

**An Energy and Climate Policy Primer for Incoming Ministers:
Some thoughts on the past, present and future
inspired by the 2024 GB Party manifestos¹**

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29 June 2024

This document is intended to be a guide for incoming ministers and their advisors with responsibility for UK energy and climate policies. We begin by discussing the UK policy context. We move on to highlight some lessons from history about which energy and climate policies have worked in the UK. Next, we make some general observations on the current state of the energy and climate policy debate. We then review and critique manifesto pledges in key policy areas: setting targets; green jobs; Great British Energy and Great British Nuclear; subsidies; energy taxes; energy prices and bills; energy independence and interconnection; deeper relations with the EU; planning reforms; and sectoral commitments on residential heat and transport. We conclude with some reflections on which energy technologies to prioritise and when.

The UK energy and climate policy context

The UK has led the world in institutional frameworks for energy and climate policy. It has been widely copied in the restructuring and privatisation of its electricity and gas supply industries⁴; it has also had a groundbreaking climate policy framework following the 2008 Climate Change Act (revised in 2019) which set a legally binding national target for decarbonisation by 2050⁵. The UK was the first country (in 2002) to have a proper carbon market⁶, which was rapidly integrated into the world leading European Union (EU) Emissions Trading Scheme. Some of its energy and climate institutions are

¹ The authors are writing in a personal capacity and the views in this paper do not necessarily represent the views of any organisation they are associated with. We focus on GB (Great Britain) because energy policy in Northern Ireland is devolved and Northern Ireland is part of the EU single market.

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⁴ Glachant, J-M., Joskow, P. and Pollitt, M.G. (eds.) (2021), *Handbook on Electricity Markets*, Cheltenham: Edward Elgar.

⁵ Rayner, T. and Jordan, A. (2016), 'The United Kingdom: A record of leadership under threat'. In *The European Union in international climate change politics* (pp. 197-212). Routledge.

⁶ NAO (2004), *The UK Emissions Trading Scheme A New Way to Combat Climate Change Report by the Comptroller and Auditor General HC 517 Session 2003-2004: 21 April 2004*, National Audit Office.

widely admired. The Committee on Climate Change⁷ is a global leader on independent monitoring of progress with decarbonisation while the GB energy regulator, Ofgem, sets a gold standard for independent regulation of the electricity and gas sectors.⁸

The UK has had notable successes with the decarbonisation of its electricity sector via first the growth of gas turbines in the 1990s⁹ and with the growth of renewables since 2010. The carbon price floor ensured that Britain was able to rapidly shift away from coal at least cost.¹⁰ The institution of auctions for contracts for differences (CfDs) for renewable generation has delivered substantial cost reductions and facilitated the roll out of offshore wind in the North Sea.¹¹ The Low Carbon Contracts Company (LCCC) model of a government procurement agency which holds two-way CfDs on renewable and nuclear generation is one which the EU recently suggested copying as it could lock in costs of a substantial portion of generation, stabilising final prices.¹²

However, the UK has also had notable energy policy failures. The Magnox¹³ and AGR¹⁴ nuclear power programmes were delivered over-budget, late and failed to result in the export British nuclear technology round the world, as was originally claimed. The government led smart meter roll-out is still ongoing, having dismally failed to make its original 2020 target.¹⁵ Other countries installed electricity smart meters to more households at a fraction of the cost of those seen in the UK.¹⁶ Successive efforts to roll out energy efficiency measures via the Green Deal¹⁷ and Green Home Grants¹⁸ failed badly with low uptake and high administrative costs. Two successive efforts to

⁷ Averchenkova, A., Fankhauser, S., & Finnegan, J. J. (2021), 'The influence of climate change advisory bodies on political debates: evidence from the UK Committee on Climate Change', *Climate Policy*, 21(9), 1218-1233.

⁸ Duma, D., Pollitt, M. and Covatariu, A. (2024), 'Regulatory Learning in the face of Net Zero Climate Policy: The Case of the UK', *Review of Industrial Organization*, <https://www.springerprofessional.de/en/regulatory-learning-in-the-face-of-net-zero-climate-policy-the-c/27207418>

⁹ Newbery, D.M.G. and Pollitt, M. (1997), 'Restructuring and Privatisation of the CEBG - was it worth it?', *Journal of Industrial Economics*, Vol.45, No.3, pp.269-304.

¹⁰ Newbery, D. M., Reiner, D. M., & Ritz, R. A. (2019). 'The political economy of a carbon price floor for power generation'. *The Energy Journal*, 40(1), 1-24.

¹¹ Zhang, H. and Pollitt, M.G. (2023), *Comparison of policy instruments in the development process of offshore wind power in North Sea countries*. Energy Policy Research Group Working Papers, No.2323. Cambridge: University of Cambridge.

¹² Pollitt, M.G., von der Fehr, N-H., Willems, B., Banet, C., Le Coq, C. and Chyong, C.K. (2024), 'Recommendations for a Future-Proof Electricity Market Design in Europe in the light of the 2021-23 energy crisis', *Energy Policy*, 188 (May): 114051.

¹³ Green, R. (1995). "The Cost of Nuclear Power Compared with Alternatives to the Magnox Programme," *Oxford Economic Papers*, 47(3): 513-524. <https://doi.org/10.1093/oxfordjournals.oep.a042185>

¹⁴ Henderson, P.D. (1977), 'Two British Errors: Their Probable Size and Some Possible Lessons', *Oxford Economic Papers*, 29(2): 159-205, <https://doi.org/10.1093/oxfordjournals.oep.a041366>

¹⁵ NAO (2023), *Update on the rollout of smart meters*, Department for Energy Security and Net Zero, Session 2022-23 14 June HC 1374, National Audit Office. The UK will, at best, have rolled out smart meters to 80% of households by 2025.

