The Unite the union response to the House of Commons Committee for Energy Security and Net Zero Inquiry: Planning for nuclear energy generation

1. Introduction

1.1. This submission is made by Unite, the UK's largest trade union with over one million members across all sectors of the economy, including manufacturing, financial services, transport, food, agriculture, construction, energy, utilities, information technology, service industries, health, local government and the not-for-profit sector. Unite also organises in the community, enabling those who are not in employment to be part of our union.

1.2. Of particular interest to this inquiry Unite represents almost 40,000 Energy and Utilities workers who amongst other things, are instrumental in the generation, distribution and managing the supply of electricity. Key amongst these individuals are the workers in the nuclear industry, both in the power plants but also refining and producing fuel rods and dismantling and processing spent rods for either the creation of new fuel rods or for storage. Members in this sector are also responsible for the decommissioning of sites to ensure they are returned to the green fields, that they once were before the nuclear industry moved in.

1.3. Unite also represents members in the construction industry who will build and eventually demolish these facilities

2. EN-7 limits

2.1. Since 2022, the UK has found itself in a position where it can no longer provide national energy security as it is highly reliant on imported electricity and natural gas supplies. This was made worse by the programme to force the closure of coal power plants.

2.2. Currently all nuclear plants in the UK, are operating beyond their designed lifespan and will hopefully do so until at least 2032 by which time, with luck, both the Hinkley Point C and Sizewell C will be completed and about to switch on. This plan may be scuppered at any moment of course if a crack or other defect is found in one of the nine remaining reactors or support equipment.

2.3. As highlighted EN-7 is limited to eight sites in England and Wales but there are others which were previously coal fired stations, old nuclear facility locations, etc, which could pay host to a Small Modular Reactor (SMR)[1] which benefit from the grid connections remaining in place[2] and which are far enough away from population centres. Unite would highlight that these locations may require some largescale generation investment, but ultimately, they could reduce the losses from power transmission over long distances.

2.4. SMRs have the advantage of a far smaller footprint, lower cost and faster to build because of their size but equally they also produce less power as a result. There is little point clustering SMR's onto a site that would otherwise have housed a full-sized power station

[1] Please note that the Rolls Royce SMR design could provide 1.5 GW from a SMR station when fully equiped with its full compliment of reactors

[2] National Grid currently has a 15-year waiting list for projects that require new grid connections. There are several old power stations sites that could be converted to SMR Nuclear but many more that have already been lost see Appendix A. This list will inevitably increase in length IF it becomes impractical to convert gas power stations to hydrogen due to the practical differences between hydrogen and natural gas.

as the total base load output would be far less for a greater overall cost. SMR's are also less energy efficient at utilizing the most out of the fuel so there will be more spent fuel rods, containing more underutilised refined nuclear material. While this could theoretically be reprocessed[3] but we have lost that capacity in the UK[4].

2.5. The advantage of SMR's over a full-size station is rapid flexibility to be able to more closely follow the demand from the grid and have the ability to refuel one module while the rest of the station continues to generate power[5]. The other advantage is longevity. As SMR reactors are modular, in theory, they can be added to or replaced over time within the same structure, up to the capacity of the building, while the decommissioning of a large reactor can take decades of careful work to achieve and eventually results in a return to nature.

2.6. One reason the Hinkley Point C plant is delayed by so much has been the need to regain the knowledge of how to build a nuclear station due to the 30-year delay[6]. Added to this have been the number of additional safety requirements that the Hinkley Point station has over the same design of station that have been built and become operational elsewhere[7]. The other reasons include the COVID pandemic and issues relating to Britain's desire to leave the EU and especially Euroatom in 2020. Hopefully none of these disruptive issues will impact a sites construction in the future.

2.7. SMR's still have the same planning and safety hurdles to overcome and hence, while they can be built faster, the designs first need to be poured over and recommendations approved. The advantage of the Hinkley Point C design is that it has already cleared this hurdle and therefore can hopefully proceed through planning far faster. Equally once one design of SMR is built the same lessons learned can be applied and construction time reduced. Equally if the design is not altered, there can be time and costs gained through scale and a reduction in decommissioning[8].

