



## Supporters of Nuclear Energy

# Newsletter

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### Rehabilitating Nuclear Power

Attitudes are persistent. We do not enjoy reconsidering negative ones or those of long standing. Yet, slowly but ominously developing problems on this overcrowded planet demand that some current attitudes be questioned. To thrive civilisation needs plentiful energy and confidence. However, the most concentrated source of energy is nuclear, but it is not trusted. Why is that, and how might the distrust be overcome?

Energy needs to be affordable, secure and reliable. Gas may be cheap, but for countries, supplied from the Middle East or piped from Russia, security is an issue – and then there is the matter of atmospheric emissions.

Current fashion suggests investing in carbon-free wind, solar and hydro. However, with the very low energy density of these sources the environmental footprint of a useful power station is huge and highly intrusive. The Kentish Flats Offshore Wind Farm delivers only 9MW peak power per square km [1]. Solar arrays, too, assume *droit de seigneur* to desecrate large areas of hillside and meadow. The artificial lake behind a hydro-electric dam is no less destructive, and the use of biofuels, emitting carbon like fossil fuels and commandeering vast areas of land, is negligent. In summary, “renewables” are not “green” – they insult nature.

But nuclear, with a million times the energy density of carbon, is compact [2]. Thirty tonnes of nuclear fuel suffices for one gigawatt-year of energy, compared to two million tonnes of coal. Nuclear ore is widespread and fuel is easily transported and stockpiled. Even a gigawatt plant needs only 15 hectares, and smaller plants, constructed of modules delivered by road, could blend with the landscape less obtrusively than wind or solar.

A nuclear plant is robust with a life of sixty years, three times longer than a wind turbine. Texas nuclear plants delivered full power throughout Hurricane

Harvey. Turbines are not useable in high winds – wind power increases as the cube of wind speed, so a turbine is easily damaged. Solar arrays, too, are vulnerable to extreme weather conditions and the hurricanes of 2017 left fields of trashed panels.

But the stability of the grid is the greatest concern. When the wind does not blow and the sun does not shine, renewables deliver no power. Neither price nor average energy can prevent a supply failure. Such instability is only increased if consumers have been guaranteed a feed-in price. If a technology were available to store excess energy, the deficit might be bridged.

Unfortunately pumped hydro storage is too small by a factor nearly 100, and batteries by nearly 1000. A recent claim [3] that renewable sources, alone, could supply the United States with electricity has been discredited [4]. Even with 80% penetration by renewables the investment in idle back-up provision becomes uncompetitive [5].

This investment is unnecessary, and so is any need for a nuclear plant to ramp up and down rapidly to balance the fluctuating output of renewables. The boot is on the wrong foot. Investment in an all-nuclear supply avoids idle plant [6]. While running steadily, any excess power is switched to desalination or the production of hydrogen suitable as fuel for carbon-free transport. Plants combined with local district heating would be particularly efficient.

Nuclear power is emission-free, reliable and steady. So why the haste to close existing nuclear power stations and the aversion to new nuclear investment?

Public attitudes to nuclear energy and radiation date from the bombs dropped on Japan in 1945. During the Cold War fears of nuclear were exploited for military advantage, and also used as the basis for exciting stories in the media and popular fiction – but never laid to rest through public education. To dampen down public concern in the 1950s, draconian safety regulations were enacted. These had the effect of suggesting huge death tolls from radiation in the accidents at Fukushima and Chernobyl. Actual casualty figures were zero and about fifty, respectively, whereas unwarranted evacuation and rumour killed thousands, and severe social and economic damage followed. [7,2]

A century ago Marie Curie pioneered the use of high doses of radiation for cancer treatment. Everyone should appreciate this connection and adopt a more positive view of nuclear, knowing as they do someone who has

benefited from radiotherapy. For three billion years life has been immersed in natural radiation and has evolved almost complete protection against it. Much is known from laboratory experiments that confirm the broad conclusion that nuclear power is safer than fire [2].

Changing attitudes is not always popular, especially among those whose jobs depend on the *status quo*. But for society to reverse its apprehensive attitude to nuclear technology and accept less draconian radiation regulations with confidence, new investment is needed in public education. Our children should learn how the natural world works including nuclear. They face a challenging road but there is no other.

*Wade Allison, Hon. Sec.*

[1] MacKay *Sustainable Energy without the hot air* (2009) [www.inference.org.uk/sustainable/book/tex/sewtha.pdf](http://www.inference.org.uk/sustainable/book/tex/sewtha.pdf)

[2] Allison [www.nuclear4life.com](http://www.nuclear4life.com) and [www.radiationandreason.com](http://www.radiationandreason.com) the two books together are available for £20 +pp from YPDbooks at <http://www.ypdbooks.com/science-and-technology/1690-wade-allison-special-book-pack-YPD01882.html> or direct from the Secretary.

[3] Jacobson MZ, et al *Low-cost solution to the grid reliability problem with 100% penetration of intermittent wind, water, and solar for all purposes*. (2015) Proc Natl Acad Sci USA 112:15060. [www.pnas.org/content/112/49/15060](http://www.pnas.org/content/112/49/15060)

[4] Clack et al *Evaluation of a proposal for reliable low-cost grid power with 100% wind, water, and solar* (2017) [www.pnas.org/cgi/doi/10.1073/pnas.1610381114](http://www.pnas.org/cgi/doi/10.1073/pnas.1610381114)

[5] Temple *Relying on renewables alone significantly inflates the cost of overhauling energy* (2018) [www.technologyreview.com/s/610366/relying-on-renewables-alone-would-significantly-raise-the-cost-of-overhauling-the-energy/](http://www.technologyreview.com/s/610366/relying-on-renewables-alone-would-significantly-raise-the-cost-of-overhauling-the-energy/)

[6] Partanen *Decarbonizing cities with advanced nuclear* (2017) <http://ekomodernismi.files.wordpress.com/2017/09/decarbonizing-cities-with-advanced-nuclear-final.pdf>

[7] Allison *We should stop running away from radiation* (2009) [www.bbc.co.uk/news/world-12860842](http://www.bbc.co.uk/news/world-12860842)

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