



Medact & nuclear power

considering our position

Medact consultation briefing
August 2021

Context

The **climate crisis** is the single biggest threat to public health. Medact has called for the UK to transition to a **zero-carbon economy by 2030** as part of a bold **Green New Deal**¹ but has no declared policy position on the extent to which **nuclear energy** should be part of a fossil free future.

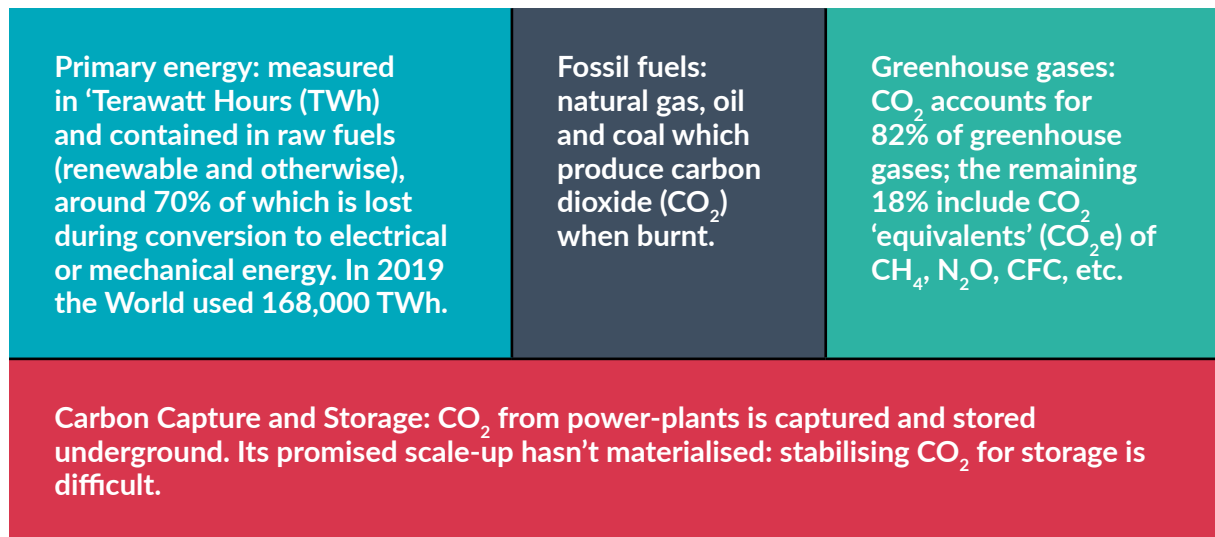
The following resolution was passed at last year's AGM:

That Medact should investigate the risks and benefits of civil nuclear power, noting its clear links with the military industry, and produce a briefing to be used as the basis for consultation with the membership, and bring a proposal for policy to be discussed at the AGM in 2021.

This briefing aims to **help members decide** Medact's position on civil nuclear power by:

- setting out the **context** including the climate crisis, current patterns of UK energy production and use, and UK government plans for nuclear expansion
- explaining **key arguments** for and against nuclear power as part of the UK energy mix in the context of zero carbon targets
- outlining three possible **proposals for policy positions** for Medact.

Brief explainer



Globally, 81% of the energy used in 2019 came from fossil fuels, 27% of which was coal.² **51.8 billion tons** of CO₂e greenhouse gases were emitted in 2018.³ In the UK, 79% of the **primary**

1 Medact (2021), *The Public Health Case for a Green New Deal*, <https://stat.medact.org/uploads/2021/04/The-public-health-case-for-a-Green-New-Deal-MEDACT-April-2021.pdf>.

2 "Total Energy Production", Global Energy Statistical Yearbook, n.d. J.G.J. Olivier and J.A.H.W. Peters <https://yearbook.enerdata.net/total-energy/world-energy-production.html>.

3 Olivier, J., and J. Peters (2020), "Trends in Global CO₂ and Total Greenhouse Gas Emissions", Netherlands Environmental Assessment Agency, https://www.pbl.nl/sites/default/files/downloads/pbl-2020-trends-in-global-co2-and-total-greenhouse-gas-emissions-2019-report_4068.pdf.

