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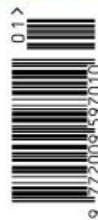
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Does nuclear have a role to play in decarbonising energy?

One zero carbon energy source has historically been vehemently opposed by environmentalists. But can nuclear power overcome the high-profile failures of its past, asks *Dr. Marc O Riain*, or has the technology missed the boat?

We stand in the transition between two energy paradigms; last centuries obsession with oil and gas consumption, and this centuries transition to renewable energy. However, there is an energy gap between the supply of renewable energy and the decommissioning of fossil fuel plants. International exogenous factors, like the war in Ukraine, have created unexpected shortages in energy supply.

The UK and Ireland's main import is natural gas for electricity supply (50 per cent and 57 per cent respectively) and gas is only up to 55 per cent efficient at producing electricity, with coal, peat or biomass having a similar low efficiency with high transformation losses. Electricity generated from wind and hydro is 100 per cent efficient. But the trouble is we don't have enough renewable energy production and we don't have a backstop to buffer the grid as traditional power plants come to the end of life. So, what will fill the gap?

Ireland and the UK achieved 36-38 per cent of total domestic demand from renewables in 2021. In response to COP 26, Ireland and the UK have targeted 80 per cent and 100 per cent renewable delivery of electricity demand by 2030 and 2035, respectively. However, the mass scaling of renewables means that we are taking fossil fuel-based energy stations offline, or not extending their lifespans. Therefore, we have a massive gap to bridge up to 2035.

James Lovelock, the man who postulated the GAIA theory of a self-regulating Earth, argued that nuclear power was a green solution since it was relatively compact, had little or no atmospheric emissions, produces little waste, and is confined and self-degradable; thus, it avoids increasing the greenhouse effect. So why do we have a hang up with using nuclear energy?

Public opinion might have been influenced by a calamity of large nuclear accidents globally which appeared to be covered up by operators and national governments. The Windscale fire in northwest England in 1957 resulted in a 200-mile radius radioactivity contamination which did not respect any national boundaries. The Three Mile Island nuclear accident in 1979 was the worst in US history, resulting in a de-prioritisation of nuclear power generation

in the US. The Sellafield reprocessing plant (formerly Windscale) accidentally discharged 20 tons of uranium and 160 kg of plutonium into the Irish Sea in 2005. But perhaps the worst nuclear accident experienced in Europe was Chernobyl in 1986. The trans-boundary nature of fallout was global in scale and raised huge environmental concerns of the potential catastrophic consequences of a nuclear accident. It is worth remembering that there is a 1,000 square mile exclusion zone as a result of the Chernobyl accident. Consider a similar exclusion zone from a similar accident in Sellafield or nearby at Heysham 1. The UK and Ireland would largely be an exclusion zone for habitation.

“ Since February 2022, the price of domestic oil and electricity has nearly doubled, at 89 per cent and 80 per cent respectively

Is the risk worth it? After the Fukushima Daiichi accident in Japan in 2011, a number of countries made policy decisions to phase out nuclear power because of such risk factors. As a result, in 2019, nuclear power provided only 7.5 per cent of Japan's electricity (down from 33 per cent in the 1960s). Germany, which planned to shut down all nuclear power by 2022, has retained two as a response to the energy crisis in 2022. In total 65 reactors have been shut down worldwide since 2011. Meanwhile in France 69 per cent of the domestic electrical energy demand is met by nuclear power, compared to 21 per cent in the UK and 0 per cent in Ireland. However, both France and the UK's nuclear infrastructure is aging badly. Decommissioning costs for the UK's degrading nuclear facilities is predicted to be €260bn to safely secure the 700,000 cubic metres of radioactive waste, while France's EDF estimates that their decommissioning costs will only be €54bn. The average age of France's 56 nuclear power plants is 37 years meaning a lot are nearing or in extended lifespan. Interestingly, climate change and higher temperatures in France are making it harder to cool nuclear power plants, impacting efficiency and pro-

duction capacity. France has also closed nearly all its gas and coals plants leaving it dependant on Germany for 50 per cent of its imported energy to cover the renewable energy gap. In turn Germany is dependent on Russia.

The war in Ukraine has exposed a worldwide energy deficit. Take out one main provider of natural gas and every country and its people end up paying on the double. Since February 2022, the price of domestic oil and electricity has nearly doubled, at 89 per cent and 80 per cent respectively.

So, were we too hasty to reject nuclear as a clean fuel to support a renewable transition? Or is the technology beset with too many socio economic/environmental risks and too ex-

pensive to decommission to be a valid option? Given the length of time it takes to build a nuclear reactor, or even a small modular reactor, and the shortfall in energy production from existing reactors as they get older, it is unlikely that nuclear energy is the panacea to bridge the renewable energy gap. ■

A fully referenced version of this article is online at www.passivehouseplus.ie

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