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The role of public power

The potential for a publicly owned energy business in Britain

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Executive summary

- Although the immediate surge in energy prices caused by the war in Ukraine and by the reduction in Russian gas exports has passed, the events of the past year have exposed the failings of the UK's current energy policy. These include the very limited progress being made on the climate agenda and the absence of an industrial base which can deliver on that agenda without relying to an unsustainable degree on imports.

- There is a serious role for a publicly owned enterprise as part of a coherent energy strategy which should also include stronger regulation and clarity on funding of the key policy steps promised but not yet delivered. The Great British Energy company (GBE), proposed by Labour leader Sir Keir Starmer, cannot solve all the problems of the energy sector or control short-term prices, which will continue to be set by the international market. GBE could, however, focus investment on a number of key areas in the transition and help ensure that most of the jobs created by that investment are located in Britain.

- The passing of the Inflation Reduction Act in the United States which provides extensive subsidies to low carbon industries and the proposal from the European Commission for an EU Net Zero Industry Act leave the UK trailing in the competition for low carbon industrial development and the jobs it will bring. If we do not develop a green industrial base and some elements of competitive advantage, the energy transition in the UK will remain dependent on imports produced in countries which are already investing on a substantial scale. The potential to create high-quality jobs in Britain will be lost.

- GBE could be shaped in a number of different ways. One option would be to create a new generating company producing low-carbon energy, but the costs of that option would be high and the benefits limited. A better option would be to control the retail side of the energy market through stronger regulation and to establish GBE as a strategic investor helping to create a low-carbon industrial base in Britain.

- A new company cannot be created overnight, or be expected to deliver instant results. GBE must be established as a long-term contributor to the delivery of policy, working within a clear remit set by government but operating independently and free of micromanagement by politicians or officials. To build for the long-term, GBE must not be seen as a partisan venture.

- The company will require experienced and qualified staff and management who should be appointed on the basis of their expertise and knowledge rather than their political allegiance.

- To attract such staff, who are in high demand across the global energy sector, the company must be securely funded from the beginning. Funding from windfall taxes or a carbon tax would be an insufficiently secure base from which to build a new company. Public spending will be under pressure from all sides and the potential for additional borrowing is limited. Therefore, to maximise the impact of GBE the company should use whatever public funds are available to leverage private investment in support of its objectives.

- The company should work in partnership with businesses already operating in the sector on the basis of shared goals and objectives.

- GBE can play an important role in developing the necessary skills for a low-carbon industrial sector through existing colleges and universities across the country. It can also help communities develop their own energy plans, creating local jobs and supply chains.

- A business plan for the company needs to be prepared with an agreed remit, a clear explanation of its finances and an initial view of immediate priorities. A shadow board should be created to produce such a plan as a matter of urgency.

Introduction

After years of neglect, energy policy has become a central focus of public concern and political debate. Insecurity of supply in the face of Russian aggression and years of underinvestment have contributed to a dramatic rise in consumer prices. Government action has limited the impact on bills for the immediate future but has not resolved the long-term problem – how can the UK make itself more resilient in the fact of volatile international markets and in parallel move towards the goal of an affordable low-carbon economy?

In response to this situation, Labour leader Keir Starmer has proposed the creation of a national energy company – Great British Energy (GBE). This paper seeks to explain the positive roles such a company could play, how it could help to build a low-carbon industrial sector in the British economy and the ways in which the entity could be financed. The aim is to demonstrate how a new enterprise could fill some of the gaps so evident in the current system and help transform energy from being a source of insecurity and economic damage into a driver of growth, employment, trade, security of supply and an affordable transition to a low-carbon economy.

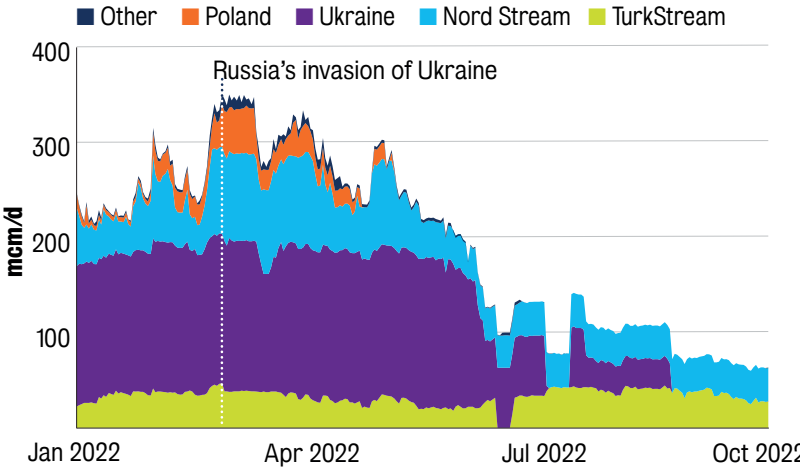
The context

The events of the past 18 months have exposed the absence of an effective energy policy in the UK. The belief that globalised energy markets would always serve the best interests of consumers and businesses in Britain was proved to be both wrong and dangerous as soon as the flow of supplies was threatened and prices began to rise.

In the spring of 2021 demand rose sharply as the economy in China and elsewhere in Asia came out of the Covid recession. Benchmark prices for natural gas in Asia rose more than three-fold in a matter of months, with a knock-on effect on global prices as gas trade in the form of liquified natural gas (LNG) was drawn into the Asian market.

Then in February 2022 Russian forces invaded Ukraine, triggering a chain of events which by the end of the year had reduced Russian gas supplies to Europe from around 45/50 per cent of total demand to less than 20 per cent. Having become a significant importer of natural gas,

FIGURE 1: Natural gas pipeline flows from Russia to the European Union and Turkey since January 2022



Source: IEA, World Energy Outlook 2022.

Britain had no choice but to pay the prices being set by the international market and to resort to large-scale government financial support for households and businesses faced with unaffordable increases in costs.

The consequences of the borrowing required – higher interest rates and a new period of enforced austerity – have yet to be felt in full. Although what precipitated the chain of events described above was beyond the control of any individual country, the UK was ill-prepared to respond and is now paying the cost of the lack of resilience built into Britain's energy market.

One serious failure exposed by the events of the last two years has been the absence of any significant amount of storage for natural gas supplies. Although the UK's direct imports of gas from Russia before the invasion of Ukraine were minimal, the prices which the UK has to pay for its imports of gas are unavoidably linked to developments in the European gas market.

Germany, France and the EU have always maintained a material level of stocks. At the beginning of 2023 those stocks amounted to a quarter of annual consumption. Their presence has helped to limit the impact of the cut-back in Russian supplies and has removed the speculative fears of major shortages and rationing which drove prices to unprecedented levels six months ago.

