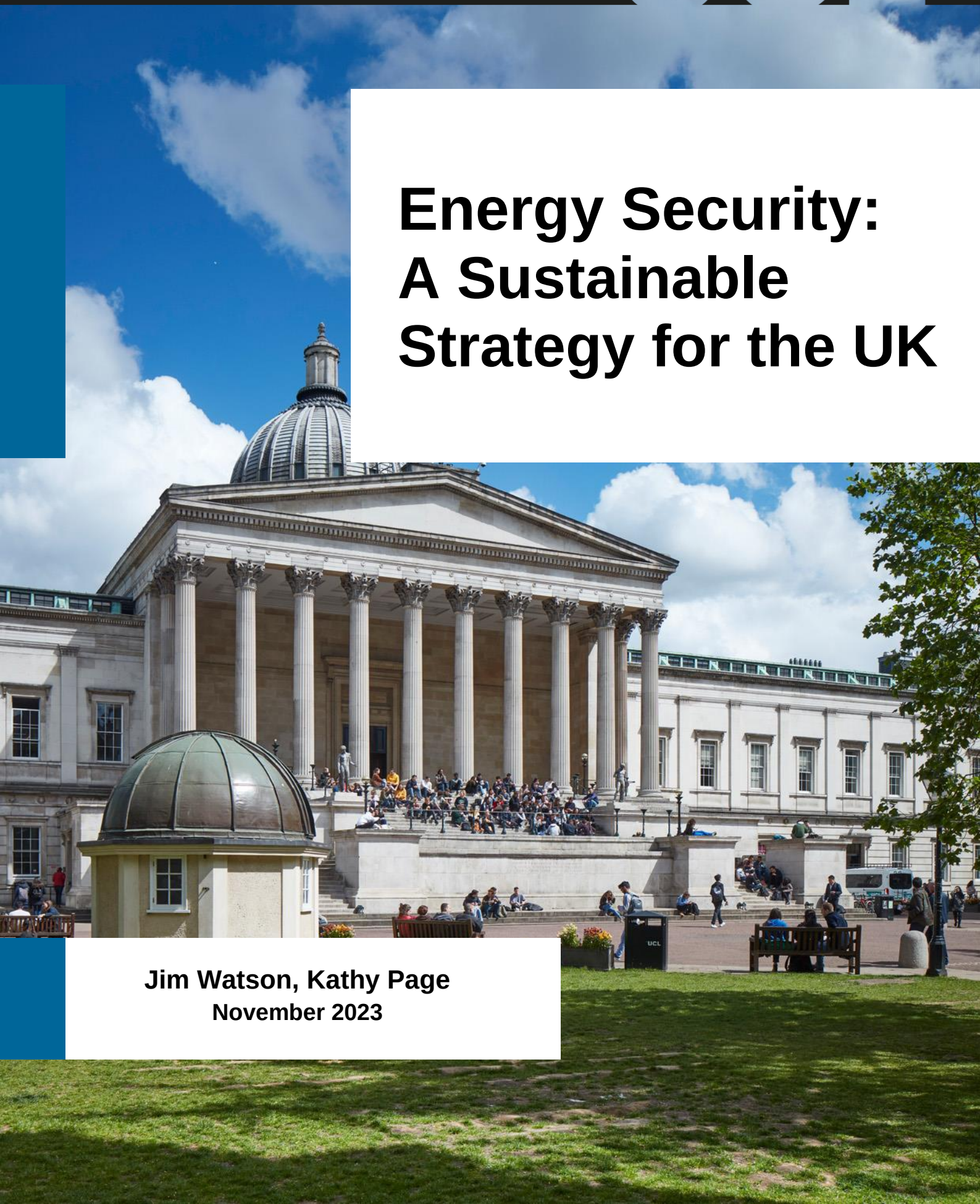
UCL Institute for Sustainable Resources

Energy Security: A Sustainable Strategy for the UK



Jim Watson, Kathy Page

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Summary and Recommendations

Russia's invasion of Ukraine in early 2022 has brought energy security centre stage once again. This has led to rapid responses and new strategies by Governments throughout Europe and other regions. The UK government responded quickly with a new energy security strategy, which was updated earlier this year in *Powering Up Britain*[1]. Some elements of the strategy are welcome, but there are also significant gaps. A more comprehensive and coherent strategy is urgently needed that integrates energy security with the imperative to tackle climate change. This should include:

