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1. Electricity Demand – will it really double?

In 1974, at the public inquiry into the construction of the Torness nuclear power station, the South of Scotland Electricity Board (SSEB) based their case for building more Advanced Gas-cooled Reactors (AGRs) on a projected 6% per annum compound growth in electricity demand until the end of the 20th Century. Just six years later the predicted annual growth in demand had fallen to 1.75 – 2.4%. Eventually the SSEB gave up the idea of justifying Torness on the basis of rising demand, and admitted the station would likely be commissioned up to 6 years too early. (1)

So, when the current Government says decarbonisation will potentially lead to a doubling or more of electricity demand by 2050, it's not surprising that some energy experts are sceptical.

The Tory vision of a decarbonised future includes approving at least one more large nuclear power station after Hinkley Point C before the next election, but also the possible go-ahead for Rolls Royce's plan to build up to 16 (so-called) Small Modular Reactors (SMRs) by 2050. Boris Johnson seems to think that, despite the climate and biodiversity crisis life can continue as normal. In October he told Sun readers: *"we are going to build back greener without a hair shirt in sight. In years to come we will still be driving cars, flying planes and heating our homes, but our cars will be electric, gliding silently around our cities; our planes will be zero-emission, allowing us to fly guilt-free; and our homes will be heated by cheap, reliable power drawn from the winds over the North Sea."* (2)

Using typical Boris-rhetoric he went on to declare that *"the Greenshirts of the Boiler Police are not going to kick in your door with their sandal-clad feet and seize, at carrot-point, your trusty old combi."* (3)

Yet the Government's Net Zero and Heat and Building Strategies barely mention energy efficiency improvements, despite the fact that we need a homes retrofit programme to tackle fuel poverty, irrespective of the climate crisis. As the *Guardian* points out any *"domestic energy-use policy should contain strict new standards for insulation ... This would have the huge bonus of helping people to reduce bills, at a time when the cost of living is rising and average household incomes are certain to be badly squeezed. Instead, the government has concentrated on a business-friendly package, with the promise of £3.9bn funding to help create 240,000 new jobs. Just last month the government was strongly criticised by the National Audit Office for the shambolic handling of a £1.5bn green homes scheme. But the net zero strategy does not make it clear how such mistakes are to be put right."* (4)

Nor does Boris's vision give any recognition to the fact that electric cars will still cause air pollution problems - they still create particulate emissions from the wear of tyres on the road and from braking, and will continue to be a significant source of PM2.5 emission especially if the average vehicle mass increases to accommodate larger batteries. (5) Electrifying cars will not address traffic jams, urban sprawl and wasted space for parking. Nor does Boris concern himself with the ethical issues raised by cobalt mining which is required to build EVs. (6)



Conventional wisdom seems to be that most of the 38 million vehicles currently on UK roads will be replaced by electric vehicles – and this is presumably partly what is driving the projections of a doubling in electricity demand. Yet the Net Zero Strategy says £2 billion will be invested in cycling and walking, building first hundreds, then thousands of miles of segregated cycle lane and more low-traffic neighbourhoods with the aim that half of all journeys in towns and cities will be cycled or walked by 2030. And £3 billion is to be invested in a National Bus Strategy.

The Government’s Decarbonising Transport Strategy says as more journeys “...are cycled or walked, so the carbon, air quality, noise and congestion benefits will be complemented by significant improvements in public health and wellbeing.”

This begs the question do we really need to plan for a doubling of electricity demand - wouldn't we be better to pro-actively plan to make sure of a different outcome? (see nuClear News No.134). (7)

- Switching to LED lighting in the professional lighting market in the UK & Ireland would generate electricity savings of 16.1 TWh, - over 60% of the output of Hinkley Point C. Lighting used to account for 19% of global power demand. It's now down to 12% and by 2030 it'll be down to 8%. Efficiency and innovation works. (8)

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1. See Torness: From Folly to Fiasco, SCRAM 1983 (Chapter 3)
https://www.no2nuclearpower.org.uk/wp/wp-content/uploads/2020/04/From_Folly_to_Fiasco.pdf
 2. This is more or less what he said in his forward to the Net Zero Strategy
<https://www.gov.uk/government/publications/net-zero-strategy>
 3. The Sun 18th Oct 2021 <https://www.thesun.co.uk/news/16460774/boris-johnson-reassures-sun-readers-climate-change/>
 4. Guardian 19th Oct 2021 <https://www.theguardian.com/commentisfree/2021/oct/19/the-guardian-view-on-the-net-zero-strategy-not-tough-enough>
 5. Telegraph 3rd Nov 2021 <https://www.telegraph.co.uk/news/2021/11/03/net-zero-policies-could-create-new-pollution-risks-warns-royal/> Also see nuClear News No.119
<https://www.no2nuclearpower.org.uk/wp/wp-content/uploads/2019/11/NuClearNewsNo119.pdf>
 6. See nuClear News No.118 <https://www.no2nuclearpower.org.uk/wp/wp-content/uploads/2019/07/NuClearNewsNo118.pdf>
 7. Decarbonising Transport Plan, Department for Transport, July 2021
<https://www.gov.uk/government/publications/transport-decarbonisation-plan>
 8. See <https://www.signify.com/en-gb/our-company/news/press-releases/2021/20211104-signify-calls-on-world-leaders-to-accelerate-transition-to-energy-efficient-connected-led-lighting> and https://twitter.com/James_BG/status/1458153803300196354