In the UK, by contrast, the levels of stocks have been close to zero since the closure in 2017 of the storage facility, capable of holding up to 100 billion cubic metres, at the Rough field in the North Sea. The closure was forced by the unwillingness of the government either to fund the necessary renovation of the facility or to require the retail sector to fund the stocks themselves. No one in government, it seems, considered that holding reserves was a necessary insurance policy in a market famous for its volatility, or questioned whether the UK was really uniquely placed to meet its needs without storage in contrast to every other major European economy.[1]

The crisis also exposed the UK's clumsy regulatory system. As prices rose OFGEM suddenly found that 29 of the energy suppliers it has licensed did not have the financial capability to cope with fluctuating

prices. No financial adequacy test has been applied by a regulator which in its mission statement proclaims itself as existing in order to defend the interests of consumers. As the failed companies went out of business in the closing weeks of 2021, millions of customers had to be transferred to other suppliers. The cost amounted, according to a report from the Public Accounts Committee, to over £2.7bn – a cost

FIGURE 2: Natural gas stocks by country, Jan 2023

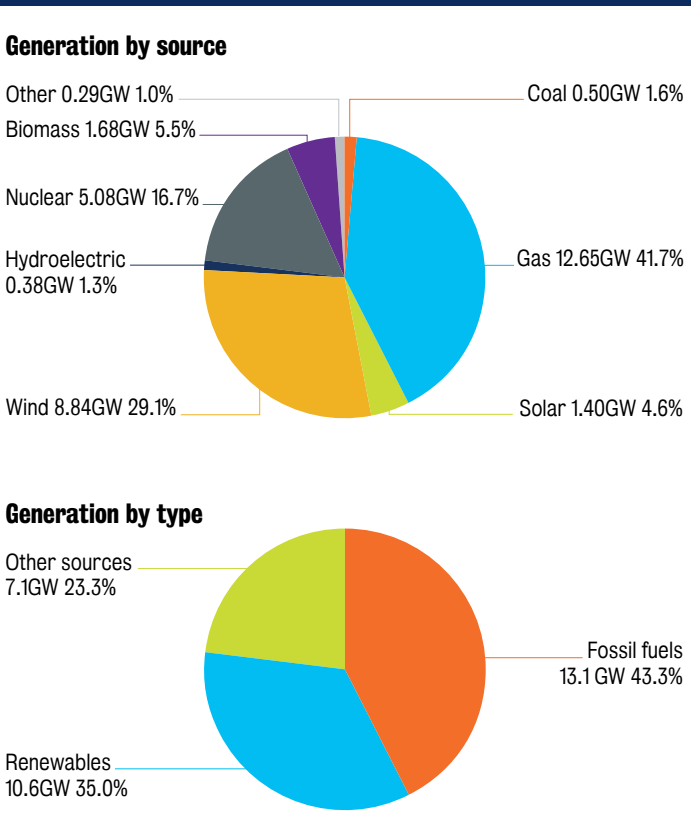
Name Selected date: 13/01/2023	Gas in storage TWh	Full %	Trend %	Consumption TWh	Stock/Cons
EU	916.8059	81.88	-0.24	3776.4337	24.28
Austria	83.9364	87.4	-0.23	90.1387	93.12
Belgium	6.8021	89.39	-0.04	169.6062	4.01
Bulgaria	4.7691	82.19	0	33.0200	14.44
Croatia	4.3677	91.52	-0.07	28.2602	15.46
Czech Republic	37.8865	86.48	-0.12	90.6943	41.77
Denmark	9.0964	91.51	-0.03	23.1592	39.28
France	106.9157	80.03	-0.45	430.4139	24.84
Germany	223.2027	90.53	-0.11	905.3031	24.66
Hungary	44.5126	65.75	-0.4	107.8658	41.27
Ireland	-	-	-	50.8989	0
Italy	154.0181	79.62	-0.38	725.0259	21.24
Latvia	11.1362	46.26	0	11.5885	96.1
Netherlands	105.497	75.93	-0.15	350.6667	30.08
Poland	34.834	95.67	-0.15	232.4541	14.99
Portugal	3.8994	98.29	0	58.6354	6.65
Romania	24.4327	74.5	-0.6	114.3571	21.37
Slovakia	28.4409	73.21	-0.11	53.2106	53.45
Spain	32.9687	93.53	-0.04	338.9865	9.73
Sweden	0.0896	88.42	0	13.0475	0.69
United Kingdom (Pre-Brexit)	-	-	-	-	0
Non EU	85.0031	25.49	-0.17	1030.5274	8.25
Serbia	-	-	-	-	0
Ukraine	75.3914	23.29	-0.17	261.0519	28.88
United Kingdom (Post-Brexit)	9.6117	97.84	-0.17	769.4755	1.25

Source: Aggregated Gas Storage Inventory.

payable through a levy equivalent to £94 on every household bill.[2] The subsequent failure of one of the larger suppliers, Bulb Energy, will add to those totals at a cost estimated at over £6bn.[3]

The regulatory failures did not stop there. As prices rose on the global natural gas market, the regulator increased the energy price cap – a device designed to set the maximum price per unit which retailers could pass onto consumers. The calculation of the cap, however, was shown to be flawed – a flaw now belatedly recognised by OFGEM itself. Tying prices to the wholesale price being paid for natural gas on the European market is a perfectly

FIGURE 3: UK power generation in 2022



Source: grid.iamkate.com.

reasonable starting point for the regulation of the price of gas supplies to final consumers. But gas-fired power is not the only source of electricity. As this table shows, in 2022 58 per cent of UK electricity came from non-hydrocarbon sources – wind and solar, hydro, and from nuclear plants, all of which have been able to lift consumer prices in line with the cap, even though their costs have not increased.

By the spring of 2023 European prices for oil and natural gas had fallen back to pre-war levels as the global market adjusted. Russian oil found markets in Asia and Africa, and Europe succeeded in replacing Russian supplies with gas from elsewhere. The challenges exposed by the events of the last year have not, however, been resolved. Britain, in common with Europe as a whole, is still dependent on energy imports and therefore vulnerable to uncontrollable events around the world. A surge in Chinese demand or delays in new gas developments could still trigger a further squeeze in supplies next winter. Meanwhile the system of energy regulation in the UK remains broken.

The longer-term challenges

In addition to these immediate problems, the most fundamental energy challenge which has not been addressed is the need to deliver on the commitments made by successive governments to reach net zero by 2050.

At the end of Theresa May's administration in 2019 the UK became the first country to set a legally binding goal of reducing emissions to net zero by 2050.[4]

Since then a series of announcements and pledges, each more ambitious than the last, have been made, including a 10-point "plan" put forward by then Prime Minister Boris Johnson in November 2020.[5] The 10 points have yet to be translated into a programme of action. Delivery on the goal of reducing emissions by 78 per cent from a 1990 base line by 2035 remains no more than an aspiration.

Several things are worth noting from this recent history.

- Despite relatively consistent if limited economic growth, total energy demand has fallen – mainly as a result of the decline of heavy industry and manufacturing and a gradual improvement in the efficiency with which we use energy.

- The use of coal has been almost completely eliminated – initially for political reasons after the miners' strikes of the 1970s and 80s, but more recently through regulations designed to reduce greenhouse gas emissions.

- Hydrocarbons – that is, oil and gas – still account for almost 80 per cent of total supply, with a shift over time in favour of natural gas as the main source of energy for power generation, home heating and industrial use.

