investment Contracts for Final Investment Decisions Enabling for Renewables (FIDeR) and Contracts for Difference (CfDs). This means that the total pot of money available to fund subsidies to low carbon energy is limited. Forecast expenditure in 2018/19, for example is £6.45bn but only £2.9bn will be available for new entrants. It is not yet known how much money will be available for levies in the years that ABWRs open, but it is clear that the allocated funds could very easily be used up by new nuclear reactors pushing out renewables, even if they are cheaper. (7)

This table provides some comparative costs of the proposed Wylfa Newydd ABWR reactor with renewable energy alternatives:

Alternatives to ABWRs	Relative to the nuclear strike price etc.	Cost	Capacity/generation (for comparison Hinkley C = 3.2GW and up to 25TWh/yr)	Reference
Interconnector with Iceland	Cheaper	£4bn	1.2GW	Sunday Times 16 th Feb 2014 http://tinyurl.com/oty5gju
Large-scale PV	EMR Delivery Plan suggests only 2.4 - 4GW by 2020	Cheaper than nuclear	30TWh for commercial roofs; 190TWh for solar farms	Solar Portal 20 th Dec 2013 http://tinyurl.com/m88l8dc
Domestic PV	Roll-out faster and less risky than nuclear	Cheaper than nuclear	22 – 140TWh/yr	Solar Portal 20 th Dec 2013 http://tinyurl.com/m88l8dc
Offshore Wind	Strike Price for 15 years rather than 35 years for nuclear	Down to perhaps £85/MWh by 2020 or soon after	195TWh/yr by 2030	A Plan for Clean British Energy FoE Sept 2012 http://tinyurl.com/mcdsb9t
Domestic Energy Efficiency	Helps keep domestic fuel costs low, unlike nuclear		~40TWh/yr by 2030	See Energy Price Freeze, NuClear News No.58 Jan 2014 http://tinyurl.com/p8krake
Overall Energy Efficiency	Helps keep business competitive with cheaper energy costs, unlike nuclear	140TWh/y at negative cost	155TWh/yr	McKinsey Report July 2012 http://tinyurl.com/ofx5gu2

Such comparisons highlight that, whilst nuclear costs continue to spiral upwards, renewable energy prices are continuing to have a downward cost trajectory. NFLA see little evidence that Wylfa Newydd will be able to produce a significantly cheaper strike price than Hinkley Point. Renewable energy and energy efficiency are much better value-for-money.

4. What impact will Wylfa Newydd have on the economy of Anglesey and Wales?

NFLA notes that Horizon, the company that plans to build Wylfa Newydd, have said previously that the project will create significant medium and long term employment in North-West Wales and inject many million pounds per year into the local economy. It claims up to 1,000 permanent jobs and approximately 1,000 additional jobs could be created during periods of outage for maintenance, presenting opportunities to draw on the experienced local skills base. Several thousand construction workers would be required, and numbers could reach 8,500 during peak periods (but would be around 4,000 most of the time). There would also be considerable additional opportunities generated for supporting businesses, such as catering, facilities management and logistics.

The population of Anglesey is around 70,000 and around three quarters of them are Welsh speakers. So the equivalent of up to 6% of the population is likely to come mostly from outside of the area for a seven year period 2017-25, and up to 12% will come from outside of the area at the peak of construction. This is likely to have a detrimental impact on critical issues like the availability of housing and the cost of rents.

In the long term, the Wylfa Newydd Project says it would also contribute to the Isle of Anglesey County Council's (IACC's) aspiration to create "*a world-renowned centre of excellence for the production, demonstration and servicing of low carbon energy*".

NFLA notes that until 1996 Anglesey was a District in the County of Gwynedd. In September 1986 the Gwynedd Planning Officer published a report entitled "*The Impact of a Power Station on Gwynedd*". This report looked at evidence from the four big construction projects in the County around that time: Trawsfynydd (1959-63) and Wylfa (1963 -69) – both nuclear power stations - Anglesey Aluminium Smelter (1969 – 71) and the Dinorwig Pumped Storage Scheme (1974-80). He observed that while these projects were in place local unemployment only dropped a little.

"...The completion of the large scale construction schemes in the County has often been followed by a rapid rise in unemployment ... The situation is much worse in a period of economic depression since it is difficult to create new jobs for local workers and migrant workers tend to stay in the area, adding to the number of unemployed. The pattern of events is well illustrated by the recent employment history in Gwynedd ... Thus, while it is difficult to prove conclusively, the evidence suggests that the long term effect of the major construction schemes in Gwynedd has been to help prevent the growth of employment in more stable industries as a result of the impact of large scale construction projects on low wage levels and labour supply".