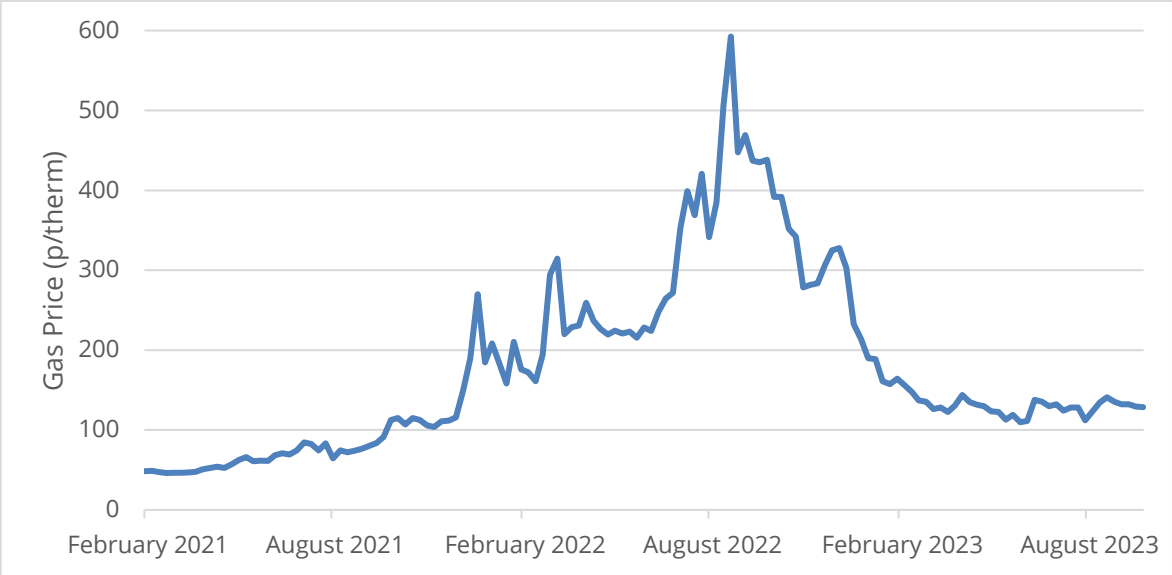
1. Much more **action to reduce energy demand**, including policies and funding to drive a rapid acceleration in home energy efficiency and heating upgrades.
2. **A social tariff** to shield the most vulnerable citizens from the impacts of high prices.
3. More **rapid deployment of non-fossil energy sources at scale**. This should prioritise the cheapest renewable energy sources (solar and wind), faster electricity network development and stronger incentives for the deployment of electric vehicles and heat pumps.
4. **A strategy to manage the decline of UK oil and gas** production and the role of fossil fuels in the energy system. This should include investment to ensure resilience of the gas system as demand declines and a broader strategy for a skills transition in the supply chain.
5. **Monitoring and managing the full range of energy security risks**. This includes the risks associated with the legacy fossil fuel energy system, and emerging risks associated with critical materials, digitalisation and interconnection.

[1] HM Government (2023) Powering Up Britain. London: HMSO; https://www.gov.uk/government/publications/powering-up-britain

Background

The current energy crisis started in 2021, when gas prices began to rise as economies recovered from the immediate effects of Covid restrictions (Figure 1).