¹⁶ <https://committees.parliament.uk/writtenevidence/44014/pdf/>

¹⁷ NAO (2016), *Green Deal and Energy Company Obligation*, National Audit Office. <https://www.nao.org.uk/reports/green-deal-and-energy-company-obligation/>

¹⁸ NAO (2021), *Green Homes Grant Voucher Scheme*, National Audit Office, <https://www.nao.org.uk/reports/green-homes-grant/>

jumpstart carbon capture and storage via a £1bn competition also failed.¹⁹ Most recently the UK instituted one of the most expensive and poorly designed price-support mechanisms in Europe during the 2021-23 energy crisis.²⁰

The lessons of history

There are both some positive and some negative lessons that can be drawn from the history of British policymaking regarding energy and climate change.

First, the UK is good at designing innovative energy governance institutions, where the mandate of these institutions is clear. A welcome recent development is the creation of the National Energy System Operator (NESO), which will create an independent electricity system operator and strategy energy system planner for electricity, gas and hydrogen.²¹

Second, private ownership and market mechanisms have been very successful in promoting the energy transition, within a framework of carbon pricing (both the Emissions Trading Scheme and the Carbon Price Floor) and market-based support mechanisms for renewables.²²

Third, global leadership on energy and climate is about demonstrable success.²³ The UK has led the world in the areas of energy market reform, energy network regulation, renewables roll out and carbon pricing because these are policies that deliver cheaper, more secure and cleaner energy. Other countries have watched, learned and wanted to follow.²⁴

Fourth, the UK is capable of policy course correction and learning from its mistakes. The UK's lagged in renewables deployment in the 1990s and early 2000s and its main approach to decarbonising its power system via renewable obligation (a poorly designed green certificate system)²⁵ was replaced with contracts for difference. Similarly, after failing twice to deliver in a £1bn CCS Competition, the CCUS Cost

¹⁹ Reiner, D.M. (2016) Learning through a Portfolio of Carbon Capture and Storage Demonstration Projects *Nature Energy*, 1: 15011; and NAO (2017), *Carbon Capture and Storage: the second competition for government support*, National Audit Office.

²⁰ Pollitt et al. (2024); and Sgaravatti, G., S. Tagliapietra, C. Trasi and G. Zachmann (2021), *National policies to shield consumers from rising energy prices*, *Bruegel Datasets*, first published 4 November 2021, available at <https://www.bruegel.org/dataset/national-policies-shield-consumers-rising-energy-prices>

²¹ See Duma et al. (2024).

²² Nicolli, F. and Vona, F. (2019), 'Energy market liberalization and renewable energy policies in OECD countries', *Energy Policy*, 128: 853-867. <https://doi.org/10.1016/j.enpol.2019.01.018>

²³ Joskow, P.L. (2008), 'Lessons Learned from Electricity Market Liberalization', *The Energy Journal*, Special Issue on the Future of Electricity, 9-42.

²⁴ On the lessons for China from the UK on power market reform, see, Pollitt, M.G. (2020), *Reforming the Chinese Electricity Supply Sector: Lessons from Global Experience*, Palgrave Macmillan.

²⁵ Butler, L. and Neuhoff, K. (2008), 'Comparison of feed-in tariff, quota and auction mechanisms to support wind power development', *Renewable Energy*, 33(8): 1854-1867.

Challenge Task Force rebooted policy in this area in 2017 and the process is currently on track to deliver a diversity of projects by the mid-2020s.²⁶

There are some lessons that reflect more of a mixed set of outcomes such as the build out of energy infrastructure.²⁷ In some instances, such as offshore wind or liquefied natural gas (LNG) terminals, the infrastructure has been delivered on time and on budget. Indeed, UK has successfully expanded its international pipelines and LNG facilities to meet rapidly declining UK continental shelf production of gas between 2003 and 2013.²⁸ In other cases, transmission lines such as Beaulieu-Denny line were bogged down for well over a decade after receiving over 20,000 objections²⁹ and onshore wind, the cheapest renewable option, was effectively banned in England for much of the past 15 years.³⁰

Other lessons from history are more clearly problematic.

Nuclear power has had a long and troubled history in the UK.³¹ A key mistake that the UK has consistently made is combining an industrial policy towards the UK nuclear industry and energy policy.³² This is in spite of the overwhelming evidence that using standardised designs from abroad would have been much cheaper to build and much more reliable. Thus, the UK failed to buy US PWR technology in the 1960s (this was a mistake which the French did not make) but went ahead with UK AGR technology.

Next, technological over-optimism is evident in UK energy policy, often leading to policy blindness to the underlying economics of new technology. The UK ‘smart’ meter roll-out over-specified the technical characteristics of smart meters, stuck with a competitive supplier led roll-out when most other countries went with a monopoly distribution company led roll-out, insisted on rolling out smart meters for gas in spite of a lack of positive cost benefit analysis and did not target customers for whom the individual

²⁶ UKRI (2023), *Enabling net zero: a plan for UK industrial cluster decarbonisation*, UK Research and Innovation, <https://www.ukri.org/wp-content/uploads/2023/11/UKRI-141123-EnablingNetZeroPlanUKIndustrialClusterDecarbonisation.pdf>

²⁷ Hall, J. W., Tran, M., Hickford, A. J., & Nicholls, R. J. (Eds.) (2016), *The future of national infrastructure: A system-of-systems approach*. Cambridge University Press.

²⁸ Azarbazin, A. and Clark, C. (2020), *Trends in trade of Liquefied Natural Gas in the UK and Europe*, Department for Business Energy and Industrial Strategy (BEIS). https://assets.publishing.service.gov.uk/media/5e7b4dfa86650c743803732a/Trends_in_trade_of_Liquefied_Natural_Gas_in_the_UK_and_Europe.pdf

²⁹ Tobiasson, W., Jamasb, T., Beestermöller, C., Meier, H. (2015), *Conceptualizing Public Engagement in Electricity Network Development: An Economic Approach*, Energy Policy Research Group Working Paper EPRG 1506.

³⁰ Carter, N., & Pearson, M. (2024), ‘From green crap to net zero: Conservative climate policy 2015–2022’, *British Politics*, 19(1), 154-174.