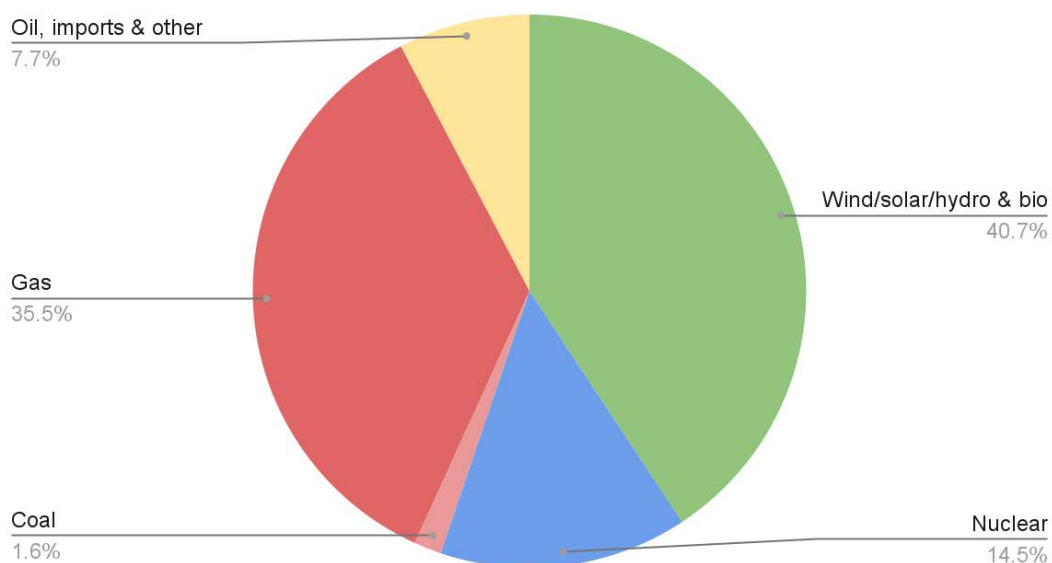
energy used in 2019 came from fossil fuels of which 3.9% was coal. **435 million tons** of CO₂e greenhouse gases were emitted.⁴ The UK's **carbon footprint** was much higher however, as most energy-intensive goods are imported. Both globally and domestically, energy use patterns are highly unequally distributed. In England alone, more than 3 million households are currently living in fuel poverty.⁴

<p>Renewables: Solar, wind, ocean (wave and tidal), hydro, bio and geothermal energy. Solar and wind dominate in the UK but their problem is intermittency, a massive challenge for stabilising the grid.</p>	<p>Hydropower: Often regarded as renewable but has profound ecological impacts. At best, hydropower harnesses up to 40% of the potential energy in cascading water. UK prospects for expanding hydropower are limited.</p>	<p>Bioenergy: electricity and gas generated from 'biomass', e.g., plants, straw, food waste, or dung. Used sustainably, biomass can be low-carbon energy but production can also be carbon intensive. Drax is the UK's main bioelectricity generator.</p>
<p>Nuclear power: energy produced via the heat of nuclear fission from uranium and plutonium generated in a nuclear reactor.</p>		

Energy generation in the UK

Figure 1 below shows the sources of the 330 TWh of electricity generated in the UK in 2020.⁵

Figure 1: UK electricity energy sources (2020)