Figure 1: Weekly average gas prices for forward delivery contracts



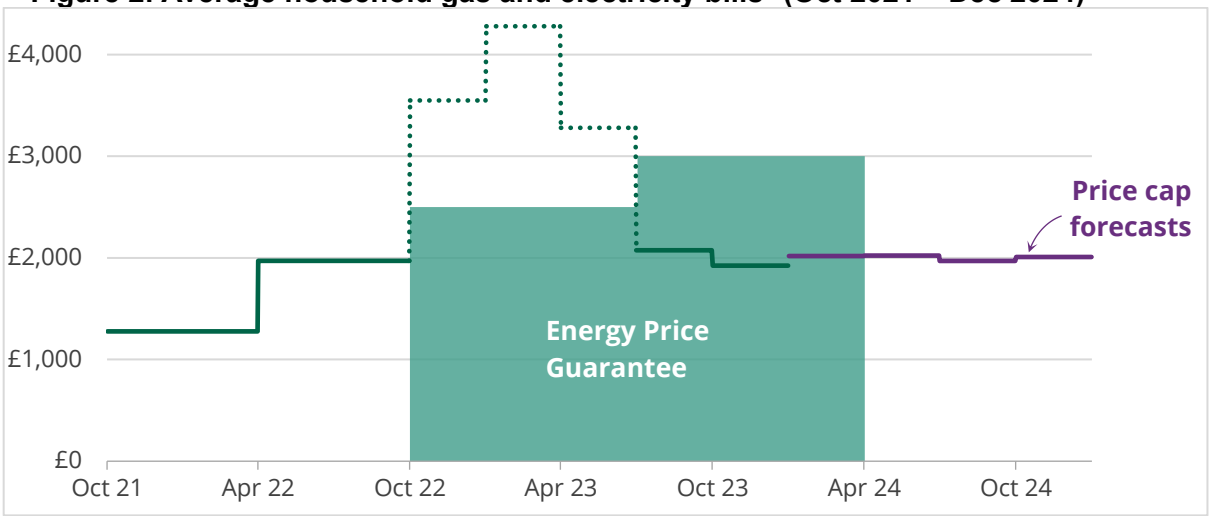
Source: Ofgem wholesale market indicators, accessed 7th November 2023; https://www.ofgem.gov.uk/energy-data-and-research/data-portal/wholesale-market-indicators

These increases were also driven by Russian restrictions on gas supplies to Europe during that summer. Russia's invasion of Ukraine in February 2022 accelerated these increases and led to a period of unprecedented prices in Europe. In some countries including the UK, the rise in gas prices also fed through into sharp increases in electricity prices. This is because gas-fired electricity generation often sets the price in the UK's wholesale electricity market, even when it is not generating most of our electricity.

The scale of these price increases led to rapid action by governments throughout Europe and beyond. Large subsidies were introduced. In the UK, a price cap was already in place to limit the average electricity and gas bill for households. This was introduced in January 2019 because the energy regulator concluded that energy suppliers were overcharging households who were on default or variable tariffs. When it became clear that the cap was due to rise dramatically, the Energy Price Guarantee was implemented in October 2022. This limited average bills to around £2,500. This was more than double the average bill just two years earlier (Figure 2). According to the government, it spent a total of £94bn supporting households due to high energy and other bills in the last two financial years (2022/23 and 2023/24)[2]. This includes around £30bn of spending on the Energy Price Guarantee.

[2] HM Treasury (2023) Spring Budget 2023. London: HM Treasury.

Figure 2: Average household gas and electricity bills* (Oct 2021 – Dec 2024)



*Annual bill equivalent for current typical levels of consumption, direct debit dual fuel customers.
Source: House of Commons Library (2023) Gas and electricity prices under the Energy Price Guarantee and beyond; https://researchbriefings.files.parliament.uk/documents/CBP-9714/CBP-9714.pdf. Thanks to the House of Commons Library for allowing the recreation of this figure.

What is Energy Security?

The International Energy Agency defines energy security as 'the uninterrupted availability of energy sources at an affordable price'[3]. Whilst there have not been significant supply disruptions in the UK during the current crisis, energy has been unaffordable for many households – even when government subsidies are taken into account.

Strategies to achieve energy security are both complex and contested[4]. They include shorter-term strategies to ensure affordability (e.g., financial help to households such as the Energy Price Guarantee), and longer-term strategies to shift us away from high cost and/or unreliable energy sources (such as the broader strategy to increase investment in low carbon electricity technologies and carriers such as renewables, nuclear power and green hydrogen).