2. Heat & Building Strategy Notes

There is very little mention of upgrading the fabric of buildings with a poor energy performance in the Government's Press Release announcing the launch of the Heat and Building Strategy (HBS). (1) One commentator called it a "heat in buildings" strategy rather than a "heat and buildings" strategy. Whilst the HBS does acknowledge that energy efficiency will bring down bills for millions of households and businesses and mentions Government support for low-income households to pay for improvements, (2) there is only £3.9 billion of new funding for decarbonising heat and buildings, including the new £450 million 3-year Boiler Upgrade Scheme. (3) The new money falls far short of the £9.2bn that the Conservative party said it would spend on energy efficiency by 2030 in its 2019 election manifesto. (4)

The £3.9 billion is made up of:

- £450m to support heat pump installations;
- £60m to support heat pump innovation;
- £1.75 billion to upgrade fuel poor homes to EPC Band C by 2030 where reasonably practicable;
- £1.425 billion for the Public Sector Decarbonisation Scheme, with the aim of reducing direct emissions from public sector buildings by 75% by 2037;
- £338m for the Heat Network Transformation Programme.

The headline-grabbing announcement of a £5,000 subsidy for heat pumps distracts us from the lack of investment in insulation and making our homes warmer, according to the New Economics Foundation (NEF). The Foundation estimates that the scale of finance committed by the government in decarbonising our leaky housing stock is less than a quarter of what is actually needed by 2025. NEF has launched a campaign called the Great Homes Upgrade, calling for a programme to retrofit all of the 19m homes below EPC C by 2030. This means a commitment to an additional £11.7bn over the remaining course of this parliament, and the creation of a national retrofit taskforce. (5)

In September, the government was strongly criticised by the National Audit Office for the shambolic handling of a £1.5bn green homes scheme. But the net zero strategy does not make it clear how such mistakes are to be put right. A domestic energy-use policy should contain strict new standards for insulation, as well as mandating the switch from dirty to clean energy. (6)

Climate think tank E3G says there is a major energy-efficiency funding gap which could significantly undermine the U.K.'s ability to cut emissions from housing. (7) The IPPR Think Tank says the Climate Change Committee figures show the UK is only installing 9 per cent of the cavity wall insulation needed by 2028, less than 3 per cent of loft insulation and less than 2 per cent of solid wall insulation. (8)

The Construction Leadership Council, an industry group says upgrading "*the UK's draughty homes to low-carbon standards would cost the government only £5bn within the next four years and would create 100,000 jobs, cut people's energy bills, increase tax revenue and bring tens of billions in economic benefits*". (9)



The HBS says adopting a fabric-first approach is key to ensuring the transition to low-carbon heating is cost-effective and resilient. This means focusing on installing measures that upgrade the building fabric before making changes to the heating system. The Government says it is committed to upgrading as many buildings as possible to higher levels of energy efficiency and flexibility, in a way that will ensure long-term compatibility with low-carbon heating systems, but there is very little in terms of new money to help that happen, and there is no national housing retrofit programme. The Climate Change Committee (CCC) says home-efficiency improvements could more than offset the increase in climate policy costs on people's bills out to 2030. (10)

The Social Housing Decarbonisation Fund will be boosted by a further £800 million over 2022/23 to 2024/25) and the Home Upgrade Grant by £950 million over the same period. which aims to improve the energy performance of low-income households' homes, support low-carbon heat installations, help to reduce fuel poverty and build the green retrofitting sector to benefit all homeowners. (page 19)

The Government says it will drive improvements to poorer performing homes throughout the 2020s, in line with the commitment made in the 1997 Clean Growth Strategy for as many homes as possible to achieve EPC band C by 2035 where cost-effective, practical and affordable, and the commitment to reduce fuel poverty by ensuring as many fuel poor homes in England, as reasonably practicable, achieve a minimum energy efficiency rating of band C by the end of 2030.

The Government has also consulted on driving energy efficiency improvements in the private-rented sector and aims to publish a response before the end of the year. (pp 18-19)

The Government consulted earlier this year on setting a target for mortgage lenders to reach a certain energy efficiency standard – EPC band C – across their portfolio by 2030. Costs would therefore be passed on to new homeowners, who should be able to make their money back through cheaper bills. However, some see the plan as unfair to first time buyers.