2.8. Unite believe that Wylfa on Anglesey, North Wales is the ideal site for the next Hinkey Point C design restoring the desire of the local community for a return to nuclear generation on the island and the jobs this creates in the process[9]. As can be seen from the list of closed coal fired generation[10], there is a significant need for electricity generation capacity rather than the easy option to convert the brownfield site for housing or industrial use.

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[3] Less than 10% of a spent fuel rod is material that could not be used in energy generation, the rest is left to cool off in ponds where some of the remaining 90% of the rods fuel is consumed. If reprocessed, the result would be a major reduction in nuclear waste and a source of new fuel rods without mining for new material to process.

[4] The spent fuel rod reprocessing facility ceased commercial reprocessing of spent nuclear fuel in 2018 with the closure of the Thermal Oxide Reprocessing Plant (THORP) at Sellafield

[5] A full-sized nuclear station has to go off grid to change its fuel rods but stations like Hinkley Point C and Sizewell C consist of two reactors meaning that this cut in supply is not total as the unaffected station can continue to produce power. An SMR's dependant on design, normally consists of six to eight small reactors the size of an HGV trailer.

[6] There was a 30 year gap between the completion of the last nuclear power station and the start of construction of Hinkley Point C

[7] Flamanville 3 in France and Olkiluoto 3 in Finland are reactors of the same basic design that have already been built and are operational. The UK design has suffered from additional safety design requirements built in before approval was finally given in 2007.

[8] A major reason that decommissioning is as expensive, has been the UK governments tendency not to stick with a single design but instead tinker with the design, often adding new demands each time. This in turn makes the construction and decommissioning more expensive to learn how to cope with each bespoke site.

[9] When the Wylfa Magnox station closed it resulted in the closure of the islands Aluminium smelting plant due to the loss of power supplies to the facility. As a result, the green smelting plant closed while the only other one remained open even though it relied on coal power. The coal power station was later converted to Wood pellets which at point of combustion produces more Greenhouse Gases (GHG) than coal. If Wylfa reopens then, perhaps industry will move back in creating the employment the area needs.

[10] See Appendix A

2.9. If the UK is to become net Zero by 2035 in electrical production, it needs to move away from natural gas-powered generation which currently accounts for up to 70% of our power creation capacity. Unite has doubts over the potential for the conversion of natural gas fuelled combustion stations to hydrogen. This is due to the volume of non-CO_2 GHG and freshwater consumption[11] from the current method of hydrogen liberation[12] and the speed of development and construction of other methods like gas pyrolysis[13].

2.10. Hydrogen transmission over distances is an important issue to overcome, as hydrogen will leach through existing pipes, making them brittle in the process. Additionally, in order to deliver the same volume of energy, at the point of use, the pipes need to become twice the current diameter or the gas pumped at around four times the current pressure[14]. Therefore, unless the gas network is replaced, before 2035, it is unlikely that we can rely on this fuel for electrical generation, by the deadline.

2.11. Demand is increasing by the day as more vehicles use electricity instead of fossil fuels and more homes are converted to heat pumps, not to mention the additional strain from industrial uses. With the grid facing a 15-year delay to connections it is vital that all existing connections are reused.

2.12. Currently, the UK is importing an increasing volume of electricity from Europe and this pathway is leading to ever increasing electricity prices for consumers, both domestic and industrial. This path is unsustainable and hence new power generation is needed to provide energy security and prevent blackouts.

3. Conclusion

3.1. Unite therefore calls for the swift but diligent improvements to the planning proposals and construction of both SMR's and full scale nuclear to meet the growing demand for sustainably produced power[15]. This generation needs to be focused into areas which have lost large scale generation capacity and not focussed into areas which are not as heavily impacted. Unite therefore recommends the use of large-scale plants in places like Wylfa, Bradwell, Oldbury and Sellafield with SMR's used more locally to areas of high demand.

3.2. Unite is concerned that if former power station sites are not retained for power generation, they will be lost to housing and industrial schemes, meaning time will be lost securing grid connectivity. As natural gas facilities close, the move to an SMR should be on the table as an option, especially if there is existing grid connectivity.

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[11] Steam Methyl Reformation requires 2.5 time the volume of fresh water to convert most of the natural gas into hydrogen and CO_2 there are plans to capture and store the CO_2 but currently this is vented to the atmosphere along with any unreacted Methane and other GHG's

[12] Other methods of hydrogen generation make no sense as a standalone method especially if electricity from the grid is used at times when it is not in plentiful supply.