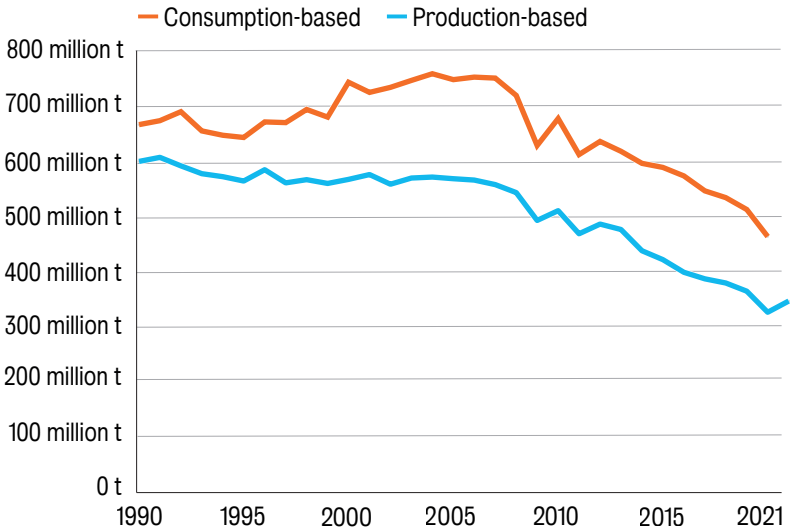
- Production of electricity from nuclear power plants has declined over the last decade. Older plants have been decommissioned as they reached the end of their working lives. 20 years ago nuclear

power provided 25 per cent of electricity supply. That figure has now fallen to less than 15 per cent in 2022. With new nuclear capacity still years away from coming onstream, nuclear output is likely to decline still further in the years ahead as more older plants are retired.

- Since the turn of the century North Sea oil and gas production has plateaued and declined. The UK is no longer self-sufficient in oil and imports half of its natural gas requirements. Over the last decade imports of electricity through interconnectors with France and Belgium have grown and now account for around 8 per cent of daily needs. On current trends import dependence will continue to grow.

- Production from wind and solar power plants is growing and in 2022 supplied some 28 per cent of all electricity. Electricity, however, accounts for no more than one fifth of total energy consumption, which means that renewables, despite strong

FIGURE 4: Production vs consumption-based CO2 emissions, United Kingdom



Source: Our World in Data (2022), based on the Global Carbon Project.

growth and falling costs account for no more 7 to 8 per cent of the energy we use each day. The full potential of wind in particular remains unfulfilled because of resistance to the development of new onshore wind power other than in Scotland. Offshore wind is constrained by the problems being encountered in bringing power ashore because of the difficulties associated with planning consents.

As the figures quoted above demonstrate, the UK energy system has changed considerably over the last half-century. By international standards the UK has done well in achieving emissions reductions, although the raw data needs to be read with care because it does not reflect the carbon content of emissions associated with the products we import.

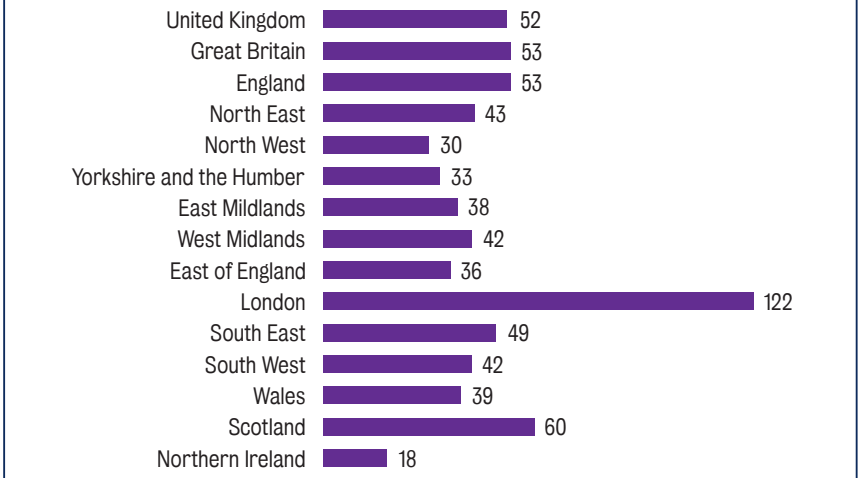
Although the UK's emissions represent only just over 1 per cent of the global total, national ambitions can indeed be valuable in setting an example to others, and in developing technologies which can be used around the world. But to achieve anything, the ambitious targets have to be delivered.

In the face of the volatile market seen over last 18 months, the pace of the energy transition has weakened. Several further steps have been identified for future action – including the transformation of home heating, renewal of the ageing nuclear fleet, and a transition to electric vehicles – but delivery has not yet matched the rhetoric.

The limited amount of charging infrastructure and the wide divergence of the levels of coverage between different parts of the country hold back those who might otherwise switch away from petrol driven vehicles.[6]

A target of installing 600,000 heat pumps each year by 2028 has been set but the funds available to support those who cannot afford to switch are minimal. There is no clear policy to promote efficiency – in sharp contrast to the position in several European countries including Germany, where governments have used the immediate crisis of 2022 to push through serious reductions in demand with great success. There is no clear funding mechanism for the new nuclear sector

FIGURE 5: Public charging devices per 100,000 of population by UK country and region: 1 October 2022



Source: Department for Transport, Electric vehicle charging device statistics: October 2022.

despite the need to replace older generation capacity. The possibility of building a new British nuclear business is being held up despite the fact that Rolls Royce is ready to proceed and believes it could bring the first small modular reactor onstream within 10 years.

The one battery production facility which had been planned was abandoned in January 2023 as the company involved, British Volt, went into administration.[7] In May 2023 it was reported that agreement had been reached on the construction by Jaguar Land Rover of a battery plant in Somerset. This is a welcome development but should be seen in the context of the 30-plus gigafactories planned or under development across Europe, including 10 in Germany. Crucially, most of these plants are close to large-scale vehicle production facilities. As Europe embraces the growing use of electric vehicles Britain will need far greater battery production facilities if we are to remain a significant car producer. Despite great success in collaborative research on energy storage and the development of new batteries and new manufacturing facilities, there is no clarity on the long-term funding of the Faraday Institution – the body created by the government to research battery technology.

Beyond the specific points on which clear decisions are needed, the wider problem is the absence of a coherent system-wide analysis of the energy system which brings together supply and demand, the role of technology, regulation and the fiscal system as it affects both production and consumption. National Grid have spelt out what they believe is needed in terms of integration to achieve the UK's net zero objectives. [8]

The net result Is that the UK is not on track to deliver the 2035 targets despite broad all-party support. The easiest steps in reducing emissions, such as the elimination of coal, have been taken. The next steps have been identified but cannot be taken without sustained and properly funded plans. The report published in January 2023 by Chris Skidmore, a Conservative MP appointed to review progress towards net zero, spells out in great detail the extent to which the opportunity to create a new low-carbon industrial sector is being missed.[9]

Within the necessary mixture of responses to current failures there is a place for public enterprise. Energy is traditionally a hybrid business – the product of a combination of public policy and private capital. But the combination as it has developed over the last 40 years since privatisation has not always worked and is now breaking down. It is clear that only strategic government intervention can create a low-carbon industrial sector capable of delivering net zero.