Energy security is often conflated with 'home grown energy' that is produced in the UK. This is due to a perception that domestic energy resources are more secure than energy from other countries. There are four key reasons why this might not be the case:

- First, domestic resources might be inherently limited. For example, the UK imports around half of the gas it needs because production in the North Sea is declining.

[3] https://www.iea.org/topics/energy-security
[4] Mitchell, C., Watson, J. and Whiting, J. (eds) (2013) New Challenges in Energy Security: The UK in a Multipolar World. Palgrave Macmillan.

- Second, other countries might be able to produce energy more cheaply – so importing some of the energy we need can be part of a strategy to keep costs down.
- Third, most of the oil produced by the UK is exported, and the UK has to buy the oil it needs from the international market at international market prices. So there is no benefit for affordability from domestic production.
- Fourth, resources that are apparently 'domestic' often depend on international supply chains for technologies and/or the minerals used to manufacture them. This applies to most energy technologies.

Energy security often gets reduced to 'security of supply'. In other words, discussions and policies have a tendency to focus on the security of energy sources. They often neglect the role of secure supply chains and network infrastructure - and the role of energy demand – in strengthening energy security. As Winston Churchill famously observed in the early 20th Century[5], diversification of energy sources and supply chains is a very important energy security strategy to avoid over-dependence on particular countries or supply routes.

Reducing energy demand, for example through insulating homes more effectively, can make a significant difference to household bills – and therefore improve energy affordability, especially at times of high prices.

Are Current Policies Fit for Purpose?

The government's strategy set out in *Powering Up Britain* is an improvement over the *British Energy Security Strategy*. Whilst it discusses increasing energy independence, the revised strategy recognises the interconnected and international nature of energy markets, technologies and resources. However, it has four significant flaws.

First, it continues the tendency to focus on security of supply. It is not ambitious enough on measures to reduce demand and lower the exposure of households and businesses to high prices. A new target to reduce demand from industry and households by 2030 was introduced a year ago[6]. However, this was recently abolished along with the Task Force that was appointed to advise the government on how to meet it. Despite some targeted schemes and demonstration programmes, upgrading the UK's inefficient housing stock is not receiving enough attention or resources.

Second, it is too long-term. Ambitious targets for non-fossil technologies such as floating offshore wind, nuclear power and green hydrogen are set out. But these targets focus on technologies that might not deliver until the 2030s and beyond. There is not enough complementary action to deploy the cheapest non-fossil technologies that are already available. The quicker the UK can

[5] Yergin, D. (2006) Ensuring Energy Security. *Foreign Affairs* March/April 2006.
[6] HM Government (2023) Powering Up Britain. London: HMSO.

deploy technologies such as solar and current designs of onshore and offshore wind, the more impact this will have on our near-term dependence on fossil fuels. Despite recent reforms[7], current policies still make it difficult for new onshore wind developments in England and Wales. Onshore wind projects are subject to more stringent planning rules than other technologies, despite it being one of the cheapest electricity generation technologies. Offshore wind, while more expensive than a few years ago because of inflation and supply chain cost increases, is still cheaper than gas-fired electricity. Failure to procure any offshore wind in the last contract auction was a major blunder.

Third, there is not enough emphasis on measures to increase the resilience of our energy system - including measures to ensure sufficient diversity of technologies, sources of energy and minerals and supply routes. The strategy contains no analysis of the current levels of diversity and resilience of the UK energy system – so it is hard for the government and other stakeholders to assess where our vulnerabilities lie, and to monitor the impact of policy and other changes. There is also a lack of attention to large-scale energy storage, which has the potential to strengthen the resilience of a decarbonised electricity system. The Royal Society recently concluded that solar and wind could generate the electricity the UK requires if sufficient large-scale storage is deployed at the same time[8].

Finally, increasing commitments to new oil and gas licences raise serious questions about the government's commitment to a security strategy that is compatible with international action on climate change. New licensing could slow down the rate of decline of UK oil and gas production. However, it is unlikely to have a significant impact on affordability for households and businesses because prices of these fuels are set through international markets. It also risks damaging the UK's reputation for leadership on climate change, and the UK's ability to persuade other countries to increase their levels of ambition.