Dr Jan Rosenow, director of European programmes at the Regulatory Assistance Project, told *Carbon Brief* that while there is a focus on efficiency measures is “*in the rhetoric*” there are “*no substantive policy announcements in there on energy efficiency that I could pick up*”. Instead, he said the strategy mainly reiterated pre-existing policies. (11)

Heat Pump funding insufficient

The Telegraph reported that in the battle between the Department for Business, Energy and Industrial Strategy (BEIS) and the Treasury, it looks as though the Treasury ultimately won, given that the budget for heat pump grants is only £450m over a three-year period, capped at £5,000, which is only enough for 30,000 per year – a long way from the government's target of installing 600,000 heat pumps each year by 2028. (12) Roger Harrabin of the BBC calls it “*a trifling number that's not remotely high enough to kick-start an entire industry*”. (13)



The strategy reiterates the 600,000 target, but notes that approximately 200,000 of these are expected to be in new-build homes. The CCC, in contrast, recommends that 900,000 heat pumps should be installed by 2028.

Dave Toke, Lecturer in Energy Policy at Aberdeen University, points out that the grant is in fact a cut in the incentives available for heat pumps compared to the existing heat pump support scheme. This is the Renewable Heat Incentive (RHI) under which heat pumps are currently funded. Under the RHI homeowners who install heat pumps receive £1000 each year for seven years – £7000 in all. Although, a lot of people will prefer getting the £5000 upfront, it still represents a cut in low carbon funding. (14)

However, the Government has an ambition to reduce the costs of heat pumps by at least 25-50% by 2025 and towards parity with boilers by 2030, and it hopes to remove distortions in energy prices, heat pumps should be no more expensive to buy and run than existing boilers. Innovation should be able to make them smaller, easier to install and beautiful in design. (15)

Analysis by Octopus Energy's Centre for Net Zero concludes that with the grant scheme available to only 90,000 households in total, the funding would leave significant unmet demand across the UK. Pedro Guertler from E3G found that in order for the government's boiler upgrade scheme to meet its own target of 600,000 heat pump installations, it would need an additional £850m. This figure nearly doubles to £1.65bn if installation rates are to be in line with net-zero. Guertler also found a shortfall in funding for low-income households – which need larger grants of around £10,000, according to his analysis – totalling between £1.5-2.5bn. (16)

Heat Pump Running Costs

Environmental levies that are added to customers' electricity bills, such as the renewables obligation and feed-in-tariffs, act as a disincentive to householders with gas central heating to switch to a heat pump. Nearly a quarter of consumers' electricity bills (23%) are made up of environmental levies. Households switching to heat pumps are currently paying on average £408 more in energy bills compared to running a gas boiler. This situation is recognised in the HBS. Given that heat pumps are around three times more efficient than gas boilers, they will be cheaper to run if each unit of electricity costs less than three times as much as gas – an achievable goal if levies are removed. HBS says the government wants to reduce the cost of electricity and plans to explore ways to “shift or rebalance” energy levies. To this end, the strategy announces the launch of a “fairness and affordability call for evidence” on these options, with the goal of making a decision in 2022.

The problem is that switching the levies to gas bills could unfairly penalise low-income households who are least able to pay to switch to electrical alternatives - adding £65 per year onto bills for poorer families according to The Sun. (17)

Phasing out gas boilers by 2035, maybe?

From 2024 the Government plans to introduce a new market-based mechanism for low carbon heat which would mandate fossil fuel appliance manufacturers to ensure a certain percentage of their sales are heat pumps. The UK-based supply chain and deployment needs to be ramped up



from approximately 35,000 heat pumps a year, to potentially being able to replace all 1.7 million fossil fuel boilers installed every year by the mid-2030s.

Its ambition is to phase out the installation of new natural gas boilers from 2035. Analysis by consultancy Aurora Energy Research highlights the importance of such a target, noting that delaying the phaseout to 2040 could leave a quarter of today's home heat emissions unaddressed by the net-zero deadline in 2050 – “*roughly equivalent to running a 2 gigawatt (GW) coal-fired power station 24 hours a day for the full year*”. Despite the minor controversy around the 2035 target date, it is considerably less ambitious than the CCC's recommendations. The advisers have stated that gas boiler sales should end in the UK by 2033 in residential properties to stay on a pathway for net-zero and that this date should be 2030-33 in commercial properties. (18)

Despite the controversy around the 2035 target, it is considerably less ambitious than the CCC's recommendations who want gas boiler sales to end by 2033 in residential properties to stay on a pathway for net-zero and that this date should be 2030-33 in commercial properties.

The Government's ambition is to build 300,000 new homes a year by the mid-2020s. It will introduce new standards through legislation (such as Building Regulations) to ensure new homes and buildings will be fitted with low-carbon heating and high levels of energy efficiency, by 2025. It will also consult on ending new connections to the gas grid. (page 16)

The future is likely to see a mix of low-carbon technologies used for heating: electrification of heat for buildings using hydronic (air-to-water or ground-to-water) heat pumps, heat networks and potentially switching the natural gas in the grid to low-carbon hydrogen. While there is work to be done to identify the best solutions for different buildings and regions, there are also areas where the solution is clear and we can take decisive, 'no-regrets' action now. No or low regrets' means actions that are cost-effective now and will continue to prove beneficial in future. For example, installing energy efficiency measures reduce consumer bills now, while making buildings warmer and comfier, but have the added benefit of making future installations of low-carbon heating more cost-effective.