Energy requires long-term investment in energy supply and in the infrastructure needed to make those supplies available to consumers. The private capital market is not well attuned to projects with an investment lead time of a decade or more before producing any revenue or profits. Private investment is being discouraged by construction risks, especially for nuclear power – by the risk that new advances might overtake specific technologies while projects are still under construction, and crucially by the continued uncertainties and indecision of public policy.

All this sets the context and defines the need for a new publicly funded energy business.

The goals of a new company

The objectives of Britain's energy policy are clear and remain unchanged – a reliable and secure supply of energy in the forms which people need at prices they can afford and which over time will contribute to the reduction and eventual elimination of greenhouse gas emissions. How can a new company contribute to the achievement of these goals?

One option is to create a new publicly owned generating company modelled perhaps on some of the successful ventures in Europe. The most relevant examples are Statkraft[10] – the Norwegian state owned company which develops and generates electricity from hydro, wind, district heating and solar – and Orsted[11], a Danish company created in 2017 from Dong, previously a coal-based power company which is now focused on producing onshore and offshore wind power. Orsted is 51 per cent state-owned.

Under this option GBE would be committed to buying from UK suppliers in contrast to the existing generating companies which have bought supplies of the necessary products and services on the international market.

The challenge of "buying British" is that there are currently few British suppliers of products such as wind turbines, batteries for electric vehicles or heat pumps for home installation. New supply chains could be created in the UK but there is no guarantee that their costs would be lower than those existing international suppliers. Unless GBE was prepared to run at a loss there would be no guarantee that retailers would buy the more expensive power supplies simply because they were "British".

The question, as raised by Andrew Sessions in an article published by NESTA, is whether creating such a company is the most effective way of applying resources in the circumstances.[12]

A second option would be for GBE to establish itself as both a producer of power and a retailer, giving consumers an opportunity to buy British. To create a new business from scratch, however, would take time and would be expensive, potentially requiring the purchase of existing assets and the transfer of existing skilled staff. Again, it is not clear whether a new company would be competitive against existing suppliers or could make any material difference to energy costs for the consumer. As an importer of natural gas for the foreseeable future, gas prices for consumers in Britain would remain vulnerable to international volatility.

If the aim of policy is to control the actions of existing suppliers, a better approach would be the establishment of an effective regulator with a clear remit to protect the interests of the customer and a commitment to transparency. A new regulator should be significantly more independent than has been the case for OFGEM, which has served as little more than a transmission vehicle for government decisions.

That would enable GBE to be established in a different role as a strategic investor – a source of finance which could expedite the transition to a lower-carbon economy, drawing in private capital as well as public funding and helping to create for the UK a technical and industrial base capable of competing for a share of the growing global expenditure on the net zero agenda.

Such investment is needed at all points in the supply chain from production, to distribution to consumption. Much of the debate on energy policy focuses on extending the base of supply, but increased volumes of low-carbon energy from wind or solar will only make a difference if consumers can use the energy produced as a substitute for their existing consumption of hydrocarbons.

On the supply side there is now a good flow of offshore wind projects and no evident shortage of private capital for more. If onshore wind developments are permitted in a sensible way which protects sensitive areas there should be no difficulty in attracting the necessary investors. As costs have fallen, renewables led by wind have grown in scale and are beginning to dominate new capacity development.

The full potential of wind power, however, will only be delivered if there are significant advances in the use of electricity in areas such as heating, transport and industry – the sectors which account for the majority of current energy demand. If electricity continues to cover no more than a fifth of final demand, net zero is an impossible goal.

On the demand side some part of the transition can be achieved through regulation but the overall shift in patterns of consumption will only move at the pace required if it is easy for consumers to switch. One interesting model of what could be done is the switch from leaded to unleaded petrol in the early 1990s. This was delivered through a combination of actions – by government, which reduced duties on unleaded fuel; by the energy refiners, who ensured that supplies were available to meet growing demand; and by the automakers, who after some initial reluctance and under pressure from tighter European regulations produced the vehicles capable of running without relying on leaded petrol.

Achieving a transition to a lower-carbon economy which creates jobs and wealth in the UK will require a simultaneous attention to energy supply, demand, the infrastructure which links producers to consumers, and to development of the manufacturing and service businesses which will deliver the transition to business and households across Britain. So far the transition has created jobs, but mostly in Europe and China rather than at home.

The areas where investment is needed include:

- **Development of the infrastructure required to make supplies of low-carbon energy available to potential consumers** – for instance through the development of a grid capable of managing large volumes of renewable power from distributed sources and charging systems for electric vehicles. An updated grid should be compatible with the potential to adapt to a two-way transfer of power with electric vehicles – a technology which could make a significant contribution to the management of variations in demand.

FIGURE 6: CILT rail freight forum Electrification for Freight study showing how 500 miles of electrification would enable 66–75% of rail freight to be electrically hauled

Source: Railway Industry Association (2021) Why Rail Electrification?

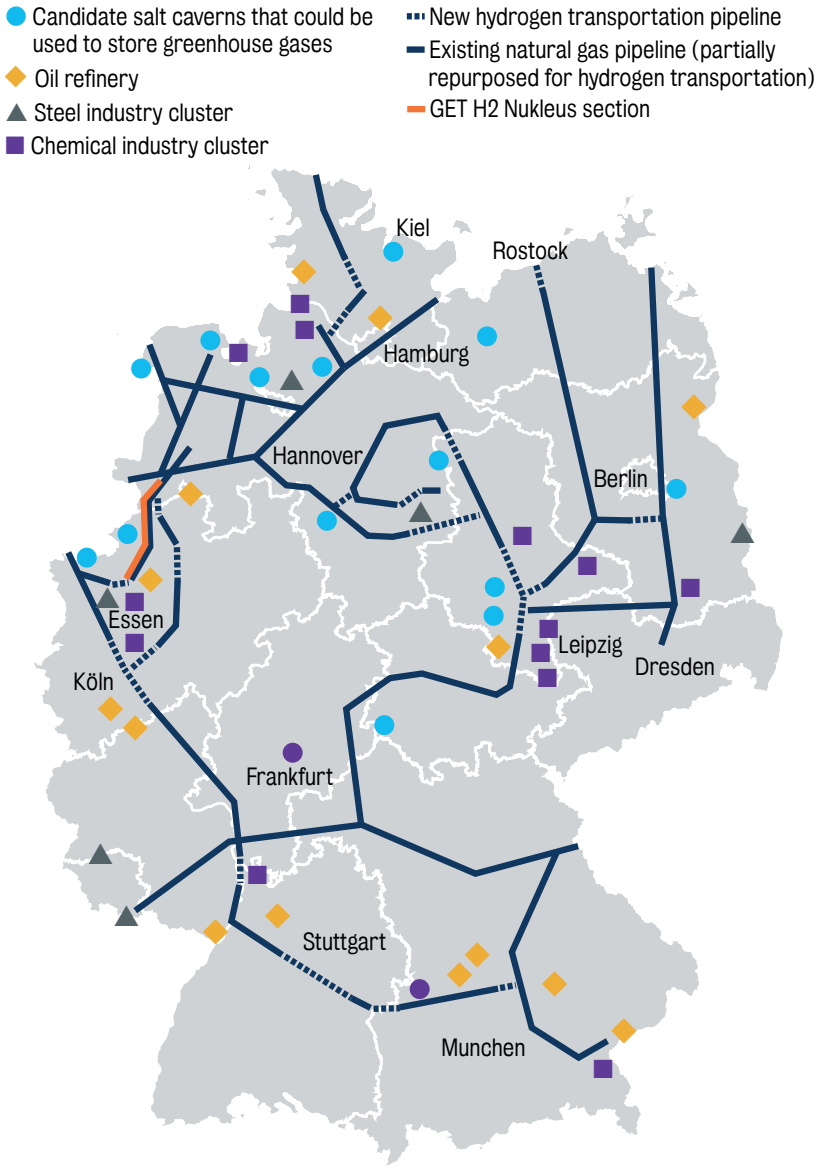
- **Development of storage capacity** at the grid level to soften the peaks and troughs of demand and to make use of excess supplies of renewable power currently wasted because of the lack of storage capacity. The range of storage options – from pumped storage to advanced batteries – is extensive, but the potential solutions still require further research and development work to prove their viability at scale.