What Would a Better Energy Security Strategy Look Like?

1. **Reduce energy demand.** Energy efficiency and measures to reduce demand should be at the heart of any serious energy security strategy. This does not mean a poorer quality of life. It does mean ensuring that households and businesses can access the services they need such as heat and power whilst using less energy. Recent research by academic colleagues in the Centre for Research into Energy Demand Solutions (CREDS) showed how demand could be reduced by more than 50% by

[7] Rankl, F. (2023) Planning for Onshore Wind. Research Briefing SN4370. House of Commons Library; https://commonslibrary.parliament.uk/research-briefings/sn04370/
[8] The Royal Society (2023) Large-Scale Electricity Storage. London: The Royal Society; https://royalsociety.org/topics-policy/projects/low-carbon-energy-programme/large-scale-electricity-storage/

2050[9]. They argue that reducing demand has the added advantage of reducing the amount of zero carbon energy that is required to meet net-zero.

   - A key priority for demand reduction is energy efficiency investment in homes. Whilst government has made available some funding for households on low incomes, there is very little support for other households. Compared to the situation 10 years ago when successful policies were discontinued, the pace of home insulation improvements has collapsed[10]. An improved energy security strategy should include clear plans to reverse this situation, and to deliver a rapid increase in the rate of deployment through a combination of stricter regulations and the provision of public and private finance. There is also a need to upgrade capacity and skills within the construction industry, building on lessons from demonstration programmes the government has already funded[11]. Similarly missing is tailored, independent advice and monitoring for households to ensure that retrofits are appropriate for their needs and of a high quality.

2. **Introduce a social tariff**. The government will need to continue to shield the most vulnerable households from the current period of high prices – and future price shocks. A broad subsidy for all households such as the Energy Price Guarantee can only be implemented for a limited period of time due to high costs. However, this could be replaced by a more targeted policy to limit and reduce the number of households in fuel poverty. A recent report by our UCL colleagues argues that a social tariff should support households that are spending more than 10% of their income on energy[12]. They suggest a 30% discount that is applied directly to energy bills of eligible households – and targeting the discount by combining income and energy use data.

3. **Accelerate the shift from fossil fuels.** The government's latest energy security strategy sets out significant plans to increase the deployment of renewable and other low carbon sources of energy. This includes ambitious targets for some renewables, nuclear power and technologies that could reduce emissions from fossil fuel use such as carbon capture and storage. An improved strategy would build on this, with a primary emphasis on five priorities:

   - Accelerating the deployment of those technologies with the lowest costs – solar and wind. To unlock their potential, planning reforms

[9] Barrett, J. et al (2021) The role of energy demand reduction in achieving net-zero in the UK. Oxford: Centre for Research into Energy Demand Solutions; https://low-energy.creds.ac.uk
[10] Climate Change Committee (2023) Progress in Reducing Emissions. 2023 Report to Parliament. London: CCC
[11] For example, the Whole House Retrofit programme which was initiated in 2019 https://www.gov.uk/government/collections/innovations-in-the-built-environment#whole-house-retrofit-(whr)-competition
[12] McNally, P. et al (2023) The Case for a Social Tariff: Reducing Bills and Emissions, and Delivering for the Fuel Poor. Report for the Aldersgate Group; https://www.ucl.ac.uk/bartlett/sustainable/sites/bartlett_sustainable/files/report_-_the_case_for_a_social_tariff_-_reducing_bills_and_emissions_and_delivering_for_the_fuel_poor31.pdf

are required to ensure that onshore wind and solar are treated in the same way as other energy technologies.