³¹ For excellent discussions see: Taylor, S. (2007), *Privatization and financial collapse in the nuclear industry – the origins and causes of the British Energy crisis of 2002*. London: Routledge; and Taylor, S. (2016), *The fall and rise of nuclear power in Britain: a history*. Cambridge: UIT Cambridge.

³² The history of the Central Electricity Generating Board (CEGB) in the 1960s and 1970s provides a case in point, where the performance and reputation of a public company was ruined by subjugating it to flawed industrial policy. See Kim, T-H. (2017), *The Central Electricity Generating Board (CEGB) and the politics of fuel and power generation, 1961-89*, <http://www.eprg.group.cam.ac.uk/wp-content/uploads/2017/06/TH-Kim.pdf> and Cambridge PhD Thesis.

benefit of smart metering was positive.³³ Meanwhile a very expensive data collection infrastructure was put in place and yet the system currently throws away data after one year rather than making it available for analysis.³⁴

Finally, the UK government and civil service can show a worrying unwillingness to engage with independent expert opinion on important issues of energy policy or to learn from successful international examples. The 2022 German Expert Commission on Gas and Heat developed in response to the Russian invasion of Ukraine comprised of 30 experts, deliberated for six weeks from mid-September to late October and recommended that a two part gas tariff be instituted to both support households in the energy crisis AND to maintain incentives to reduce energy consumption and to allow the competitive market to continue.³⁵

By contrast, the response of the UK Government was the Energy Price Guarantee (EPG), which was the biggest single energy policy intervention in British history. Unfortunately, there was no external consultation on its design and it was developed over the course of Liz Truss' leadership campaign and implemented within the first three days of the Truss premiership (with vociferous encouragement over the summer from certain energy retailers)³⁶, resulting in an unnecessarily costly design which raised both gas demand and government borrowing, and reduced retail competition.³⁷ Panicked by the rapid rise in natural gas prices, the UK applied a blanket and unlimited guarantee, which was initially projected by the Office of Budget Responsibility (OBR) to cost £67 billion or 2.7% of GDP.³⁸ In the end, the government's price support resulted in a cost on the order of 'only' £50 billion (or 2% of GDP) because the 2022/23 winter across Europe was relatively mild and so the cost to the Exchequer was tens of billions of pounds below what it could have been. Some £6bn of this total was offset via windfall taxes levied through the energy profits levy (EPL) on oil and gas companies and the electricity generator levy (EGL), the vast majority of which was via the EPL.

³³ <https://committees.parliament.uk/writtenevidence/44014/pdf/>

³⁴ The Data Communications Company (DCC) currently costs the UK consumer £600-700m per year. <https://www.newpower.info/2023/10/ofgem-prepares-to-find-new-licensee-to-run-smart-meter-data-and-communications-hub/>

³⁵ See Pollitt et al. (2024).

³⁶ For example, see:

https://www.scottishpower.com/news/pages/grasping_the_nettle_of_the_energy_affordability_crisis.aspx

³⁷ See: Pollitt, M.G., Reiner, D.M. and Newbery, D.M.G.(2022), *The Energy Price Guarantee: What principles should the UK Government apply in thinking about how to implement this?*

<https://www.eprg.group.cam.ac.uk/wp-content/uploads/2022/09/EPRG-The-Energy-Price-Guarantee.What-principles-should-the-UK-Government-apply-in-thinking-about-how-to-implement-this-1.pdf>

³⁸ Office of Budget Responsibility (2023), *The cost of the Government's energy support policies* <https://obr.uk/box/the-cost-of-the-governments-energy-support-policies/>

A few general current observations

First, it is easy to confuse energy and climate policy and industrial policy.³⁹ While the UK has a strong track record in a few niche areas of energy equipment manufacturing, such as the net export of fossil fuel engines and generators, the idea that UK energy policy should be actively diverted towards encouraging UK technology for the purposes of promoting exports has little historical or empirical support.⁴⁰

Second, when it comes to climate policy what matters is global emissions. UK policy needs to be concerned with leakage of emissions abroad and policies which simply result in the offshoring of emissions (often at a higher level, due to lower environmental standards) are to be resisted.⁴¹ This means that policies which simply result in the transferring of high emissions intensity production abroad are not good for the climate.

Third, the UK cannot decarbonise alone and needs to encourage other countries to also commit to deep decarbonisation⁴². This is most obviously done by close cooperation with the European Union (EU). If the UK and the EU want to lead the world in this area, they must demonstrate that they are prepared to cooperate to create a coupled carbon market with a single price. This can be achieved by tight coupling as the EU ETS has recently achieved with the Swiss ETS⁴³. There are also other mechanisms for encouraging other states to be pursue deep decarbonisation including the demonstration effect to show others that the costs are not unnecessarily high and decarbonisation can be accomplished with broad public acceptance as well as efforts to train civil servants and provide exchanges at all levels (government, industry and academia) to improve information flow and knowledge transfer. One such mechanism is Mission Innovation⁴⁴, which brings together leading countries who have pledged to double their energy R&D after the Paris Agreement in 2015 and where the UK has played a central role in many of the missions.⁴⁵

Fourth, continuing economic growth is a pre-requisite for continuing decarbonisation. In general, richer countries decarbonise more not less.⁴⁶ Policies which deliberately

³⁹ Cohen, L.R., Noll, R.G. with J.S.Banks, S.A.Edelman, W.M. Pegram (1991), *The Technology Pork Barrel*, Brookings Institution Press.

⁴⁰ Relative to Germany the UK electrical equipment industry was rendered less competitive a closed home market between 1945 and end of the 1960s. This reduced incentives to seek export markets. See Reindl, J. (1997), 'Collusion and Competition: The Electrical Engineering Industry in the United Kingdom and West Germany between 1945 and the Late 1960s', *Business and Economic History*, 26(2): 738–750. <http://www.jstor.org/stable/23703066>

⁴¹ Branger, F. and Quirion, P. (2014), 'Would border carbon adjustments prevent carbon leakage and heavy industry competitiveness losses? Insights from a meta-analysis of recent economic studies', *Ecological Economics*, 99: 29-39. <https://doi.org/10.1016/j.ecolecon.2013.12.010>

⁴² Pollitt, M.G. (2019), 'A Global Carbon Market?', *Frontiers of Engineering Management*, 6(1): 5-18.