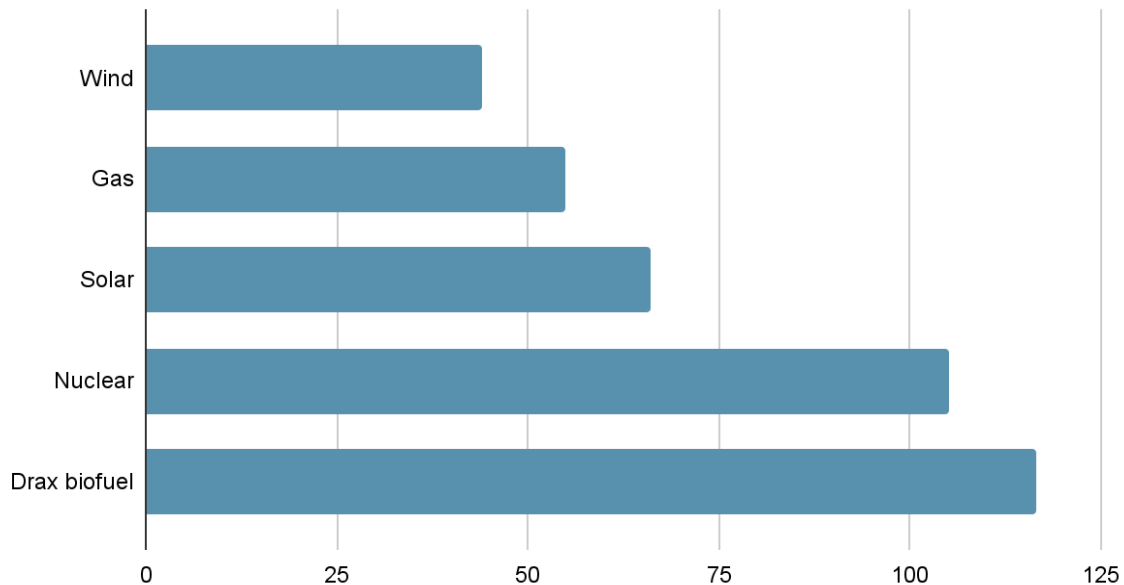


4 Ambrose, J., "Almost 400,000 more UK homes heading for fuel poverty, campaigners say", *Guardian*, 13 July 2021, <https://www.theguardian.com/society/2021/jul/13/almost-400000-more-uk-homes-heading-for-fuel-poverty-campaigners-say>.

5 "Wholesale market indicators", Ofgem, n.d., <https://www.ofgem.gov.uk/energy-data-and-research/data-portal/wholesale-market-indicators>.

In terms of costs, electricity ‘strike prices’⁶ predicted for 2023 are shown in Figure 2.⁷

Figure 2: Predicted 2023 electricity strike prices (£/megawatt hr)



UK governments have **historically supported nuclear power plants**. Between 1976 and 1988, the UK built 18 ‘Advanced Gas Reactor’ nuclear power plants: seven still operate but their **poor design** means even the most recent are working at between 50-75% capacity. No more will be built and the remaining ones **will close within 5 years**.⁸ Meanwhile, an American-designed Pressurised Water Reactor at Sizewell B, Suffolk (built in 1995) has an output of 10 TWh annually but will not resume operating until the end of August 2021, after a long shut-down.⁹

To **reverse the decline** the UK government has backed construction of a nuclear power plant at **Hinkley Point C** with the aid of a Chinese state company which owns one third of the business. It is due to open in 2026 with build costs of at least £22.5 billion over 10 years.¹⁰ The government also supports plans for a nuclear plant at **Sizewell C**. Designed to improve **safety, fuel-efficiency, and economy**, both would be **among the largest in the world**: each site could produce **12-13 TWh** a year.

On the following pages we set out in broad-brush terms the main arguments for and against nuclear power as part of the UK’s energy mix over the next few decades. Finer points and fuller details are in the references.

6 The price at which a derivative can be bought or sold.

7 Evans, S., “Analysis: Record-low price for UK offshore wind cheaper than existing gas plants by 2023”, *Carbon Brief*, 20 September 2019, <https://www.carbonbrief.org/analysis-record-low-uk-offshore-wind-cheaper-than-existing-gas-plants-by-2023>; Ember (2020), *The Burning Question: Should the UK end tax breaks on burning wood for power?*, <https://ember-climate.org/wp-content/uploads/2020/06/2020-Ember-Burning-question-FINAL.pdf>.

8 Morrison, R., “EDF Shuts Dungeness U.K. Nuclear Plant 7 Years Ahead of Plan”, *Bloomberg*, 7 June 2021, <https://www.bloomberg.com/news/articles/2021-06-07/edf-says-dungeness-b-u-k-nuclear-plant-will-not-restart>; Nathalie Thomas, “Britain prepares for new wave of nuclear decommissioning”, *Financial Times*, 22 June 2021, <https://www.ft.com/content/0381e567-d088-4802-a2e4-e125c8099605>.

9 EDF, “Nuclear plant status”, accessed 14 July 2021, <https://www.edfenergy.com/energy/power-station/daily-statuses>.

10 Ambrose, J., “Hinkley Point C costs may rise by £500m on back of Covid crisis”, *Guardian*, 27 January 2021, <https://www.theguardian.com/uk-news/2021/jan/27/hinkley-point-c-costs-may-rise-by-500m-covid-crisis-nuclear-power-plant>

Five arguments for nuclear power as part of the mix

Proponents of nuclear power claim that it is a clean, reliable, 24/7, safe and sustainable energy source that, for the next few decades at least, should form part of the UK energy mix. Some argue that Small Modular Reactor technology could decrease the cost of nuclear power, or stress the benefits regarding nuclear medicine.