In other words past experience suggests that building a new nuclear power station at Wylfa could actually have a detrimental effect on employment and economic development in the long term. Local companies cannot compete with the high wages offered on construction projects, so even if these projects are required to hire as much local labour as possible, rather importing skills from outside, the projects can still have a detrimental effect. High wages on construction projects can hasten the decline of local companies. Perhaps more serious, in an area where a construction project is creaming off skilled and unskilled workers by offering high wages, this will act as a deterrent to new firms moving into the area. (8)

NFLA also recommends that the Committee consult a copy of the People Against Wylfa B (PAWB) 'Manifesto for Sustainable Employment' for the area. This provides a well researched overview of ways to develop the local economy in North West Wales, without recourse to new nuclear reactors. It is available at the following weblink:

<http://stop-wylfa.org/wp/wp-content/uploads/2012/06/Maniffesto-Mon.pdf>

5. What the environmental impact of Wylfa Newydd will be?

The Wylfa Newydd nuclear power station, along with other proposed new reactors, would produce highly radioactive waste and spent fuel with a radioactivity inventory equal to a large proportion of

the radioactivity in all of the UK's existing radioactive wastes put together. Such waste will also remain on site for as long as 160 years after its operation, leaving a dangerous environmental legacy for generations to come.

Despite the nuclear industry and the Welsh and UK Governments repeatedly saying the volume of nuclear waste produced by new reactors will be small - approximately 10% of the volume of existing wastes - the use of volume as a measure of the impact of radioactive waste is 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.

Recent figures from Radioactive Waste Management Ltd, published in July 2015, suggest that waste from the proposed 16GW new reactor programme will be more than quadruple the inventory of radioactivity in the 2010 inventory. The 2.7GW Wylfa Newydd project alone would be a core part of increasing the inventory substantially; the vast majority of which would be of intensely hot and highly radioactive spent fuel.

Another way of looking at the impact of radioactive waste produced by new reactors was presented by the Nuclear Decommissioning Authority (NDA) to the West Cumbria Managing Radioactive Waste Safely Partnership (WCMRSP) in August 2010. (4) The NDA's document considered the proposals to build almost 16GW of new capacity (Hinkley C 3.2GW; Sizewell C 3.2GW; Wylfa Newydd 2.76GW; Oldbury 2.7GW; Moorside 3.6GW). It estimated that the repository footprint for a 16GW new reactor programme could almost triple the repository footprint:

	Baseline Inventory	Maximum Inventory
High strength rock	5.6km ²	12.3km ²
Lower strength rock	10.3km ²	25.0km ²
Evaporite	8.8km ²	24.1km ²

The repository footprint for a maximum inventory including a 16GW New Build programme.

The NDA subsequently said: *“These values seem reasonable as indicative figures at the present time, given the uncertainty over the reactor types that will be used”*. Such figures show the currently proposed new reactor programme would increase the repository footprint by between 120% and 174%. NFLA consider this to be a major environmental and safety burden being placed on the country, which could be avoided by not moving forward with new nuclear build. (9)

The need for safe protection of the environment from large energy projects like Wylfa Newydd has also been considered in the Cumbria area (for Sellafield Moorside) in a report developed by the group Friends of the Earth North Lakes and West Cumbria. NFLA recommends the Select Committee consider its report as a guide for some of the local issues that could affect Wylfa:

http://www.no2nuclearpower.org.uk/wp/wp-content/uploads/2013/06/Towards_Sustainable_Cumbria_210613.pdf

6. What potential is there for small modular reactors to be built at Trawsfynydd and how will it impact on decommissioning and future planning?

NFLA has developed an analysis of the potential for developing small modular reactors (SMRs), given the recent financial support provided by the UK Government for research and development into the technology and the problems being encountered in developing larger-scale nuclear reactor projects.

The full analysis can be found at: <http://www.nuclearpolicy.info/briefings/new-nuclear-monitor-37-small-modular-reactors-the-uks-long-term-nuclear-strategy-and-irelands-future-energy-mix-debate>

In the conclusions of that report, NFLA note that SMRs have been seen as a way to reduce costs and speed up construction by using large-scale standardized manufacturing to churn out dozens, if not hundreds, of identical plants, each of which would ultimately produce cheaper kilowatt-hours than large one-off designs. However, there first needs to be built a massive supply chain. Money for that would presumably come from customer orders - if there were any. The problem is it appears that no one in the international energy market actually wants to buy one at present.