- **Support for consumers** through targeted loan schemes to help households and businesses – in new equipment such as electric vehicles or heat pumps. Such schemes could cover some of the high upfront costs of moving from the existing energy system dominated by hydrocarbons to a new energy mix. In some areas that is likely to require a mechanism which incentivises consumers to scrap old equipment including petrol driven vehicles and gas-powered boilers.

- **Support for a major programme of electrification.** Electricity is the main vehicle for the reduction of emissions at present, but currently accounts for only 20 per cent of final energy demand. To raise that figure to 40 per cent would represent a major gain in the reduction of emissions. One obvious target is the railway network, which is only partially electrified. Numerous schemes for upgrading different lines have been proposed, as Figure 6 shows. But the programme set out in the Network Rail Traction Decarbonisation Strategy remains undeveloped mainly because of a lack of funding. Electric trains are twice as powerful as diesel locomotives and could therefore bring the additional benefit of taking freight traffic off the roads. At present only 4 per cent of rail freight is electrified – in Europe the comparable figure is 56 per cent.[13]

- **Support for the development of hydrogen** as the next stage in the transition in parts of the economy where the use of electricity is not viable. If Germany can plan the develop of a 1,800km hydrogen energy pipeline, as shown in Figure 7, combined with a doubling of its existing electrolysis capacity to produce green hydrogen using electricity generated from renewables, there is no reason why Britain cannot set similar goals.[14] Crucially policy should also be directed to create a base of demand encouraging industry and other users to prepare for the switch. The development of supply and for demand must be synchronised.

FIGURE 7: The planned German hydrogen network



Source: Mitsui & Co. Global Strategic Studies Institute Monthly Report, December 2020.

- **Support for local energy schemes** allowing local communities to create networks maximising the value of resources. The UK has much to learn from best practice in Europe. In Norway companies commonly owned by groups of local authorities have created region-wide power supply systems.[15] 90 per cent of electricity production capacity is owned by local and regional entities. In Germany municipal energy enterprises (Stadtwerke[16]) have existed for decades and typically provide water and waste management services as well as energy. SWM in Munich provides some 6.3bn kilowatt hours of power, plus district heating and cooling, telecoms systems and water supplies. Municipal energy enterprises have a long history in the UK and after a period of neglect are now being revived by local authorities keen to develop local low-carbon resources, to eliminate waste and to create local supply chains. In Aberdeen city buses powered by hydrogen are replacing diesel vehicles. In Manchester a local energy plan covers improvements in the energy efficiency in council properties, combined heat and power schemes and the development of new renewable production capacity. In Leeds the objective of decarbonisation is being built into the planning process for all new developments as part of a strategy to make the city net zero by 2030.

- GBE does not need to own or operate such ventures, which are best managed at the local level. A national energy company could, however, provide expert advice and support, and potentially some of the capital required to develop local supply chains.

- **GBE could also support the development of an energy grid across the North Sea.** The grid could use digital technology to pool supplies and to manage distribution to a market stretching from Norway and the Baltic to Scotland, the East of England and Northern Europe. Some links from Norway to the UK for gas and electricity already exist but a much more comprehensive grid is possible. The existence of multiple sources of supply would help mitigate the challenge of intermittency and reduce the need for back-up sources of supply – usually powered by natural gas – in times when the wind is not blowing. An extensive North Sea grid would enhance energy security for all concerned.[17]

Supporting industrial capacity

Investment in the projects described above is necessary but would not in itself create the industrial capacity in the UK to deliver the products and services required. There is a real danger that the supplies needed would continue to depend on imports.

Part of the core mission of GBE should be to help build the industrial capacity to deliver the ambitions of the energy transition and in the process create a new source of jobs and wealth across Britain.

A clean energy sector exists already in the UK, including many excellent enterprises. The problem is one of scale. Most of the companies are small and therefore lack the resources and staff needed if the full transition is to be delivered without overwhelming reliance on imported products and services. Existing companies are beginning to adapt to changing needs but the lack of clarity on government policy and funding mechanisms remain a serious barrier to major investment.

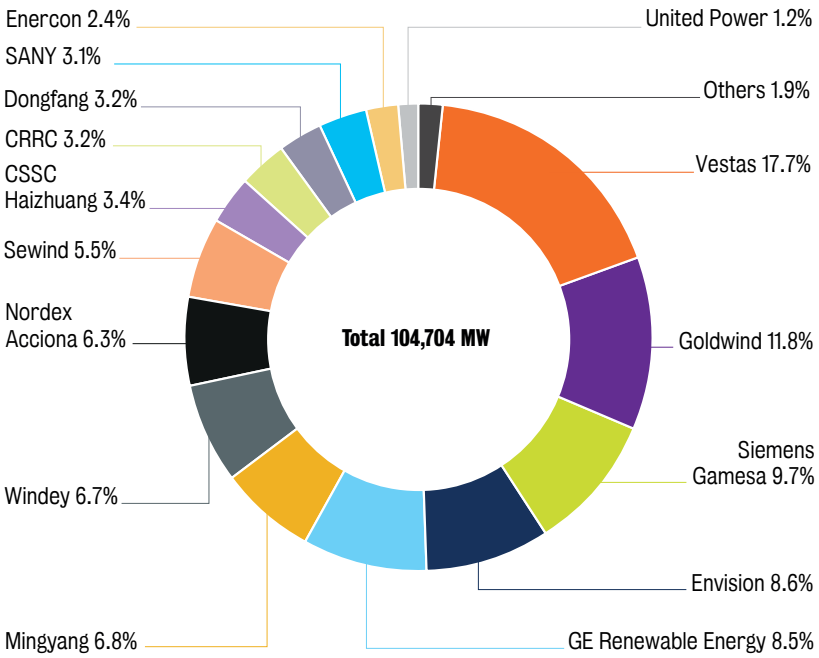
GBE's role should be to provide development capital and management support to create a new low-carbon industrial sector. The aim would not be to create a monolithic nationalised industry or to freeze technology development around a single set of solutions. The goal must be to stimulate the creation of a dynamic mixed economy. Investment should be through shareholdings which can be retained or sold as projects mature, with the proceeds reinvested in the further projects.