[13] Gas Pyrolysis is where natural gas is heated to a temperature where the molecular bonds of the gas are broken, reducing the gas to its elements (black carbon powder and hydrogen gas) as the process converts all hydrocarbons it leaves no remaining greenhouse gasses to enter the atmosphere and the process is conducted in the absence of Oxygen no CO_2 or NO_X is produced, leaving behind carbon powder that can be used for soil enrichment, the production of graphite, graphene, industrial diamonds and of course carbon fibre.

[14] This is due to the relative low density of hydrogen and low energy density per unit volume. The energy density of natural gas in the UK varies, but a typical value is around 36-38 MJ/m³ (megajoules per cubic meter) compaired to pure Methane 40 MJ/m^3. Hydrogen by way of contrast is 12.7 Mj/m^3. Pumping any gas at four times the pressure through brittle pipes is far from a good idea especially when that gas is hydrogen which has the largest range of explosive concentrations and fastest flame front dispersion of any gas.

[15] The power demands are according to some estimates due to increase by up to ten times by 2050 due to the need to phase out fossil fuels and phase in electric heating, cooking, transport and manufacturing and the growth of the population over time. Initial calculations by Unite suggested an increase in power generation of around 17 times is required when every aspect of the conversion to electricity considered. Unlike fossil fuels for example, a battery will not deliver back all its charge as some will diminish over time.

3.3. Informed decisions need to be made very soon or the energy security of the UK will be at increased risk, and prices destined to climb[16]. In order to ensure that we do not face another 30 year gap and undo the damage caused by 14 years of Tory indecision, there is a need for a minimum of a 5 year rolling programme of replacement fleet stations so that we do not have to extend the lifespan of nuclear stations to twice their design parameters and retain the skills needed in construction, operation and eventual decommissioning. Similarly, when fusion becomes viable at scale reality, the same rolling programme will provide the foundations for a secure energy future.

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[16] Part of the reason for increased costs are the increasing demands from companies using contracts for difference model funding. These demands mean that the government will need to ensure that these providers receive a guaranteed income from their instillation, which therefore bakes in higher energy costs for the UK consumer long into the future.

Appendix A Closed Power Stations from 2005

The below locations were previously nuclear, and coal, oil, gas & biomass fired powerstations listed by closure date.

Energy generation capacity has declined from 2005 from its peak of **395.4 TWh** (= 395,400,000 MWh) to **285 TWh** by 2024 to match demand and in order to become more environmentally conscious of the industries impacted on the climate. During that period the demand for electricity dropped but only to **319 TWh** with the nation making up the shortfall of **33.4 TWh** was imported electricity from Europe, which comes at a premium cost to UK consumers. In 2024 generation fell 3.1% from 2023 levels and net imports were **up 40%** from 2023 levels.

The National Grid needs to build in more capacity to move electrical generation from wind farms onshore connections and onshore wind etc. found in Scotland and solar produced mainly in the south to the rest of the UK. The only way to avoid this is to have far greater degree of decentralised generation capacity.

Station	Type of fuel	Closed	Notes	Site demolished
Sizewell A	Nuclear	2006	**650 MW**	Decommissiong of the Magnox station started in 2006 with the station defuelled by 2014
Dungeness A	Nuclear	2006	**570 MW**	By 2012 the sites two Magnox reactors were defuelled
Roosecote B	Cycle natural Gas Turbine (CCGT)[17] Coal	2012	**229 MW**	2015 First CCGT in the UK starting the dash for gas fired generation. In 2018 Centrica Business Solutions commissioned the **49 MW** Roosecote battery storage facility.
Oldbury	Nuclear	2012	**434 MW** from two Magnox reactors, The station was initially designed for a net capacity of 626 MWe but this was reduced due to cooling issues	Decommissioning commenced in 2013 with all fuel removed by January 2016

[17] CCGT plants use gas furnaces to heat water into steam which drives the turbine. The water is then cooled and returned to the furnace to create more steam, closing the cycle. As there is a delay between turning on the furnaces until it can generate power natural gas may need to be burnt only to turn the turbine so it is ready to fill the gaps in the supply from wind or solar generation.