⁴³ <https://icapcarbonaction.com/en/ets/swiss-ets>

⁴⁴ Myslikova, Z., & Gallagher, K. S. (2020), 'Mission Innovation is mission critical', *Nature Energy*, 5(10): 732-734.

⁴⁵ Mission Innovation (2022), 'National Innovation Pathway Round-up: United Kingdom' https://mission-innovation.net/wp-content/uploads/2022/09/National-Innovation-Pathway-Roundup_UK_FP.pdf

⁴⁶Tu, Y-X., Kubatko, O., Karintseva, O. and Piven, V. (2022), 'Decarbonisation drivers and climate change concerns of developed economies', *Journal of Environment and Pollution*, 69 (1-2): 112-129.

reduce UK GDP are not going to be good in the long-run for decarbonisation, though they may reduce measured emissions in the short-run. Thus, although there may well be rhetorical and political advantages, a policy of not granting new oil and gas licenses in the North Sea is economically non-sensical if it reduces UK GDP, while also not reducing global emissions. Similarly, policies which limit airport development rather than seeking to properly tax aviation fuel are bad for the environment (because they reduce UK economic growth⁴⁷) and bad for international relations and global economic growth (by discouraging international travel)⁴⁸.

Fifth, it is important not to overclaim the potential for green growth. There is little theoretical or empirical evidence that faster 'green growth' will, on net, somehow be positive for the UK economy.⁴⁹ Decarbonisation is likely to reduce conventionally measured productivity growth because it raises capital inputs and reduces measured outputs. That does not mean decarbonisation is not worth it in terms of environmental and health benefits: we decarbonise because it is good for the planet and aggregate societal welfare not because it raises GDP. Most advanced countries typically spend 1-2% of GDP on environmental protection and these expenditures have been easily absorbed by these economies and are widely popular.⁵⁰

Sixth, a common energy policy mistake made by politicians which they need to be constantly reminded not to make is to confuse costs and benefits, by presenting costs as benefits. Thus, a claim that a particular energy investment will create 100,000 jobs is not a benefit to the UK as a whole. Where will these workers come from: will there be less workers in the NHS, education, construction elsewhere? Energy should be a high productivity sector in the economy, with as few jobs as possible dedicated to satisfying home demand, precisely because as a society we don't value energy per se, but the final services (thermal comfort, travel and entertainment etc.) it facilitates.

Seventh, the price of energy is not dependent on ownership of production or the source of energy. The 2021-23 European energy crisis demonstrates this: the UK was one of the countries in Europe least dependent on Russian gas and even possessed its own (diminishing) sources of gas, however the price of gas and electricity went up dramatically anyway.⁵¹ Decoupling the UK price of energy from world prices is incompatible with an open trading economy. What we *can* do is mitigate the wealth impact of such price rises by owning more of our own energy at home or abroad.

<https://doi.org/10.1504/IJEP.2021.125194>

⁴⁷ The benefits of airports expansion in the South East of England are substantial, even including the cost of GHG emissions. See Airports Commission (2015), *Airports Commission: Final Report July 2015*, <https://assets.publishing.service.gov.uk/media/5a808ab4e5274a2e8ab50bd4/airports-commission-final-report.pdf>

⁴⁸ https://www.icao.int/Meetings/wrdss2011/Documents/JointWorkshop2005/ATAG_SocialBenefitsAirTransport.pdf

⁴⁹ Ajayi, V. and Pollitt, M.G. (2022) "Green growth and net zero policy in the UK: some conceptual and measurement issues." *Energy Policy Research Group Working Papers*, No.2215. Cambridge: University of Cambridge.

⁵⁰ Morgenstern, R.D., Pizer, W.A., Shih, J.-S. (2001). The Cost of Environmental Protection. *The Review of Economics and Statistics* 2001; 83 (4): 732–738.

⁵¹ Pollitt et al. (2024).

Indeed, it is because the UK has a large amount of private energy wealth⁵² that we have been able to tax this to partly fund the energy cost of the crisis.⁵³

*Some comments on the Party Manifestos*⁵⁴

Setting Targets: The UK has very ambitious energy targets for 2030 already. The idea that these can be accelerated on a 6-year timeframe is unrealistic, in the absence of a sharp decline in energy consumption (perhaps due to falling GDP).⁵⁵ For instance on offshore wind the current target of 50 GW already requires more than doubling the current build rate⁵⁶. There is nothing in history to suggest that the build rate could be accelerated by *more* than current ambitions. Similarly, the idea of accelerating the achievement of net zero at the whole economy level earlier than 2050 runs the risk of making a difficult task impossible.⁵⁷ Political parties need to stop competing on the basis of bringing forward target dates and concentrate on what needs to be done to reach net zero by 2050.

Green Jobs: The repeated claim that climate and energy policy might create hundreds of thousands of new jobs is, at best, questionable since the energy sector is traditionally highly capital intensive⁵⁸. Where would such a huge number of jobs come from? Unless they come from net migration this will mean that other parts of the economy will be starved of human resources. Also, these additional jobs need to be paid for by someone. Hinkley Point C, which currently employs 25,000 on site, is the largest construction project in Europe and took several years to build its local workforce and the project is substantially over-running in cost. This suggests that even if it were

⁵² The UK is a major global owner of fossil fuel assets. See: Semieniuk, G., Holden, P.B., Mercure, J.F. et al. (2022), 'Stranded fossil-fuel assets translate to major losses for investors in advanced economies', *Nature Climate Change*, 12: 532–538 (2022). <https://doi.org/10.1038/s41558-022-01356-y>

⁵³ <https://www.gov.uk/government/publications/changes-to-the-energy-oil-and-gas-profits-levy/energy-oil-and-gas-profits-levy>;

⁵⁴ We look at the Conservatives, Labour, Green, Liberal Democrat, Scottish National Party, Plaid Cymru and Reform manifestos. Conservative and Unionist Party (2024), *The Conservative and Unionist Party Manifesto, Clear Plan, Bold Action, Secure Future*; Labour Party (2024), *Change: Labour Party Manifesto 2024*; Green Party (2024), *Manifesto for a fairer, greener country Real Hope. Real Change (long version)*; Liberal Democrats (2024), *For a Fair Deal, Manifesto 2024*; Scottish National Party (2024), *SNP Manifesto: A Future Made in Scotland*; Plaid Cymru (2024), *For Fairness, For Ambition, For Wales*; and Reform UK (2024), *Our Contract with You*.