Hydrogen

The Government hopes to take major strategic decisions on the role of Hydrogen for heat by 2026. It aims to consult on the case for enabling, or requiring, new natural gas boilers to be easily convertible to use hydrogen ('hydrogen-ready') by 2026. The Government aims to consult on the case for enabling, or requiring, new natural gas boilers to be easily convertible to use hydrogen ('hydrogen-ready') by 2026.

It will support industry to conduct first-of-a-kind 100% hydrogen heating trials, including a neighbourhood trial by 2023 and a village scale trial by 2025.

Pedro Guertler from E3G says while the gas boiler phaseout is “*world leading*”, there is a “*risk*” that without sufficient support for heat pumps the target could end up being met with hydrogen-ready boilers instead. (19)



The Government is engaging with industry and regulators to develop the safety case, technical and cost-effectiveness assessments of blending up to 20% hydrogen (by volume) into the existing gas network. This has the potential to deliver up to 7% emissions reductions from the grid, whilst supporting the development of the UK Hydrogen Economy.

Heat Networks

The Government will continue to provide funding through the Green Heat Network Fund and Heat Networks Investment Project to support current market growth, and develop the heat network zoning approach in England. This is part of a broader Heat Network Transformation Programme, in which it is investing £338 million (over 2022/23 to 2024/25). It will develop regulations to drive decarbonisation and deliver better consumer protections, all as part of a comprehensive transformation programme for heat networks.

The Government intends to start by phasing out the installation of fossil fuel heating systems in properties not connected to the gas grid and is consulting on ending the installation of high-carbon fossil fuels to heat homes that are not connected to the gas grid in England from 2026 and non-domestic buildings not connected to the gas grid from 2024.

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<https://www.gov.uk/government/news/plan-to-drive-down-the-cost-of-clean-heat>
 2. Heat and Building Strategy, BEIS, 19th Oct 2021 page 11
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1026507/heat-buildings-strategy.pdf
 3. UK's Path to Net Zero BEIS Press Release 19th Oct 2021 <https://www.gov.uk/government/news/uks-path-to-net-zero-set-out-in-landmark-strategy>
 4. Carbon Brief 20th Oct 2021 <https://www.carbonbrief.org/in-depth-qa-how-will-the-uks-heat-and-buildings-strategy-help-achieve-net-zero>
 5. New Economics Foundation 24th Sept 2021 <https://neweconomics.org/2021/09/great-homes-upgrade>
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 7. Bloomberg 19th Oct 2021 <https://www.bnnbloomberg.ca/u-k-heat-pump-plan-risks-driving-up-bills-for-drafty-homes-1.1668324>
 8. IPPR 8th Sept 2021 <https://www.ippr.org/blog/on-the-home-front>
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 12. Telegraph 19th October 2021 <https://www.telegraph.co.uk/news/2021/10/19/rush-heat-pumps-hasnt-thought/>
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16. Ibid
17. The Sun 9th June 2021 <https://www.thesun.co.uk/news/politics/15205065/gas-bills-levy-switch-hit-poor/>
18. Carbon Brief 20th Oct 2021 <https://www.carbonbrief.org/in-depth-qa-how-will-the-uks-heat-and-buildings-strategy-help-achieve-net-zero>
19. *ibid*



3. Net Zero Strategy

Since 1990 the UK has reduced its greenhouse gas emissions by 44%, while growing its economy by over 75%. The Net Zero Strategy (NZS) sets a long-term plan to end the UK's domestic contribution to man-made climate change by 2050. Although every study shows that the costs of inaction on climate are far greater, there will, of course, be costs to the investments needed to make this transition happen.

The NZS backs up the Government's target of decarbonising the UK's electricity supplies by 2035, with 40 GW of offshore wind, 1GW of it floating, by 2030. There's also support for hydrogen & for one more large nuclear plant, plus some SMRs.

Business & Energy Secretary Kwasi Kwarteng said *'The policies and spending brought forward in the Net Zero Strategy mean that since the Ten Point Plan we have mobilised over £26bn of government capital investment for the green industrial revolution. Along with regulations, this will support 190,000 jobs by 2025, and 440,000 jobs by 2030, and leverage up to £90 bn of private investment by 2030. This will put us on an ambitious path to meet our Sixth Carbon Budget and our Nationally Determined Contribution, cutting emissions by at least 68% by 2030 on 1990 levels, and reaching net zero by 2050.'*