This is not to close off the economy to international investment or to pretend that we can or should be entirely self-sufficient. We will, for instance, need to continue to import both oil and gas for many years to come, and international investment in the low-carbon economy in the UK should be welcomed. But if the transition is to contribute to the growth of the UK economy, imports and inward investment

are not enough. A competitive low-carbon industry must be built here, not least to capture a share of what is becoming a major global market. According to the International Energy Agency's analysis, investment in clean energy amounting to some $2.8 trillion per year (double the current level) will be required by 2030 to meet the commitments already announced by dozens of countries around the world.[18] There is no reason why the UK cannot improve on its current minimal share of that market.

The jobs which will emerge from the transition range from the high-level technical roles required to produce new modular nuclear reactors, to the development of new battery technology and the construction of grids capable of managing distributed sources of power.

FIGURE 8: Leading wind turbine suppliers



Source: Global Wind Energy Council.

One key objective must be to transform the trade balance in low-carbon activity. The uncomfortable but inescapable fact is that with a few honourable exceptions the UK has been painfully slow to develop the businesses capable of delivering the transition. Most of the progress made so far has been reliant on imports. Although Boris Johnson proclaimed Britain to be the Saudi Arabia of wind, most of the turbines used in our wind farms have been manufactured outside the UK. Not one of the world's 20 largest wind turbine manufacturers is based in the UK.

The main elements of the Hinkley Point nuclear reactor are designed and built in France. Grid technology is dominated by Chinese companies and by the recently joint venture between Hitachi and ABB. Other than Rolls Royce's small modular reactors there is no clear existing or potential British leader in any significant strand of the low-carbon economy.

Perhaps the sharpest example of this is the failure to develop battery production in the UK. This has been highlighted by the collapse of British Volt, which had planned to produce 300,000 battery units a year. Electric vehicle numbers in the UK are growing and the sale of new petrol and diesel vehicles will be banned by 2030. The demand for batteries will be substantial but, according to an authoritative analysis by S&P Global Market Intelligence, on current plans battery production capacity in the UK in will be smaller than China, Germany, the US, South Korea, France and several other countries.[19] The failure of British Volt suggests that even this forecast may be too optimistic. Since electric vehicle and battery production facilities are likely to be located close to one another, this puts the future of the car industry in the UK in serious doubt.

As things stand there is little sign of Britain being at the heart of the green industrial revolution. The transition, however, is only just beginning and there is still a chance for the UK to catch up if we can match the sense of urgency being shown elsewhere. The United States, in its recent Inflation Reduction Act, has provided for $370bn of subsidies for the development of a low carbon economy in the US. The European Union has responded with a package of measures including a EU Net Zero Industry Act which will permit extensive

state aid for the development of an European industrial base in low carbon activities.[20] Germany is investing €9bn to create industrial leadership in the production and use of hydrogen.[21] France gives billions of euros to support its nuclear industry. The European Union President, Ursula von der Leyen, announced in January a "grand plan to keep Europe's industry competitive in a race to attract green tech and climate related investment".[22] The grand plan includes a relaxation of state aid rules to allow greater public funding of green enterprises.

In each case the actions being taken by different countries around the world are based on substantial plans, linked to business and backed by financial resources. The sequence of announcements show just how far the UK is falling behind its major competitors in creating a green industrial economy.

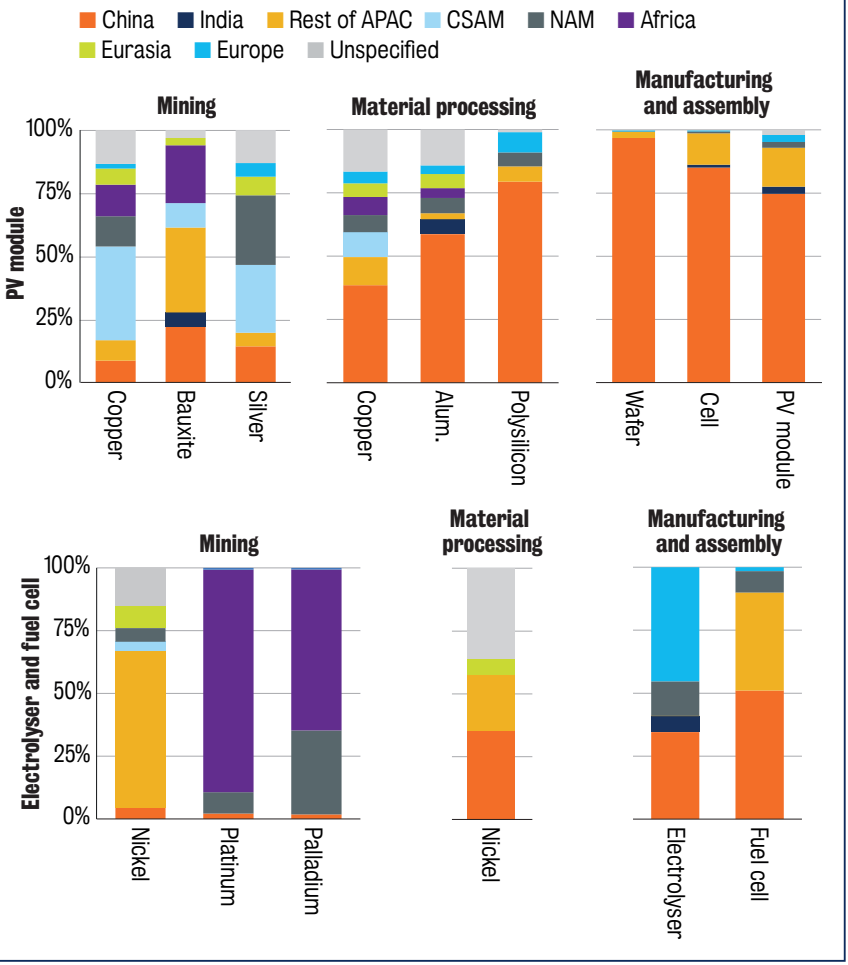
There is a strong case for open trade but also for the active development of a British industrial base which can not only help meet our own needs but also win markets overseas.

FIGURE 9: Predicted top 10 lithium-ion manufacturing nations by 2025

Rank	Country	2025P Li-ion manufacturing capacity (GWh)	% of World Total
#1	China	944	65.2%
#2	Germany	164	11.3%
#3	US	91	6.3%
#4	Poland	70	4.8%
#5	Hungary	47	3.2%
#6	Sweden	32	2.2%
#7	France	32	2.2%
#8	South Korea	18	1.2%
#9	Japan	17	1.2%
#10	UK	12	0.8%
N/A	Rest of the World	20	1.4%
N/A	**Total**	**1,447**	**100.0%**

Source: S&P Global Market Intelligence.