⁵⁵ Labour suggest they can deliver zero carbon power by 2030 (Labour Party 2024, p.13).

⁵⁶ The maximum amount installed in any one year recently was 2.4 GW. 35 GW more is required in 6 years (almost 6 GW / year). And only 7.8 GW was actually under construction as of 31 December 2023. See: https://downloads.ctfassets.net/nv65su7t80y5/5Ej0qLFMQnqiT3QuWffj9g/c130a6294cca40b8f04db7dd7f8830/11964_OffshoreWindReport_2023_Final300424.pdf

⁵⁷ The Liberal Democrats have a 2045 target for net zero in the UK (Liberal Democrats 2024, p.23), the Greens by 2040 at the latest (Green Party 2024, p. 10), Plaid Cymru have a 2035 target for Wales (Plaid Cymru 2024, p. 34) and the SNP a 2045 target for Scotland (SNP 2024, p. 21).

⁵⁸ The Liberal Democrats want to create 'hundreds of thousands of secure, well-paid new jobs' in climate and energy (Liberal Democrats 2024, p.23). The Conservatives also foresee the 'opening up whole new sectors and creating hundreds of thousands of good jobs' (Conservative and Unionist Party 2024, p.49). Labour suggest: 'Our plan will create 650,000 jobs across the country by 2030' (Labour Party 2024, p.50). The Greens suggest that 'The green economy means...millions of rewarding and well-paid jobs'. (Green Party 2024, p.12).

possible to increase the number of jobs in energy by this extent, it would take years of planning and training, and too many additional jobs can translate into additional energy costs. One of the more labour-intensive elements of the energy transition would involve rapidly ramping up heat pump installation. To be on track to meet the current government target of installing 600,000 heat pumps per year in 2028, the consultancy EY estimated in 2021 that 10,000 qualified heat pump installers in the UK would be required within the next four years, which at the time was eight times then-current workforce of 1200.⁵⁹ The latest figures do augur well – the number who completed their training as qualified heat pump installers reached almost 8,000 in 2023.⁶⁰ This recent upsurge is auspicious in terms of how quickly the necessary workforce can be trained but also indicates that the scale of the workforce needed for the energy transition should not be overstated.

Great British Energy / Great British Nuclear: Both Labour and Conservatives are committed to some role for government in the ownership of electricity generation assets. The Conservative government have already established Great British Nuclear, a public company dedicated to taking government stakes in nuclear power projects. Of the Labour Party’s ‘first steps for change’, one of its six steps that is focused on energy or climate is to set up ‘Great British Energy’.⁶¹ Unlike 2019, when the Labour Party sought to nationalise all transmission and distribution assets in Great Britain including National Grid⁶², this is not a publicly-funded energy company that would compete with other energy companies or operate aspects of the energy system. Instead, the total capitalisation is only anticipated to be £8.3bn, with which it will focus on co-investing in clean power leading technologies, support capital-intensive projects; and local energy production. Great British Energy intends to absorb Great British Nuclear.⁶³ It is sensible to make a public investment in large scale nuclear at Sizewell C and Wylfa if that helps keep the financing cost down and increases the cost of government interference in the projects.⁶⁴ However, the danger is if Great British Nuclear and Great British Energy primarily become mechanisms for implementing predetermined industrial policies towards energy. Great British Nuclear⁶⁵ seems to currently be making the same

⁵⁹ EY Parthenon (2021), *Review of the Future Homes Standard*. https://ina.org.uk/wp-content/uploads/2021/06/2FEY-Report-on-the-Future-Homes-Standard-June-2021_Final-1.pdf

⁶⁰ <https://www.pbctoday.co.uk/news/energy-news/2023-saw-166-increase-in-qualified-heat-pump-installers/137672/>

⁶¹ Labour Party (2024) *Labour’s First Steps for Change*, 16 May.

<https://labour.org.uk/updates/stories/labours-first-steps-for-change/>

⁶² Labour Party (2019) *Bringing Energy Home*, <https://www.labour.org.uk/wp-content/uploads/2019/03/Bringing-Energy-Home-2019.pdf>

⁶³ See page 12, Labour Party (2024), *Make Britain a Clean Energy Superpower*, <https://labour.org.uk/wp-content/uploads/2024/03/Make-Britain-a-Clean-Energy-Superpower.pdf>

⁶⁴ The Conservatives and Labour propose public investment in Sizewell C (Conservative and Unionist Party 2024, p.49). The Conservatives also suggest support for Wylfa (Conservative and Unionist Party 2024, p.49). Reform does not mention existing plants but would fast track small modular reactors The Green Party would scrap new nuclear projects and phase out existing nuclear plants (Green Party 2024, p.12), the SNP and Plaid Cymru rule out nuclear power in Scotland and Wales respectively and the Liberal Democrats don't mention nuclear power.

⁶⁵ This is already implemented and proposed to be beefed up in the Conservatives manifesto (Conservative and Unionist Party 2024, p.49).

mistakes as the Magnox and AGR programmes by backing expensive British designed small modular reactors which are not proven for deployment at scale.⁶⁶ Given the relatively modest scale of the investment and limited ambition, Great British Energy⁶⁷ may prove to be mostly harmless if it only facilitates some extra investment, much of which would have happened anyway. In essence, it largely seems to be a re-incarnation of the Green Investment Bank (created in 2012) which was sold to Macquarie in 2017.⁶⁸ However, if Great British Energy is the main priority of a new Government, the danger is that too much time and effort will be spent on what will, at best be of marginal benefit, and this will distract from the many other areas of energy and climate policy that need to advance over the next parliament for the UK to even come close to being compatible with a net-zero trajectory.