The Strategy says: *"Renewable energy is now the cheapest source of power across two-thirds of the globe"*. Under the NZS the power system will consist of abundant, cheap British renewables, cutting edge new nuclear power stations, and be underpinned by flexibility including storage, gas with CCS, hydrogen and ensure reliable power is always there at the flick of a switch. The transformation of the power sector will bring high skill, high wage job opportunities right across the UK. Key policies for the Power sector include:

The Government wants to secure a final investment decision on a large-scale nuclear plant by the end of this Parliament, and launch a new £120 million Future Nuclear Enabling Fund, retaining options for future nuclear technologies, including Small Modular Reactors, with a number of potential sites including Wylfa. (1)

Boris Johnson announced £160m for floating offshore wind power projects ahead of the COP26 summit. New floating offshore wind port and factory projects will be able to bid for £160m of Government funding announced. The money will go towards the development of port infrastructure capable of mass-producing floating offshore wind turbines and installing them at sea. (2)

Deployment of new flexibility measures including storage to help smooth out future price spikes.

Plans for hydrogen include support for blue hydrogen with carbon capture and storage as well as green hydrogen made using electrolyzers.

In 2030 the Government will end the sale of new petrol and diesel cars and then in 2035 it will require all new cars and vans to be 100% zero emission at the tailpipe. A £2bn investment aims to enable half of journeys in towns and cities to be cycled or walked by 2030, and £3 billion will



help to create integrated bus networks, more frequent services and bus lanes to speed journeys. There will be significant investment in rail electrification and city rapid transit systems.

On nuclear power, the Government says it is committed to delivering new and advanced nuclear power, including:

- Pursuing large-scale nuclear projects, subject to value for money;
- Legislating for a new financing model for nuclear projects;
- £385 million Advanced Nuclear Fund to enable up to £215 million into Small Modular Reactors;
- £170 million for a R&D programme on Advanced Modular Reactors

The NZS includes illustrative net zero scenarios to explore possible energy and technology solutions in 2050. Three modelled scenarios all reaching net zero by 2050 through the same pace of decarbonisation, demonstrate a range of practical ways in which net zero could feasibly be delivered.

Electricity demand in 2019 was around 346TWh. Scenario 1 – the high electrification scenario – sees this growing to 690TWh and low carbon hydrogen production scaling up to 240TWh by 2050.

Scenario 2 – the high resource scenario - sees low carbon hydrogen generation increasing to around 500TWh. As hydrogen is the main energy source for heating, electricity demand and therefore generation is lower than in scenario 1 at 610TWh.

Scenario 3 – the high innovation scenario - sees electricity and low carbon hydrogen generation requirements in between the two scenarios explored previously, at 670TWh and 330TWh respectively. This scenario makes more optimistic assumptions around carbon capture and aviation, such as the availability of sustainable fuels at scale and zero emission aircraft,

One of the most significant decisions which will affect which pathway is taken will be the decision in 2026 on the role of hydrogen and electrification for heating in buildings. In a scenario where hydrogen has a more significant role in decarbonising heat in buildings, hydrogen demand would increase by 70TWh by 2035 and electricity demand would decrease by 20TWh (due to the high efficiency of heat pumps more hydrogen is required to produce the same amount of heat).

The government says it will take measures to inform investment decisions during the next Parliament on further nuclear projects as we work towards our net zero target. This will include consideration of largescale and advanced nuclear technologies, including Small Modular Reactors (SMRs) and potentially Advanced Modular Reactors (AMRs). It announced a new £120 million Future Nuclear Enabling Fund to provide targeted support in relation to barriers to entry.



It is also providing funding for an SMR design through the £385m Advanced Nuclear Fund and progressing plans for an Advanced Modular Reactor demonstrator in the early 2030s. Whether large- or small-scale projects, there remain a number of possible sites available for these options, including Wylfa in North Wales.

The NZS also mentions the possibility of using nuclear reactors to produce hydrogen.

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 2. iNews 30th Oct 2021 <https://inews.co.uk/news/environment/climate-change-boris-johnson-cop26-160m-floating-offshore-wind-power-g20-rome-1275308>



4. Nuclear Energy Finance Bill

On Wednesday 3rd November, MPs debated the second reading of the Nuclear Energy (Financing) Bill. The Liberal Democrats and the SNP, both put forward an amendment, but neither was accepted for debate by the Speaker.

LibDem Motion: That this House declines to give a Second Reading to the Nuclear Energy (Financing) Bill because there is no economic or environmental case for the construction of any further nuclear stations in the UK; because the Bill does nothing to address concerns about costs around nuclear waste disposal and decommissioning; because the Bill fails to bring forward meaningful reforms to accelerate the deployment of renewable power or the removal of restrictions on solar, wind and the building of more interconnectors to guarantee security of supply; and because it fails to remove barriers to investment in renewables or to support investment and innovation in cutting-edge energy technologies, including tidal and wave power, energy storage, demand response, smart grids and hydrogen.