- Learning lessons from the recent renewables auction, which failed to award any contracts to offshore wind. A new auction round should be run as soon as possible taking into account the impact of inflation on costs. This should ensure that the UK continues its track record of leadership in this technology.
- Reforming planning for electricity networks so that developers of renewables can connect to the network on a realistic timescale. As the Winser report argued recently[13], connection times are much too long and there is a lack of strategic planning of networks to facilitate the transition to net zero.
- More incentives for system flexibility and storage. This is required to ensure that a zero-carbon electricity system with high shares of renewables can operate with a high level of reliability and resilience. Whilst battery storage deployment has increased significantly in recent years, the recent Royal Society report[14] highlights the crucial role of large-scale and longer-term storage.
- Ensuring that the uptake of electric vehicles continues at pace, and that the deployment of heat pumps increases significantly from current low levels. It is not the time to delay the phase out of petrol and diesel vehicles. On heat pumps, the UK is at the bottom of the European league table[15]. Whilst the government has increased the financial help to individual households that install heat pumps (from £5000 to £7500), the overall amount of funding available is too small to meet the government's own targets for heat pump deployment.

4. **Manage the decline of fossil fuels.** The recent energy crisis has demonstrated that the energy transition is likely to be complex and challenging at times. It is therefore essential to proactively manage the declining role of fossil fuels over the next few decades. Issuing new oil and gas licenses in the UK is not the right response. It will do little to reduce energy prices and consumer bills. Projections from the North Sea Transition Authority (the oil and gas industry regulator) show that new sources of production will not reverse the decline in UK production – they will only slow the rate of decline. Instead, the government should:
    - Ensure that this declining role of fossil fuels is managed. As Mike Bradshaw has argued, this includes pursuing a policy of 'gas by design' rather than 'gas by default' to reflect the changing role of gas in the transition to net-zero[16]. Such a deliberate strategy

[13] Winser, N (2023) Electricity Networks Commissioner Report to the Secretary of State; https://es.catapult.org.uk/report/electricity-networks-commissioner-report/
[14] Royal Society (2023) Large-Scale Electricity Storage. London: The Royal Society.
[15] Millard, R. et al (2023) The humble heat pump blows a green wave across Europe. Financial Times, 7th August 2023; https://www.ft.com/content/acd6e873-751a-46bc-b789-52fc49165833
[16] Bradshaw M. (2021) Still Waiting on 'Gas by Design'. UK Energy Research Centre; https://ukerc.ac.uk/news/still-waiting-on-gas-by-design/

includes ensuring that there is sufficient diversity of gas supplies and investing in more gas storage capacity to improve resilience.

- A 'gas by design' policy should also include the future of gas networks. Ofgem and the gas network companies need to plan for declining gas demand, and the implications for funding the ongoing costs of operating and maintaining the gas network. Whilst many studies do not see a major role for home heating with hydrogen[17], this planning process should also identify any specific regions where hydrogen might make sense (e.g., because of proximity to industrial sites where hydrogen is likely to be used).
- Work with industry on a transition strategy for skills and jobs. This should extend beyond the North Sea Transition Deal which focuses on the upstream oil and gas industry. A comprehensive strategy should also include those working on the demand side, particularly gas appliance installers, to help them diversify their skills to include low carbon technologies such as heat pumps.

5. **Monitor and manage the full range of risks**. The government already monitors and assesses some risks to energy security, but this needs to go further. At present, the focus of published annual data is on import dependency and capacity margins for electricity and gas (the difference between capacity availability and demand). This is complemented by annual assessments of gas and electricity security by National Grid. The government should go further than this to include a wider set of indicators[18]:
    - Assessments of current and future diversity within the electricity, gas and wider energy systems. This would integrate the important point made by Winston Churchill a century ago – and apply it to the current and future energy system.
    - More comprehensive data on energy efficiency. Given the importance of demand reduction for energy security, monitoring progress in specific sectors – particularly buildings – should be much more systematic, including historical data.
    - Data and assessments of new risks to energy security including sources and diversity of critical minerals, the vulnerability of electricity infrastructure to disruptions (including the vulnerability of international interconnectors), and cyber security. The International Energy Agency already includes the assessment of critical minerals in its assessment of the security implications of the energy transition, for example.

[17] The most recent example is the National Infrastructure Commission's Second National Infrastructure Assessment; https://nic.org.uk/studies-reports/national-infrastructure-assessment/second-nia/
[18] Watson, J et al (2018) The Security of UK Energy Futures. Research Report. UK Energy Research Centre.