1. LOW-CARBON CLEAN ENERGY

Drastic reduction of carbon emissions is now very urgent and Medact supports a zero-carbon UK economy by 2030 as part of a Green New Deal. Such a rapid shift away from fossil fuel usage for electricity generation, transport and heating will require filling the vast gap with other forms of energy and it is not clear whether renewables *alone* can be sufficiently scaled up quickly enough. Nuclear power plants produce neither greenhouse gases nor the polluting carbon particulates of burnt fossil fuels or biofuels. A new-build nuclear power plant programme in the UK could contribute significantly to clean energy and help reduce air pollution-related deaths.¹¹

2. RELIABILITY

Hinkley Point, Sizewell C and small modular reactors could form a new generation of nuclear power plants in the UK to generate a reliable, steady electricity 'baseload' all year round.¹² This contrasts with the intermittency of wind and solar and the substantive energy storage challenges associated with this.

3. SAFETY

The new power plants of the 'nuclear renaissance' in the UK and elsewhere are designed with improved safety standards, meaning better occupational safety for workers, the safest possible disposal of nuclear waste and drastically minimised risk of accidents.¹³

11 "Air Quality", Nuclear Energy Institute, n.d., <https://www.nei.org/advantages/air-quality>.

12 "Nuclear Power is the Most Reliable Energy Source and It's Not Even Close", Office of Nuclear Energy, 24 March 2021, <https://www.energy.gov/ne/articles/nuclear-power-most-reliable-energy-source-and-its-not-even-close>.

13 Department for Business, (2008), Enterprise and Regulatory Reform, *Meeting the Energy Challenge: a White Paper on Nuclear Power*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/228944/7296.pdf.

4. AFFORDABILITY

Despite a reputation as an expensive energy source, some have argued that prefabricated small modular reactors (SMRs) could be erected relatively cheaply and quickly across multiple sites.^{14,15}

5. NUCLEAR MEDICINE

The beneficial effects of nuclear medicine are clear. Positron emission tomography ('PET') scans are common imaging techniques utilising radioactive substances from spent fuel rods of nuclear reactors.¹⁶ Maintaining a home-based civil nuclear industry could arguably ensure retention of knowledge and skills which could lead to developments in this field and ultimately provide health benefits. Advocates argue that decommissioning nuclear power risks losing these opportunities.

14 Deign, J., "So, What Exactly Are Small Modular Nuclear Reactors?", *Green Tech Media*, 9 September 2020, <https://www.greentechmedia.com/articles/read/so-what-exactly-are-small-modular-nuclear-reactors>.

15 World Nuclear Association, "Small Nuclear Power Reactors", June 2021, <https://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-power-reactors/small-nuclear-power-reactors.aspx>.

16 "Nuclear Medicine", National Institute of Biomedical Imaging and Bioengineering, n.d., <https://www.nibib.nih.gov/science-education/science-topics/nuclear-medicine>.

Five arguments against nuclear power as part of the mix

Opponents of nuclear power believe it poses unacceptable environmental, health and safety risks as well as being relatively costly. They dispute the veracity of key arguments for nuclear, emphasise links to the military industry and claim the superiority of renewables makes a 'nuclear renaissance' unnecessary.

1. ENVIRONMENTAL, HEALTH AND SAFETY RISKS

Uranium mining, needed for nuclear power, is environmentally hazardous and has harmful effects on the health of 'fence-line' communities, particularly in the global south.¹⁷ The radioactivity of nuclear waste persists for millions of years; it can neither be disposed of nor stored safely.¹⁸ Furthermore, the nuclear industry has unique occupational hazards: one of the most detailed environmental health hazards studied is exposure to ionising radiation below 100 mSv (about 20 times more than natural annual background in most places). Risk-avoidance measures can help but healthy nuclear workers are more liable to leukaemias, cancers and cardiovascular disease.¹⁹ Finally, although the risks are orders of magnitude below those at Chernobyl and Fukushima, opponents of nuclear power argue that tragic nuclear accidents in a climate-changing world could occur and stress that just one in the UK could be devastating.

2. COSTS

Nuclear power is expensive and the cost displaces spending on other much-needed energy policy interventions; and nuclear power plants take years to construct. Even SMRs would be too costly and slow a solution to the urgent problem of replacing fossil fuels with a decarbonised energy economy. Renewables' costs, by contrast, are falling rapidly: wind and solar energy could supply much more electricity at even lower costs.²⁰ Funding for new nuclear plants would be better spent on reducing energy demand including through large-scale home insulation programmes - which would also have significant health benefits - and on further improving renewable, electricity storage, and transmission technologies.

17 "Briefing on the health and environmental hazards of uranium mining", London Mining Network, 26 May 2010, <https://londonminingnetwork.org/2010/05/briefing-on-the-health-and-environmental-hazards-of-uranium-mining-2>.

18 "Radioactive fuel rods: The silent threat", *The Week*, 8 January 2015, <https://theweek.com/articles/485781/radioactive-fuel-rods-silent-threat>.