SNP Motion: This House declines to give a Second Reading to the Nuclear Energy (Financing) Bill because it believes there is no longer a justification for a large nuclear power station to provide base load energy, because large scale nuclear is not compatible as a counter to the intermittency of renewable wind as nuclear stations are too inflexible, because pumped storage hydro should be utilised to provide renewable energy that can be dispatched when required and pumped storage hydro should be supported with a minimum electricity price providing better value to bill payers than funding new nuclear, because wave and tidal technologies should be utilised to provide stable and predictable electricity generation and these technologies should be supported to scale up via the provision of a ring fenced pot of funding within the forthcoming contracts for difference auction, because the net zero pathway will be better advanced by supporting the Scottish Cluster as a fast track Carbon Capture, Utilisation and Storage project given that it includes hydrogen production, direct air capture and carbon storage facilities that will serve the wider UK, and because greater support and investment should be directed towards green hydrogen production and emerging storage technologies; and, as the cost of energy increases, this House calls on the Government to spend more money on energy efficiency measures and targeted support for those who suffer from or are at risk of fuel poverty.

During the debate in the House of Commons, the Minister of State for Business, Energy and Industrial Strategy, Gregg Hands said that we need a new funding model to support the financing of large-scale and advanced nuclear technologies. He said the lack of alternatives to the funding model used for Hinkley Point C has led to the cancellation of recent potential projects, at Wylfa Newydd in Wales and Moorside in Cumbria.

Gregg Hands was introducing the Nuclear Finance Bill as it received its second reading in the House. He said the Bill was intended to get new projects off the ground throughout Great Britain, including, potentially, the Sizewell C project in Suffolk, which is the subject of ongoing



negotiations between EDF and the Government, as well as potential further projects, such as on the Wylfa site in Wales.

“The most important thing to understand about this Bill is that it enables future nuclear projects and a diversity of financing models, with greater access to private sector finance in particular, so that we are less dependent on overseas developers as we go forward.”

“A RAB model allows a company to charge consumers to construct and operate new infrastructure projects. It allows the company’s investors to share some of the project’s construction and operating risks with consumers, overseen by a strong economic regulator. That in turn significantly lowers the cost of capital, which is the main driver of a nuclear project’s cost to consumers.”

“The funding model will require consumers to pay a small amount on their bills during the construction of a nuclear project. These payments from the start of construction will avoid the build-up of interest on loans that would otherwise lead to higher costs to consumers in the future... a project starting construction in 2023 will add only a very small amount to the average dual-fuel household bill during this Parliament—on average less than £1 per month during the full construction phase of the project ... Our analysis has shown that using this funding model for a nuclear project could produce a cost saving for consumers of more than £30 billion, compared with funding projects through a contract for difference.”

“Members will know that the Scottish Government have a different position with regard to new nuclear projects. To be clear: this Bill will not alter the current approval process for new nuclear, nor the responsibilities of the devolved Governments. Nothing in this Bill will change the fact that Scottish Ministers are responsible for approving applications for large-scale onshore electricity-generating stations in Scotland. The steps taken in this Bill will mean that Scottish consumers will benefit from a cheaper, more resilient and lower-carbon electricity system, so it is right that Scottish consumers should contribute towards the construction of new projects.”

Labour’s Alan Whitehead disappointed many when he said: *“At last we have a Bill that might rectify some of that poor performance [of the Tories] over the last 10 years. We need to support the need to finance new nuclear. We will scrutinise this Bill to guarantee fairness for bill payers, including protecting consumers against any potential cost overruns, protecting the poorest households, and scrutinising the balance between public spending and bill payers.”*

The SNPs Energy Spokesperson Alan Brown said: *“...successive Governments seem to have developed a groupthink, following lobbying from the nuclear industry, that somehow nuclear is a prerequisite for our future.”*

He went on to say:

“...it was stated in the letter that the new funding model could potentially save the taxpayer £30 billion to £80 billion. How much money do the Government estimate has been wasted on Hinkley?”

“On costs, we are told that a new deal signed under the proposed new funding model in the Bill will cost consumers only £1 a month during construction, but if we look at a 10-year construction period for Sizewell C, we see that that means that bill payers in 28 million households will pay £3.4



billion before it is operational. That is a further £3.4 billion in expenditure when that money could be better invested elsewhere ... we have been told for five years that Hinkley is good value for money, but now the Government have come back to the House to say that actually that is not the case and they have a new plan for how to deliver nuclear.”

“What else could we do with that amount of money? We could upgrade all homes to energy performance certificate band C. We could have wave and tidal generation. The UK Government are willing to introduce the Bill and commit hundreds of millions of pounds to nuclear—the Budget has £1.7 billion just for developing nuclear to a negotiation stage—but they will not even ringfence £24 million for wave and tidal in pot 2 of the forthcoming contracts for difference auction. The disparity is clear.”