Subsidies: There are important roles for different mechanisms to support low-carbon from research to demonstration to deployment, however, one often cited example, the US Inflation Reduction Act (IRA) is *not* something for the UK to emulate⁶⁹. The IRA is an admission of defeat that in the current US political system a sensible climate policy such as we have in Europe cannot pass through Congress. While the US may gain some benefit in certain technologies from it, the UK cannot hope to compete in a subsidy race with the US (and the EU) and would be better off buying cheap technologies or energy from the US rather than copying their subsidy regime.⁷⁰ At its core, the IRA is a protectionist policy that is intended to deliver a ‘Made in America’ industrial policy approach to decarbonisation. The EU has sought to emulate (but not genuinely replicate) some elements of the IRA in its new Net Zero Industry Act (NZIA) by establishing a non-binding benchmark that 40 percent of so-called strategic technologies should be produced within the EU.⁷¹ In the UK, with the Labour Party’s retreat from its 2021 pledge to borrow £28bn a year, which was seen as a mini-version of the IRA⁷², the only party making a major fiscal commitment is the Green Party, which has pledged to spend £40bn per year on energy and climate.⁷³

⁶⁶ Reform, which is otherwise hostile to subsidies for renewables and which claims to be able to save £30bn per year by scrapping net zero commitments, nevertheless supports a hodgepodge of industrial policies and so want to ‘fast-track clean nuclear energy with new Small Modular Reactors, built in Britain’, as well as supporting ‘clean synthetic fuel’, tidal power and something called ‘clean coal mining’ (Reform UK, 2024, p. 8).

⁶⁷ This is proposed by Labour (Labour Party 2024, p.52). It will subsume Great British Nuclear.

⁶⁸ <https://www.gov.uk/government/organisations/uk-green-investment-bank>

⁶⁹ This is thankfully not mentioned by the Conservatives, Labour or Liberal Democrats (or any of the other parties) in their manifestos.

⁷⁰ <https://www.frontier-economics.com/uk/en/news-and-insights/articles/article-i10390-the-inflation-reduction-act-and-what-it-means-for-the-eu-and-the-uk/>

⁷¹ There is no new funding associated with the NZIA so at most there may be some impacts on public procurement processes. Packroff, J. (2024), ‘Europe’s net-zero industry law will do little for manufacturing ambitions, experts say’, Euractiv, 26 May.

⁷² Pickard, J., Parker, G., McDougall, M. and L. Fisher, What is Labour’s £28bn green investment plan — and will it survive until polling day? *Financial Times*, 10 January.

⁷³ The Green Party suggest that £200bn will be required over the course of the next parliament in the ‘shift to the green economy’ – of this total, one quarter would go to support measures in the power system, one quarter on buildings, another quarter on various transport initiatives and much of the remainder to nationalise the electric (and water) utilities. See Green Party (2024, p.14).

Rationalising Energy Taxes: Energy taxation is currently a somewhat incoherent mess in the UK as in many other countries.⁷⁴ Motor fuel is heavily taxed, electricity is moderately taxed, natural gas is lightly taxed and aviation fuel is not taxed at all. Some economically sensible but politically difficult changes that are needed would be to raise VAT on natural gas and to impose VAT on aviation. Motor fuel taxes pay for the costs of the road network and constitute an effective road user charge.⁷⁵ One of the implications of net zero is the loss of fossil energy tax revenue and the need to start charging (somehow) for road use; and to start taxing aviation.⁷⁶

Prices versus Bills: Regardless of how sensibly taxes are rationalised or subsidy regimes are implemented, the suggestion that energy prices can fall while we still achieve deep decarbonisation is a dangerous misrepresentation.⁷⁷ All decarbonisation scenarios involve substantially lower energy consumption and substantially higher carbon prices, thus the marginal cost of energy will necessarily have to be high. There will be some cheap sources of energy and so the combination of high marginal unit prices and lower consumption might mean energy bills do not have to rise by as much as the marginal unit price.

Interconnected Britain: The notion of energy independence is essentially impossible for a relatively small trading nation like the UK⁷⁸. Global prices are inter-related even under net zero, due to trading between countries. We are heavily interconnected to European gas and electricity systems and we have benefited from the liquidity of the global oil market. We benefit from cheap imports of energy equipment and the ability to export our energy-related goods to markets from whom we accept imports. Oil is the textbook case of a globally traded commodity but increasingly we have seen growth in global trade in natural gas (via pipelines and liquefied natural gas) and electricity (via interconnectors). British success over the long term will be contingent on mutually assured access to one another's markets and common energy security. Thus, if we want to be a 'clean energy superpower'⁷⁹ we will need to access to overseas markets and for

⁷⁴ Newbery, D.M.G. (2005), 'Why Tax Energy? Towards a More Rational Policy', *The Energy Journal*, 26(3):1-39.

⁷⁵ Newbery, D.M.G. (1988), 'Road User Charges in Britain'. *Economic Journal*, 98(390): 161-76. Newbery (2005) argues that in 2000, fuel taxes did cover all of the main externalities of road use. See Newbery, D. M. (2005), 'Road user and congestion charges'. In S. Cnossen (Ed.), *Theory and practice of excise taxation smoking, drinking, gambling, polluting, and driving*. Oxford: Oxford University Press, pp.193–229. This work could be updated to include the latest figures on local health impacts and GHG damages.

⁷⁶ The Liberal Democrats are proposing to tax international aviation (Liberal Democrats 2024, p.81). The Greens are proposing to tax air travel and aviation fuel (Green Party 2024, p.32).