NFLA notes that the former CoRWM Chair, Professor Gordon Mackerron, has written that no SMR (properly defined) has yet been commercialised anywhere in the world, and work on them has been waning because the developers cannot find a market. This is unsurprising as their cost per unit of output is higher than the already expensive conventional, larger reactors, unless hundreds can be sold to give manufacturing economies. Mackerron also says it is unlikely to expect a significant contribution from SMRs before 2050.

None of the designs, including the most credible, which are based on scaled-down versions of currently deployed PWR technology, is yet ready. The National Nuclear Laboratory speaks of 'detailed technical challenges' not yet resolved. It is therefore no surprise that no company has yet to build a single SMR, let alone made a commitment to building the large numbers that would be needed to make the economic case remotely credible. And the safety licensing process that will need to follow design completion would, according to the Chief UK Nuclear Inspector, take up to 6 years in the UK.

The cost of SMRs is essentially unknowable at the moment, but there is evidence to suggest they could be even more expensive than existing reactors. Despite this the NNL have suggested two scenarios - 'niche' and 'parity' (of cost). It concludes that the world market could be only just over 5 GW in 2035 in its 'niche' scenario but 65-85GW in 'parity'. It then suggests a potential UK market of between 7GW and 21GW by 2035. Professor Mackerron says this latter number is frankly not credible under any conceivable circumstances. These hoped-for UK markets are also linked to the idea that the UK could become a major technological player in SMR technology, a view that seems unlikely, given that all significant SMR development to date has been outside of the UK.

What is most worrying to the NFLA about such future nuclear scenarios is that the UK Government (and the Welsh Government as well) is failing to develop alternative non-nuclear scenarios to replace them if the project is unachievable, which NFLA believe is likely to be the case. In the NFLA's view, the political will of both the UK and Welsh Governments should be focused on developing such non-nuclear scenarios.

7. How well is the Welsh Government and UK Government co-ordinating their policy in this area?

The relatively recent change of Welsh Government policy to support new nuclear build – after previously taking a neutral stance on nuclear power – was criticised at the time by NFLA. It has been clear in the past few years that the Welsh Government has been aligning its support for nuclear power to mirror UK Government policy, and ignoring the well argued comments of groups like the NFLA. That has been a retrograde move.

NFLA suggest the Welsh and UK Governments should seriously consider the quite different policy of the Scottish Government, and also the quite rapid change of energy policy of the German Government, to move away from nuclear power. Given the strongest economy in the European Union is seeking to phase out nuclear power by 2022, the question has to be asked is why the Welsh and UK Government have not understood the key factors coming out of the Fukushima disaster and its aftermath in pursuing new nuclear reactors with such vigour. It is clear that renewable energy is expanding far quicker now than nuclear power around the world, and the

current problems at Hinkley Point show the time has come for a radical reappraisal of both Governments' energy policies.

References

- (1) Detail on the first three and the fifth bullet points can be found in NFLA New Nuclear Monitor 31 http://www.nuclearpolicy.info/docs/nuclearmonitor/NFLA_New_Nuclear_Monitor_No31.pdf
- (2) Detail on nuclear safety can be found in NFLA Policy Briefing 133, Fukushima and nuclear emergency planning, 29th June 2015 [http://www.nuclearpolicy.info/docs/briefings/A247_\(NB133\)_Fukushima_Nuclear_EP_update.pdf](http://www.nuclearpolicy.info/docs/briefings/A247_(NB133)_Fukushima_Nuclear_EP_update.pdf)
- (3) Detail on new nuclear power is not needed can be found in NFLA New Nuclear Monitor 32 http://www.nuclearpolicy.info/docs/nuclearmonitor/NFLA_New_Nuclear_Monitor_No32.pdf
- (4) See, for example, The Spectator, 16th February 2016 <http://blogs.spectator.co.uk/2016/02/another-delay-over-hinkley-point-isnt-a-surprise-but-its-still-a-worry>
- (5) BBC, 27th January 2016 <http://www.bbc.co.uk/news/business-35415187>
- (6) NFLA submission to Horizon's pre-application on Wylfa Newydd, NFLA New Nuclear Monitor 36, October 2014 http://www.nuclearpolicy.info/docs/nuclearmonitor/NFLA_New_Nuclear_Monitor_No36.pdf
- (7) See reference (6).
- (8) See reference (6).
- (9) Paper developed by NFLA Policy Advisor for Stop Hinkley, January 2016 <http://stophinkley.org/PressReleases/ImpactNewReactorProgrammeUK.pdf>