For the Liberal Democrats, Sarah Olney said *“our position is very much that there should not be new nuclear power stations. We need to go further to make sure that we can completely decarbonise our energy sector. We want to support renewables and household and community energy ... there is currently no economic or environmental case for the construction of any further nuclear stations in the UK ... it will take 20 years to build a new nuclear power station, however it is funded. We have very ambitious net zero targets. As the Minister said, we want to be net zero in our power sector by 2030, which is much sooner than in 20 years. We need to move considerably faster than that.”*

She went on to say: *“The current issue with renewables is one of storage, but the technology to address some of the problems is being developed at speed. It is clear that by putting our energies, investment and ingenuity into answering some of the questions in relation to storage in particular, but other things as well, we can achieve net zero much faster through renewables. It would be much more productive to invest in storage solutions than to invest in nuclear power ... We need to do much more to insulate the existing housing stock and to ensure that we have much better building standards for new builds. The Government need to do much more on that.*

She said the Public Accounts Committee report on the green homes grant, which was a total failure, goes into a fair amount of detail as to why. We need to redouble efforts to get Britain’s homes insulated.

On the £30 billion savings the NFLA UK & Ireland Steering Committee Chair Councillor David Blackburn said:

“The Minister is comparing one expensive environmentally unsustainable project with another expensive environmentally unsustainable project. If he really wanted to save consumers’ money he would introduce a National Homes Retrofit Scheme as quickly as possible having learned the lessons from its failed Green Homes Scheme, and introduce a scheme to support flexibility, demand management and smart grids so that we can use more of our cheap, sustainable renewable electricity.”

On Scottish Consumers paying this “nuclear tax” because they “will benefit from a cheaper, more resilient and lower-carbon electricity system,” Scottish NFLA Chair, Cllr. Feargal Dalton said:



“Renewables met 97% of Scotland's electricity demand in 2020. The Scottish electorate has consistently voted for Governments opposed to building new nuclear power stations. With wind and solar now the cheapest forms of electricity Scottish consumers shouldn't have to pay for the Tories' failed energy policies.” (2)

Of course, consumers who have signed up to buy 100% renewable electricity could quite rightly feel aggrieved at having to pay the “nuclear tax” as well.

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1. Hansard 3rd November 2021 [https://hansard.parliament.uk/commons/2021-11-03/debates/B5FFA487-74CE-4197-B8AB-3DA3803F3946/NuclearEnergy\(Financing\)Bill](https://hansard.parliament.uk/commons/2021-11-03/debates/B5FFA487-74CE-4197-B8AB-3DA3803F3946/NuclearEnergy(Financing)Bill)
 2. NFLA 4th Nov 2021 <https://www.nuclearpolicy.info/news/nfla-comments-on-plans-to-impose-a-nuclear-tax-on-consumers-bills/>



5. Rolls Royce's Small Modular Reactors

On 9th November the Government announced that it would back the Rolls-Royce Small Modular Reactor with £210m in funding. Matched by private sector funding of over £250 million, this investment will take forward phase 2 of the Low-Cost Nuclear project to further develop SMR design and take it through the regulatory processes to assess suitability of potential deployment in the UK.

The Government claimed that SMRs have the potential to be less expensive to build than traditional nuclear power plants because of their smaller size, and because the modular nature of the components offers the potential for parts to be produced in dedicated factories and shipped by road to site – reducing construction time and cost. Rolls Royce SMR estimate that each Small Modular Reactor could be capable of powering 1 million homes – equivalent to a city the size of Leeds.

The £210 million grant follows £18 million invested in November 2019, which, according to the Government, has already delivered significant development of the initial design as part of Phase One of the project. (1)

The Rolls Royce SMR design is not exactly small. It was originally conceived as a 440 MW unit, but R-R has found a way of getting 470 MWe out of the core. Each of the proposed 16 reactors is expected to cost around £1.8 billion to £2.2bn and produce power at £40-60/MWh over 60 yrs. (2) Rolls Royce says it has a target cost of £1.8 billion once 5 reactors have been built. (3)

As well as the Government funding, Rolls-Royce has been backed by a consortium of private investors. The creation of the Rolls-Royce Small Modular Reactor (SMR) business was announced following a £195m cash injection from BNF Resources, and Exelon Generation to fund the plans over the next three years. (The *Guardian* suggests Rolls Royce will top this up with £50m of its own money, which gets us to £245m –not quite the 'over £250m' mentioned in the Government Press Release, but it's not clear whether the £50m is extra money or part of the £195m). It is hoped the new company could create up to 40,000 jobs by 2050. The investment by Rolls-Royce Group, and the government will go towards developing Rolls-Royce's SMR design and take it through regulatory processes to assess whether it is suitable to be deployed in the UK. It will also identify sites which will manufacture the reactors' parts and most of the venture's investment is expected to be focused in the north of the UK, where there is existing nuclear expertise. (4)

BNF Resources UK Limited appears to have been created in June and has two significant employees, Nicholas Fallows and Sean Benson. Benson says: "*BNF has an established history of energy market investing and we are proud to be a part of Rolls-Royce SMR in this exciting opportunity. Following reviews of numerous proposals we found that this project, featuring a highly experienced team was the most realistic, affordable and scalable solution for provision of carbon-free baseload and alternative power requirements.*" (5)

It appears that BNF Resources UK Limited is a subsidiary of BNF Capital Limited which was created in 2012 (same address) and is registered in Guernsey. These two people seem to have a



history in Financial Investment. The Perrodo family, which made its fortune from the private oil company Perenco, is behind BNF Resources UK.