Station	Type of fuel	Closed	Notes	Site demolished
Kingsnorth Power Station	Coal/Oil/ 10% Biomass mix Next to Damhead Creek 1 Closed currently CCGT producing **805 MW**	2008 finally closing in 2012	**1,974 MW** The site was previously the former World War I Royal Naval airship base RNAS Kingsnorth on the Hoo Peninsula.	2014 - 2018 There are plans to build a Damhead Creek 2 CCGT powerstation on the site which would produce 1000 MW
Grain power station	Oil Then Coal Now a CCGT	2003 2015 open	**1,275 MW** The location is next to the Thames Port facility on the mouth of the river Medway where it empties into the Thames. Due to the proximity to a major gas and oil import facility is isolated from the general public	2016 While most of the site of the coal fired station is now derilict there remains a Combined Heat and Power (CHP) natural gas fired station on the site.
Tilbury B Power Station, Essex	Coal Then Biomass	2011 2013	**1,428 MW** of electricity from the station on the North Shore of the Thames	2016 -2019 The site and its jetty now form part of the Port of Tilbury and used for storage of un-unitised freight
Teesside	CCGT	2013	**1,875 MW** Open Cycle Gas Turbine (OCGT)[18] as the only available machine, leaving the station with an operating capacity of 45 MW	2013-14 This was the largest CCGT plant in Europe
Fawley	Oil	2013	**2,000 MW** from four boilers	Demolition started in 2019 – In 2017 it was announced that the power station site would be turned into a "new

[18] OCGT use the exhaust gasses from the combustion of gas to turn a turbine so are far faster to react to the demand needs of the National Grid. This comes at a price as they are only 30% efficient in turning fuel to electricity.

Station	Type of fuel	Closed	Notes	Site demolished
				town" consisting of 1,500 residential units, commercial and civic space, and a new school but this scheme has now been shelved.
Didcot A Power Station Didcot B	Coal and OCGT	2013	**2,000 MW** The 1.2 km^2 (300 ache) former part of the Ministry of Defence Central Ordnance Depot in Oxfordshire.	2016 to 2020 A large part of this collapsed during demolishion killing 4 workers.
Cockenzie Power Station	Coal	2013	**1,200 MW** Situated on the south shore of the Firth of Forth, between Prestonpans and Cockenzie/Port Seton. Given Scotlands opposition to Nuclear power generation this site is not suitable	2015 The site is being redeveloped, with plans for a CCGT
Uskmouth B Powerstation	Coal	2014	**363 MW** of electricity from Newport Wales	Converted to Biomass
Littlebrook D Power Station	Oil – last to close	2015	**2,055 MW** of electricity south bank of the Thames in Dartford Kent	2015 – 2019 Too close to highly populated area for a large new nuclear site but AGR possible
Ironbridge B	Coal Converted to Biomass but now closed	2015	**1,000 MW** of electricity from Shropshire facility	2017 to 2021 but land sold off for the construction of 1,000 new homes, shops and other buildings
Wylfa	Nuclear	2015	**1,000MW** from two Magnox reactors with the last 490 MW reactor ending production on the isle of Anglesea. The closure caused the closure of the last remaining electrically powered aluminium	Site in the process of decommissioning with the last of the fuel now transferred out to cooling ponds at Sellafield in Cumbria with the last flask transported in 2019.

Station	Type of fuel	Closed	Notes	Site demolished
			smelting plant, leaving the UK to rely on coal fired Aluminium fuelled smelting only While there were discussions over a possible biomass furnace to provide the Aluminium plant with power, this came to nothing	
Rugeley B	Coal	2016	**1,000 MW** of electricity from Staffordshire	2021 The site is planned to be transformed into a low-carbon, mixed-use community featuring 2,300 new homes, a school, employment space, and a country park.
Ferrybridge C	Coal	2016	**2,000 MW** of electricity from North Yorkshire	2018 to 2022 and land sold for a major industrial and employment zone.
Longannet	Coal	2016	**2,400 MW** of electricity from Fife Given Scotlands opposition to Nuclear power generation this site is not suitable	2019 to 2021 Scotland was looking to develop a train building factory but this came to nothing
Lynemouth	Coal	2017	**420 MW** from Northumberland	Converted to Biomass
Eggborough	Coal	2018	**2,000 MW** from North Yorkshire	Replaced by gas fired power station
Cottam	Coal	2019	**2,008 MW** from Nottinghamshire	2019 – ongoing ARUP has plans for the site of a zero-carbon technology and energy hub.
Fiddlers Ferry	Coal	2020	**1,961 MW** from Cheshire Wales	2020 – ongoing The overall plan is to redevelop the 820-acre site, with Peel NRE proposing 4 million