⁷⁷ The Conservatives are promising to 'Cut the cost of net zero for consumers by taking a more pragmatic approach, guaranteeing no new green levies or charges while accelerating the rollout of renewables.' (Conservative and Unionist Party 2024, p.4) whereas Reform UK have promised to abandon net zero entirely (Reform UK, p. 8).

⁷⁸ This is mentioned by the Conservatives (Conservative and Unionist Party, 2024, p.8) and Labour will have an Energy Independence Act (Labour Party 2024, p.51). The Greens do recognise the need for interconnection for a renewables-based electricity system (Green Party 2024, p.10).

⁷⁹ Labour propose this (Labour Party 2024, p.50). The Conservatives want to 'seize the opportunities created by the transition, opening up whole new sectors and creating hundreds of thousands of good jobs in all corners of the country.' (Conservative and Unionist Party 2024, p.49).

the cost of our production to be globally competitive. It would not make sense to subsidise domestic energy production which would then be enjoyed by foreigners.

Deeper EU Relations: A closer energy relationship with the EU should be at the heart of UK energy and climate policy. We should re-couple to the EU ETS⁸⁰ and to the EUPHEMIA electricity market coupling algorithm. This would increase policy effectiveness, reduce trade distortions and improve our credibility on climate policy. It would also mitigate the impact of the EU's carbon border adjustment mechanism (CBAM)⁸¹. Some of the manifestos do mention the introduction of a CBAM, but fail to mention it as a looming problem if this is not fully aligned with the EU⁸². Rather than pointlessly trying to develop an independent CBAM⁸³, the UK should work together with the EU. Recent development of the EU ETS suggests the need to extend UK carbon pricing to heating and transport to increase the coverage of the scheme and to better rebalance gas and electricity prices, in order to reduce the current tax distortion which favours gas use over electricity use for heating and cooking.

Permitting: One area that receives more attention in the manifestos with regard to housing than to energy is the issue of planning permission although the implications for net zero are profound and recognised in some cases.⁸⁴ Achieving net zero at reasonable cost and on anything like the proposed timeline is contingent on effective reforms of the planning system that would allow the needed infrastructure to be built. However, such changes are likely to run into significant opposition at the local level and the challenges of rolling out ambitious reforms should not be minimised.⁸⁵ Such changes may be difficult but are an essential precondition for many different elements in the energy transition.

Residential Heat: The decarbonisation of heating is a major issue for the UK, given its current dependence on natural gas. Heating will be one of the most difficult sectors to decarbonise because as of the end of 2023, it was four times more expensive to replace

⁸⁰ The Liberal Democrats are proposing coupling the UK and EU ETSs (Liberal Democrats 2024, p.27). The Greens propose a comprehensive carbon tax on fossil fuels. They don't mention the UK ETS or the EU ETS (Green Party 2024, p.10), in spite of the fact they are in favour of rejoining the EU (Green Party 2024, p.43), which would imply automatically re-joining the EU ETS.

⁸¹ Evans, S., Mehling, M. A., Ritz, R. A., & Sammon, P. (2021), 'Border carbon adjustments and industrial competitiveness in a European Green Deal', *Climate Policy*, 21(3), 307-317.

⁸² The Conservatives do propose to impose the UK's own CBAM (Conservative and Unionist Party, 2024, p.49). Labour describes in somewhat vague terms that it 'supports the introduction of a carbon border adjustment mechanism' (Labour 2024, p. 56) and similarly, the Lib Dems 'Support British industry to cut emissions by: [...] implementing the carbon border adjustment mechanism' (Lib Dems 2024, p. 28)

⁸³ UK Government (2024). Introduction of a UK carbon border adjustment mechanism from January 2027. https://assets.publishing.service.gov.uk/media/65fc11fef1d3a0001132ac6f/Introduction_of_a_UK_carbon_border_adjustment_mechanism_from_January_2027.docx.pdf

⁸⁴ For example, the Labour manifesto emphasises that the 'current planning regime acts as a major brake on economic growth' and so a Labour government would commit to making the changes needed to deploy 'nationally significant infrastructure'. Labour Party (2024, p.30). Other party manifestos support everything from the Green efforts to 'transform the planning system to reduce the environmental impact of new construction' (Green Party 2024, p. 7) to Reform's call to 'Fast-track new [...] infrastructure projects' (Reform UK 2024, p. 6).

⁸⁵ Sykes, O., & Sturzaker, J. (Eds.) (2023), *Planning in a Failing State: Reforming Spatial Governance in England*. Policy Press.

a gas boiler with a heat pump than with a new gas boiler.⁸⁶ What must happen here is that the current costs of alternative technologies must come down – the UK government has set an aspiration that by 2030 the cost of both purchasing and running a heat pump will be the same as for gas boilers.⁸⁷ There will also need to be significant investment in thermal energy storage to avoid the need for a dramatic increase in generation capacity.⁸⁸ The 2011 Offshore Wind Cost Reduction Taskforce⁸⁹ did get the cost of offshore wind down by that sort of order of magnitude, albeit from a very high base – so what is needed is a similar task force focused on the decarbonisation of residential buildings.

Transport: The decarbonisation of transport offers scope for major improvements to local health and the quality of the local environment. Electrification combined with better road priorities can result in large savings and environmental improvements.⁹⁰ This suggests that urban transport does need to begin to reduce the prioritisation of private cars and that there should be more attempt to radically reduce vehicle sizes and weights for slow speed urban transport.⁹¹

Final comments on policy priorities for the next five years

The UK has been a global leader in terms of policy design for energy and climate and in delivering emissions reductions over the past two decades. It is the next two decades that will determine whether we will meet our ultimate goals of net zero and the next parliament's term is at a critical juncture on that journey.

The problem is that the 'easy' part of the effort is running out. The British economy has shifted away from manufacturing to less energy-intensive services (rising from 70% in 1990 to 81% even as the share of manufacturing fell from 17% to 9%)⁹² and no British leader will want to see manufacturing disappear entirely. Reducing the carbon intensity of the UK power system from over 500gCO₂/kWh in 2013 to around one third of that figure in 2023⁹³ is a laudable achievement but that was largely accomplished by swapping out coal for gas and ramping up renewables and getting below 100g/kWh – let alone to zero – is a daunting prospect.