FIGURE 10: Geographic concentration of selected clean energy technologies by supply chain stage and country/region, 2021



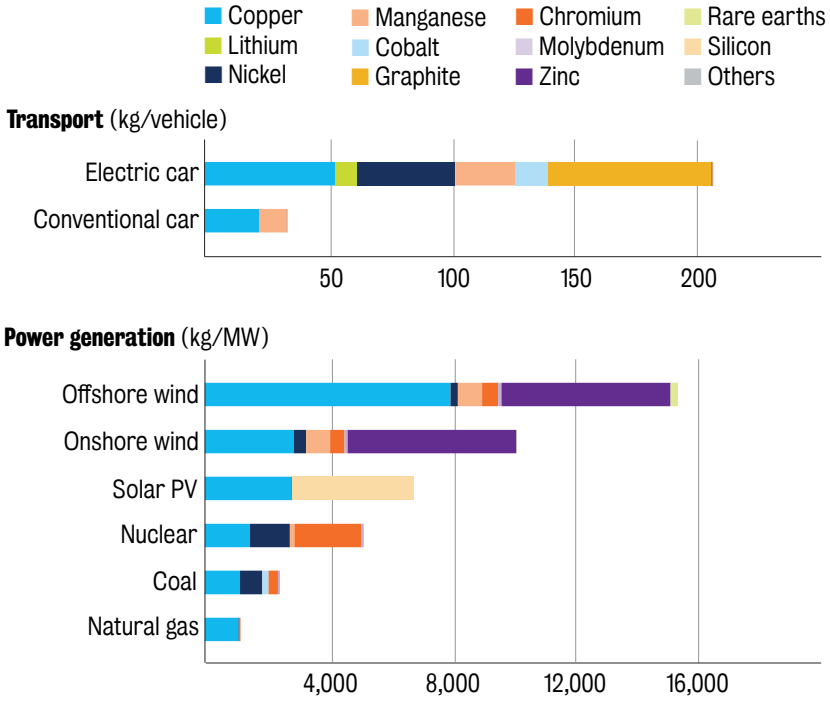
Source: IEA (2022) Securing Clean Energy Technology Supply Chains.

An industrial base would also help us to avoid some of the vulnerability associated with dependence on supply chains which are beyond our control. Their vulnerability has been demonstrated during the Covid pandemic over the last two years and in particular by the tight lockdown of activity in China.

In some cases the logic is to reconstruct the supply chains closer to home, creating new entities capable, for instance, of processing raw materials or building batteries. But that may not be possible or economic in all cases, and if the UK wishes to remain a trading nation we will have to accept that imports as well as exports are part of the way forward.

The crucial role for a new national energy company is to ensure that the vital elements of the key supply chains relevant to the energy transition agenda are protected and that where we do continue to rely on the international market we have diverse sources of supply. That will provide a degree of resilience against disruption in supplies from one particular area, or the manipulation of trade flows at times as part of wider political disputes.

FIGURE 11: Mineral intensity of selected clean and fossil energy technologies



A new company can also play a role by ensuring that the UK has access to the rare earth minerals which are essential to the growth of the low-carbon economy. The supply and processing of lithium and colbalt, along with a range of rare earth minerals, are at the moment dominated by China. As the transition proceeds the demand for key minerals will undoubtedly grow, and access to supplies from a range of sources will be essential.

An associated issue which should also be on the agenda of the new company is recycling. There are a number of areas where management of waste and large scale recycling will soon become essential. The most obvious example is the battery business, which will expand in line with the market for electric vehicles. While there is an established industry recycling most of the batteries from conventional cars, the recycling of lithium ion batteries is still in its infancy. This will be a challenge not just for the UK but for every country around the world. As with plastic waste, leaving batteries and other products to be abandoned once they reach the end of their initial life would be both wasteful and dangerous. There is a real opportunity for the UK to set an example in this area and to build companies that can deal with the challenges of recycling which are inherent even in a low-carbon world.[23]

Source: IEA (2022) The Role of Critical Minerals in Clean Energy Transitions.

Skills

At the heart of much of what could be done lies the question of skills. A low-carbon economy requires a range of specific skills, many highly accomplished. They range from nuclear engineering – once a major competitive strength in the UK but weakened over the last few decades by the lack of new activity – to the technical skills associated with electrifying the railways, the IT skills needed to optimise the operation of the energy supply chain, and the specialist skills required for the recycling of batteries.[24]

As part of the process of encouraging the creation of a significant green industrial base, GBE will need to support the development of the necessary skills through existing universities and colleges. There is an opportunity to create low-carbon colleges across the country which offer a range of technical training, and to establish the UK as a centre of education which can offer internationally recognised qualifications. The ability to offer specialised training as other countries pursue their own decarbonisation objectives provides another business opportunity.

Research

Great British Energy can and should be more than a financing vehicle – another green bank. A new company can also help remove some of the non-financial barriers which have held back the energy transition or denied the UK the substantial benefits available in the creation of a supply chain.

In addition to this range of potential activity, there is a need for the company to look ahead. Existing technology supported by clear policy can deliver significant reductions in emissions. But there remains a substantial gap if the high ambition of reaching net zero across the world by 2050 is to be achieved.

GBE should be tasked to contribute to the coordination and commercialisation of the currently fragmented research effort around a limited number of key priority technologies. These could provide the next wave of decarbonisation here and internationally, including lower-cost carbon capture and air capture, low-carbon aircraft fuels and fusion. The ability to make breakthroughs in one or more of these technologies is likely to be the base of Britain's long-term competitive advantage in the low-carbon economy.

How to fund GBE

The level of financing available will determine which of these many desirable activities GBE will be able to pursue. Energy is a highly capital-intensive business. The costs of a typical offshore wind farm using known technology are estimated at £2.3m per megawatt.[25] The cost of building a single full-scale carbon capture and storage facility in Norway is estimated at $2.5bn.[26] It is hard to see how a new company would be able to make a material difference in the UK energy market unless it was able to invest at least £5bn to £10bn a year. Unless the company were gifted some existing sources of revenue, its creation and development would require a steady inflow of capital at that level for several years until it became self-sustaining.

One option is to impose further windfall levies on the profits of existing energy companies. Windfall levies are popular with the public but offer an uncertain source of income for a company which will need to be established and grow over a period of years before it can become a standalone business free of the need for regular capital injections.

The amounts available from a windfall levy will be limited if market prices for gas and electricity fall back from the exceptional heights reached in the middle of 2021. That fall has already begun. The level of demand for natural gas has clearly been suppressed in Europe. New gas and renewable power developments around the world are underway and will come onstream in due course. In addition, there remains a possibility that some sort of settlement will eventually be reached between Russia and Ukraine, reopening the European market to at least some volumes of Russian gas.

Equally, if prices do stay high or rise further as the Ukraine war continues, the proceeds of any available windfall profits tax would be needed to provide continuing financial support to energy consumers.

A second funding option for GBE is the introduction of a carbon tax. In economic terms the taxation of products which generate

emissions would be the most effective way to encourage consumers to change their behaviour and to adapt their consumption to new lower-carbon options to avoid paying the tax.

If options to adapt are available, the tax would raise only limited amounts of free revenue and there would no doubt be pressure from the Treasury to use that revenue to replace some of the existing duties charged, for instance, on the use of petrol. As things stand, fuel duties raise some £25bn a year but will produce less over time if, as intended, petrol driven vehicles are replaced by electric cars.[27] If applied to products which as yet are not easily substituted, a carbon tax would simply add to general taxation. Given that those who are relatively poor spend a higher proportion of their income on energy, a carbon tax of this sort would be regressive.