19 Leuraud, K., et al (2015), "Ionising radiation and risk of death from leukaemia and lymphoma in radiation-monitored workers (INWORKS): an international cohort study" *The Lancet Haematology* 2, no. 7: e276-e281, <https://pubmed.ncbi.nlm.nih.gov/26436129/>; Richardson, D., et al, (2015) "Risk of cancer from occupational exposure to ionising radiation: retrospective cohort study of workers in France, the United Kingdom, and the United States (INWORKS)", *British Medical Journal* 351, <https://www.bmj.com/content/351/bmj.h5359>; Little, M., and Lipshultz, S., (2015), "Low dose radiation and circulatory diseases: a brief narrative review", *Cardio-Oncology* 1, no. 1, 1-10, <https://cardiooncologyjournal.biomedcentral.com/articles/10.1186/s40959-015-0007-6>.

20 Dubai, M., and De Clerq, G., (2019) "Nuclear energy too slow, too expensive to save climate: report", 24 September 2019, <https://www.reuters.com/article/us-energy-nuclearpower-idUSKBN1W909J>; Krzyzaniak, J., "Three takeaways from the 2020 World Nuclear Industry Status Report", *The Bulletin*, 25 September 2020, <https://thebulletin.org/2020/09/three-takeaways-from-the-2020-world-nuclear-industry-status-report>.

3. SUPERIORITY OF RENEWABLES

Renewables are more readily expandable than nuclear. The vast expansion needed to replace all fossil fuels is achievable in the UK through renewables alone, without nuclear, although the last phases may be challenging.²¹ Energy storage problems posed by the intermittency of wind and solar can be overcome by short-period batteries, long-period hydrogen, and 'flexible' biomass with short re-growth times, mainly from waste (not wood). While the International Atomic Energy Authority promotes the idea that hybrid 'Nuclear/Renewables' systems offer the most realistic energy future,²² it also acknowledges that nuclear power more easily hybridises with gas-fired plants.²³

4. NUCLEAR MEDICINE

Critics of nuclear power from the health community say that medical isotopes can be readily produced without nuclear reactors. Accelerators can produce isotopes at a cost comparable to reactors; such use would minimise supply disruptions.²⁴

5. MILITARY INDUSTRY LINKS

Nuclear technology is at the heart of the UK government's defence strategy. The government wants to enhance military nuclear engineering and naval (submarine) propulsion, and believes a home-based civil nuclear industry would enhance expertise,²⁵ a factor in its support for nuclear power. The UK military nuclear industry is geared for naval engines so nuclear weapons' proliferation risks are less relevant (although the UK has enough plutonium for tens of thousands of bombs).

21 Elliott, D., (2020), *Renewable Energy, Can it Deliver*, Polity Press: Cambridge.

22 Todd, F., "Is a hybrid between nuclear power and renewables a genuine reality?", *NS Energy*, 27 June 2019, <https://www.nsenerybusiness.com/features/hybrid-nuclear-power-renewables>.

23 *Ibid.*

24 Hoedl, S., and Updegraff, W. D., (2015), "The Production of Medical Isotopes without Nuclear Reactors or Uranium Enrichment", *Science & Global Security* 23, no. 2, 121-153, <http://scienceandglobalsecurity.org/archive/sgs23hoedl.pdf>.

25 Johnstone, P., and Stirling, A., (2020), "Comparing nuclear trajectories in Germany and the United Kingdom: From regimes to democracies in sociotechnical transitions and discontinuities", *Energy Research & Social Science* 59, <https://www.sciencedirect.com/science/article/abs/pii/S2214629618313501?via%3Dihub>.

Potential Medact policy positions

We suggest members may choose to propose motions to the AGM based on one of the following proposals:

- 1. Given the anticipated massively increasing demand for clean energy in the UK, Medact should broadly support current government plans to include new-build nuclear power plants as part of the energy mix over the next few decades to fill energy gaps left by the accelerated withdrawal of fossil fuels.**
- 2. Given the rapid and accelerating deployment of renewable energy across the UK, there will soon be no justifiable argument for costly and polluting nuclear power as part of the energy mix, Medact should advocate for an immediate cessation of new-build nuclear power stations and for the associated industries, civilian and military, in the UK to be gradually decommissioned.**
- 3. Given the balance of arguments is inconclusive for or against nuclear power, Medact should remain neutral on the question of nuclear power's place in the UK's energy mix.**

We also encourage members and supporters to [express their views in our mini-consultation](#). The results of this consultation will be made available on an advisory basis during discussion of motions at our [2021 AGM](#).



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