⁸⁶ NAO (2024), *Decarbonising Home Heating*, National Audit Office <https://www.nao.org.uk/wp-content/uploads/2024/03/Decarbonising-home-heating-HC-581.pdf>

⁸⁷ The current running cost of electric air source heat pump is roughly the same as a gas boiler. A £100 / tonne carbon price for gas would raise the cost of gas by around £200 per year per household, thus roughly justifying a £2500 premium on the cost of the heat pump vs the gas boiler.

⁸⁸ Charitopoulos, V. M., Fajardy, M., Chyong, C. K., & Reiner, D. M. (2023). The impact of 100% electrification of domestic heat in Great Britain. *iScience*, 26(11), 108239.

⁸⁹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/66776/5584-offshore-wind-cost-reduction-task-force-report.pdf

⁹⁰ The Greens do discuss this (Green Party 2024, p.31-32).

⁹¹ The Greens propose to make road tax related to vehicle weight (Green Party 2024, p.32).

⁹² Panjwani, A (2023), *Industries in the UK*, Research Briefing House of Commons Library, 31 October. <https://commonslibrary.parliament.uk/research-briefings/cbp-8353/>

⁹³ [https://www.carbonbrief.org/analysis-uk-electricity-from-fossil-fuels-drops-to-lowest-level-since-1957/#:~:text=The%20remainder%20is%20from%20imports,hour%20\(gCO2%2FkWh\).](https://www.carbonbrief.org/analysis-uk-electricity-from-fossil-fuels-drops-to-lowest-level-since-1957/#:~:text=The%20remainder%20is%20from%20imports,hour%20(gCO2%2FkWh).)

Some low carbon technologies can be rolled out at scale at reasonable cost. Thus, the time is right for a large increase in energy efficiency investments (which are well below their peak number of household interventions⁹⁴), distributed solar panels⁹⁵, and heat pumps, as well as the judicious use of batteries to expand transmission system transfer capacity.⁹⁶

Meanwhile, other technologies are further behind but may have an important role to play in the 2030s and 2040s and should be supported through funding research, development and demonstration (RD&D) activities at scale. For example, green hydrogen⁹⁷, SMRs⁹⁸ and sustainable aviation fuel (SAF)⁹⁹ are currently expensive sources of energy, which may only be necessary in the later stages of decarbonisation but significant investment today in RD&D can help identify whether and which options and pathways are most viable. They are also likely subject to developments globally which can help to bring down their costs via the emergence of international markets or aid their deployment due to multi-country agreements on their use.

If the UK is serious about deep decarbonisation by 2050 then we do not have the luxury of engaging in endless debates over green growth or focusing too much of the government's attention on policies with minimal impact. Rather, the next government will need a laser-like focus on the difficult task of ensuring that the mechanisms and incentives to accelerate deployment and attract the needed investments are effective. Since costs will inevitably increase and be more obvious as we drive down emissions, it is even more critical that we identify the least-cost paths to emissions reductions going forward. We will also need to pay attention to emerging cost information, overall policy credibility (which itself reduces costs) and take the sequencing of policies seriously (as this best exploits the cost benefits of learning¹⁰⁰).

Evidence of a populist backlash against green policies from around Europe highlights further the need to keep a close eye not just on total costs but on distributional

⁹⁴ https://assets.publishing.service.gov.uk/media/6656084d8f90ef31c23ebb57/HEE_Stats_Release_-_MAY_2024.pdf

⁹⁵ The Liberal Democrats (Liberal Democrats 2024, p.23) suggest expansion of energy efficiency and distributed solar panels.

⁹⁶ We should be careful not to repeat the mistake of the overly costly initial rollout of solar panels in 2011-12. The lucky recipients of the initial feed-in tariff are currently receiving 66p / kWh (41.3p/kWh indexed to RPI).

⁹⁷ Labour mentions a £500m investment in green hydrogen (Labour Party 2024, p. 27). The Liberal Democrats are proposing to invest in this to improve energy security (Liberal Democrats 2024, p.26). The Greens also want to support green hydrogen (Green Party 2024, p.12).

⁹⁸ The Conservatives are committing to 'approve two new fleets' of SMRs within one hundred days of the next parliament (The Conservative and Unionist Party 2024, p.49)

⁹⁹ The Conservatives, Labour and the SNP all mention SAF in their manifestos (The Conservative and Unionist Party 2024, p.8; Labour Party 2024, p. 33; SNP 2024, p. 22) whereas the Green Party (2024, p. 32) says nothing about SAF and instead focuses on measures such as a frequent flyer levy and a ban on short-haul domestic flights.

¹⁰⁰ Grubb, M. & Haj-Hasan, N. & Newbery, D. (2008), 'Accelerating innovation and strategic deployment in UK electricity: applications to renewable energy'. In Grubb, M., Jamasb, T. and Pollitt, M.G. (Eds.) *Delivering a Low-Carbon Electricity System: Technologies, Economics and Policy*, pp.333-360.

impacts.¹⁰¹ The poor and vulnerable need to be protected and the overall incidence of climate and energy policy needs to be progressive and demonstrably well managed. Climate policy co-benefits – such as better health outcomes, reduced congestion, increased overall resource sustainability - need to be recognised and taken proper account of wherever possible. Decarbonisation is a global challenge, and we need to be open to greater cooperation with other countries and learning from abroad. Further, the scale of the transition means we cannot tolerate industry rent seeking, ideological attachment to fixed approaches or an unwillingness to learn from experience. Rather we need to recognise that the path ahead will be difficult and will require experimentation, and flexibility in our mindset and world class delivery from our institutions. If any country has the experience, skills and resourcefulness to lead the world in these areas, it is the UK, but the next five years will present a demanding series of tests for any new government we elect on July 4th.

¹⁰¹ Patterson, J. J. (2023), 'Backlash to climate policy', *Global Environmental Politics*, 23(1): 68-90.