One variant of the carbon tax option would be to use the fiscal system to keep end user prices high even if there is a fall in prices on the world market. This amounts to creating a price floor – set, for example, at today's level, with the balance being used to fund green investment plans. The problem with this is that it places the whole burden of investment on consumers and would require substantial continuing subsidies to protect the poorest. Unless carbon taxation is applied by other countries as well, imposing higher prices on industrial energy users in the UK would also run the risk of reducing their competitiveness in international markets.

Windfall levies and carbon taxes offer some limited potential revenue for GBE, but **the logic is that the new company will be fundamentally dependent on a contribution from central government funds, perhaps through the use of additional borrowing.**

Given the pressures on public spending and the current high levels of borrowing, the sums available will be limited and it would therefore be logical for GBE to use whatever funds are available to leverage private sector investment – either at the corporate level (as is the case with Orsted) or at the level of individual projects.

A logical starting point would be to develop projects in conjunction with businesses already active in the low-carbon sector, including existing energy companies. Their knowledge and experience would be valuable and GBE should be able to accelerate and extend their existing plans.

Private investors such as pension funds and insurance companies will of course require a reasonable return on investment and GBE may choose to restrict its reliance on private capital to specific projects, allowing GBE itself to use at least part of its core funding to invest in activities on which the returns are too uncertain or too far in the future to support the sort of revenue flow which private capital would require.

An active programme of public investment developed as part of a coherent energy strategy would provide additional confidence to many private investors currently interested in low-carbon activities but deterred by a lack of certainty about the future direction of policy.

The structure and standing of GBE

The track record of publicly owned businesses, and in particular those associated with industry, is weak and associated in the public mind with poor management, commercial failures, interference and micromanagement from Whitehall, and sudden changes of policy resulting from shifts in political power. In creating the new company, it will be important to learn the lessons of the past, both from the UK and from other countries.

In the 1970s the British National Oil Corporation was created to capture for the British people an appropriate share of the benefits flowing from the development of North Sea oil and gas. BNOC was never strong enough, technically or financially, to compete against the major international oil and gas companies and was always seen as a political vehicle. The desire to build the company was overtaken by Labour's loss of power in the 1979 general election. As a result, the company lost its political support, and BNOC was renamed as Britoil and eventually fully privatised in 1988.

The history of BNOC stands in sharp contrast to that of Statoil, the Norwegian state company. Statoil was also created to capture the benefit of North Sea development for the Norwegian people, but was always seen as a national rather than a political venture.[28] The company was given privileged access to resources on the Norwegian continental shelf, and Statoil, now Equinor, developed the skills necessary to become a successful operator and one of the world's leading developers of offshore resources – first of oil and gas and now of offshore wind. From the beginning Statoil was run on strictly commercial lines, reinforced by a minority private shareholding which at present accounts for 33 per cent of the total share base.

In France, EDF was created after the war to rebuild the country's energy system and became a national champion through the "Trente Glorieuses", the decades of French renewal and industrial success.

EDF led the development of the French nuclear sector, which has provided France with a substantial degree of energy security by reducing dependence on imported oil and gas. Over recent years, however, EDF has been damaged by the imposition of price controls which have undermined its commercial viability and forced the company to rely on successive bailouts from the French government, leading to the restoration of 100 per cent state ownership in 2022.[29] The technical lead and reputation which EDF once enjoyed in the nuclear sector has been lost.

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Much will depend on the quality of management and leadership in GBE. The company should be staffed by professionals chosen for their expertise and not political loyalty. The skills and experience required are in high demand internationally, and GBE will only attract the right people if it seen to have a long-term future in support of objectives broadly agreed across the political spectrum.

The company should be open and international. The key objective is to help put UK at the heart of the move to a low-carbon economy, but the issues involved, and the science and technology which can provide solutions, are global. GBE should position itself at the centre of a wide network across the whole energy market.

Existing specialist bodies such as the Nuclear Decommissioning Authority and the North Sea Transition Authority (formerly Oil and Gas Authority) will continue to have important roles, but there is a strong case for rationalising the numerous different bodies which oversee the energy sector. GBE must be designed to fit into the architecture without friction and to work effectively with the private sector, which will remain the largest source of energy provision.

The company should be established as a platform rather than as a traditional centralised and hierarchical organisation – a participant and contributor, rather than an owner which can draw in others in pursuit of a common goal. The energy transition will not be linear, and the shape of the sector which we might now anticipate to be in place in 2030 or 2040 could well turn out to be very different. Just

as there has been a revolution in communications technology over the last several decades, so now there is every possibility that the landscape of the energy business is entering a period of continuous change. GBE should be grounded in financial discipline but ambitious and dynamic in responding to a market which is no longer predictable.

The aim must be to create an organisation which is seen as playing a role that contributes to the delivery of the energy transition by supporting the development of a low-carbon industrial sector. Success should make GBE an indispensable element of the UK's energy policy regardless of future shifts in the political complexion of the government.

Next steps

A new government will face many challenges and competing claims for attention and funding. It is important, therefore, to prepare thoroughly and to put in place the foundations of a new national energy company well in advance of any change in government.

Not everything can be done at once, and to attempt too much from a limited capital base would be a recipe for disappointment and failure.

The aim must be to create a sustainable business which can act in support of the national objective of a transition to low carbon, in order to deliver net zero by 2050 – an aim which has been endorsed by all the main political parties. GBE should follow the example of companies such as Statkraft, Equinor and Orsted – all of which have secured and maintained broad support from across the political spectrum in their home countries.

A shadow board, comprising individuals with direct experience of the energy market, should be established now with the authority to bring forward a detailed business plan with clearly identified priorities matched to the level of funding likely to be available.

Conclusion

A national energy company is a viable proposition. Various different organisational structures are possible but the most attractive is a public-private enterprise with sufficient funds to intervene in the energy market in the interests of the UK, in a way which has not been achieved under the current structures. The aim of public policy should be to use scarce resources in a strategic and targeted way to deliver the maximum impact.

A new national company could not be expected to solve all the evident problems of the energy market. A firm regulatory environment must be created and distinct policies adopted to help customers whose lives are blighted by energy poverty. The necessary specific funding decisions to support each element of the transition must be taken. GBE is one crucial part of the wider set of reforms required.

GBE's remit should be to:

- Develop industrial capacity to reduce the current dependence on imports and to secure a share of the global opportunities which decarbonisation will provide.
- Contribute to the development of essential skills, to ensure that the energy transition is a source of new high-quality jobs across the UK.
- Help develop the infrastructure needed to hasten the pace of decarbonisation.
- Support consumer take-up of opportunities to switch to low-carbon patterns of consumption.
- Support local and regional authorities to develop their own energy plans and to build local supply chains.

- Ensure that research and development continues to keep the UK at the leading edge of scientific and engineering advances in the sector and support the commercialisation of those advances.

Building a new industrial base in the UK to support the transition to low carbon will not be a simple process, particularly given the limited starting point and the strength of competition from China, the US and Europe. With clarity of purpose and the ability to make use of both public funds and leveraged private capital, GBE could make a material contribution to the necessary transformation of the energy sector in the UK.

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