Confusingly there has been no mention of the Rolls Royce SMR Consortium which included Assystem, Atkins, BAM Nuttall, Laing O'Rourke, National Nuclear Laboratory (NNL), Jacobs, The Welding Institute (TWI) and Nuclear AMRC, as well as Rolls Royce. The consortium existed in July of this year when Cavendish signed up to work on the SMR. (6) Assystem has since said it will continue to lead on the design of key areas of power plant infrastructure including the turbine island, cooling water island and balance of plant systems, and is expecting to double the size of its SMR team in the next six months. (7) Similarly Nuclear AMRC has said it will work with Rolls-Royce to help prepare critical components for commercial production in the UK. The centre will also support the design of a new UK factory for large SMR components. (8)

Exelon is contributing under an agreement from a year ago to find international markets. (9)

This new funding will help Rolls-Royce start the SMRs on the Generic Design Assessment (GDA) process. (10) In May, the government declared the Generic Design Assessment (GDA) open to advanced nuclear technologies – including SMRs – for the first time. The process allows the nuclear regulators to assess the safety, security and environmental implications of new reactor designs. Rolls-Royce SMR has stated its intention to enter the GDA process shortly. (11) This could take about 5 years. (The GDA process took 5.75 years for the EPR, 7.5 years for the AP1000, 4.75 years for the ABWR, and process for the UK HPR1000 is continuing after 4 years. (12)) According to the Office for Nuclear Regulation (ONR) the GDA on SMRs was expected to have started by now but there have been delays.

Each of the initial run of reactors is expected to have a generation capacity of 470MW, or enough to power the equivalent of 1.3m UK homes, and cost about £2bn on average, well below the price per MW sought by developers of large-scale nuclear reactors. The consortium hopes to build on an initial run of five SMRs, the first of which could go on line by 2031, to create a multibillion-pound stable of 16 SMRs around the country. (13)

This means that if delivered on budget and to engineering specifications, a single SMR would deliver roughly a seventh of the power of Hinkley for less than a twelfth of the price, while using less land. Each power station is said to be the size of two football pitches, (but this is open to question) and can also be used to create hydrogen by splitting water molecules. The company, primarily a jet engine maker, hopes the hydrogen SMRs could produce would accelerate a move to greener aviation.

Rolls-Royce will be seeking more investment for the project to help fund the building of actual SMRs. The government is currently passing legislation that will allow investors to back projects like SMRs using a regulated asset base (RAB) model, which allows them to recoup up-front costs. The government said this would “attract a wider range of private investment into these projects, reducing build costs, consumers’ energy bills and Britain’s reliance on overseas developers for finance.”

Professor MV Ramana, a nuclear policy expert at the University of British Columbia in Canada, cautioned that this would be a new market for Rolls. He said: “*It's the same technology, but the*



set of constraints that you will be dealing with in the electricity sector are very different from submarines." He also said Rolls has some catching up to do against rivals pursuing the same goals. NuScale Power, based in Oregon, received US regulatory approval for its own reactor design last year and could have a plant working by 2026. (14)

Steve Thomas, Emeritus Professor of Energy Policy at Greenwich University said this is a huge risk of public money on a speculative design. By the time we know how much SMRs will cost and whether they are reliable or not, there will be up to 10 reactors being manufactured unless production lines are allowed to sit idle for years waiting until the design is proven enough for new orders to be placed. Realistically the first reactor won't be complete before the mid-2030s at about the time the last fossil fuel will disappear from the generation mix, so it's too little, too late and too expensive.

Chair of the E3Gthink tank, Tom Burke, points out that this is the third or fourth time this programme has been announced in the past year. What it turns out to amount to is an agreement to spend £400m over the next three years which may produce a design for a reactor which may get approved by the regulators and which may find investors willing to pay what will be at least £2billion to build each one and which may be generating electricity which may be competitive with renewables just before the whole of our electricity system has to be decarbonised to meet the PM's target. So, six things have to go right before we might see an SMR somewhere.

As expected, Moorside, Wylfa and Trawsfynydd have all been mentioned as potential sites for an SMR. Tees Valley mayor Ben Houchen also wants Hartlepool to be on the list. (15) Dylan Morgan of PAWB (People Against Wylfa B) said: *"We have an immediate crisis now. Nuclear power is slow, dangerous and extortionately expensive. It will do nothing to address the current energy crisis, neither will it be effective to counter climate change. The UK and Welsh governments should divert resources and support away from wasteful and outdated nuclear power projects towards developing renewable technologies that are much cheaper and can provide faster and more sustainable solutions to the energy crisis and the challenges of climate change."* (16)

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