Station	Type of fuel	Closed	Notes	Site demolished
				square feet of industrial space and a residential neighborhood
Aberthaw B	Coal	2020	**1,586 MW** from Vale of Glamorgan	2021 – ongoing Cardiff has plans for it to be a site to support green energy generation
Dungeness B	Nuclear	June 2021	**1,040 MW** Although designed to operate till 2028, the station was taken offline in 2018 for scheduled maintenance but further issues were discovered which were deemed beyond reasonable repair due to technical challenges by owners EDF	2021 – decommissioning ongoing
Drax	Coal Now Biomass	2021	**3,960 MW** Reduced to **2,595 MW**	Converted to Biomass to create the largest Biomass facility in the world.
West Burton A	Coal	2023	**2,000 MW** from Nottinghamshire	2024 – ongoing Site to be used for the prototype fusion energy plant, a project led by the UK Atomic Energy Authority (UKAEA).
Kilroot	Coal	2023	**560 MW** from County Antrim Northern Ireland	2024 – ongoing The site is also earmarked for further development as a wider Kilroot Energy Park.
Radcliffe-on-sour	Coal – last one to close	2024	**2,115 MW** from Plant in Nottinghamshire	2025 ARUP has plans for the site of a zero-carbon technology and energy hub.
Heysham 1	Nuclear	Designed to stop production in 2019 however is not now scheduled to	**1,155 MW** from two Advanced Gas cooled Reactors (AGR's)	

Station	Type of fuel	Closed	Notes	Site demolished
		close until March 2027		
Heysham 2	Nuclear	Designed to stop production in 2023 however is not now scheduled to close until 2028	**1,220 MW** from two AGR's	
Hartlepool	Nuclear	Designed to close production in 2024 however is not now scheduled to close until 2027	**1,180 MW** from two AGR's	
Torness	Nuclear	Designed to close production in 2023 however is not now scheduled to close until 2030	**1,290 MW** from 2 AGR's This is the last Nuclear station in Scotland	Scotlands anti-nuclear policy will prevent a like for like replacement.
Sizewell B	Nuclear	Scheduled to retire in 2035	**1,198 MW** from 1 Pressurised Water Reactor (PWR)	

In addition to the above will be:-

- Any biomass or municipal waste combustion facility that cannot employ a Carbon Capture and Storage solution or a method to deal with the particulates and NO_X that will result from the combustion of the fuel in air to make the station Net Zero by the 2050 deadline.

- Any natural gas fired generation that cannot be converted to hydrogen combustions due to the costs associated with the extraction of the hydrogen, it's delivery, storage and/or the methods to deal with the gallons of fresh water and the volume of NO_X that will result from the gases combustion in air to make a conversion to Net Zero before 2050 a reality.

Appendix B Cost of Imported electricity

The costs in May 2025[19] alone the trade in electricity were as follows:-

Country	Import costs	Export Costs	Net Cost
France	£140 million	£0	£140 million
Norway	£57.4 million	£4.3 million	£53.1 million
Belgium	£22.5 million	£11.6 million	£10.9 million
Netherlands	£15.0 million	£13.9 million	£1.1 million
Denmark	£14.7 million	£5.34 million	£9.36 million
Ireland	£0	£29.3 million	£29.3 million

According to the OEC[20] in the period June 2024 till May 2025 the UK sold £747 million worth of electricity but needed to purchase £3,550 million worth of electricity to meet demand. Irelands had the largest increase in demand on our electrical supplies increasing by £27.1 million and Denmark being the fastest growing source of supplies up £370 million!

These net costs are being passed on to the UK consumer which could otherwise fund new generational capacity.

Sizewell C is estimated to cost £38 billion but once operational, the plant is anticipated to deliver annual savings of £2 billion to the electricity system according to Sizewell C[21] and provide tens of thousands of jobs plus 1,500 apprenticeships. This is something that is desperately needed on Anglesey to help it redevelop its economy and help reduce the need for more energy imports into Wales.

[19] According to the OEC

[20] https://oec.world/en/profile/bilateral-product/electricity/reporter/gbr

[21] According to Sizewell C