

The coal question

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There is no serious transition to net zero without an exit from coal. Coal is the dirtiest of the fossil fuels, making up 33% of all energy consumption and about 40% of electricity generation. The world as a whole is 80% dependent on fossil fuels. The case against coal is overwhelming: its pollution is so great that even before climate change comes into the picture, it should be phased out. Air pollution causes lots of illness and deaths, coal mining kills lots of workers, coal mining is incredibly energy-intensive, and mines leach out heavy metals which remain a problem years after the mines are closed. There is no route to decarbonisation without getting rid of all this coal.

And yet coal remains the main energy source, and it is not hard to work out why. It is cheap and widely distributed, and hence has been vital to security of supply. The cheap bit explains why China and India are doubling down on coal to power their economic development. The secure bit explains why European countries are dashing back to coal following Russia's brutal invasion of Ukraine and Russia's explicit wielding of the gas weapon against a Europe that has foolishly allowed itself to become dependent on Russian pipeline gas supplies.

Just six months on from the "triumph" of the Glasgow COP, coal burn is up across the world. Coal India is pushing on with record production; China has explicitly put short-term economic development ahead of climate commitments; and even with a Green Party participation in the coalition government in Germany, its deadline for a coal phase-out has been pushed back and coal is making a comeback. Perhaps even more extraordinary as a sign of the new coal times, the UK is contemplating opening a new coal mine.

The coal question is therefore how to get out of coal whilst at the same time meeting the challenges of cheapness and security of supply, and how to do this in what is a much more hostile context. Only if this coal question can be credibly answered can there be much hope that the world will even begin to address climate change.

The immediate coal question: security of electricity supply

The security of supply case for coal arises because many governments have swallowed the simplistic notion that there can be a fast-track switch to renewables without worrying about that security. Put simply, and especially in Europe and the UK, there has been no serious attempt to address the daily and especially seasonal intermittency of wind and solar. Had this been taken seriously, the decarbonisation pathway would have put gas central to the early transition to renewables, and ensured security of gas supplies rather than coal supplies.

The coal question is at root a gas question. Security of gas supplies does not happen automatically. The coming of intermittent renewables renders gas generation of electricity intermittent too. A gas station in an electricity market with lots of wind generation runs only when the wind is not blowing. This is devastating to the economics of gas generation and for two reasons: it means that the recovery of the fixed and sunk capital costs takes longer and is more uncertain; and it means that the contracts for gas supplies to the gas power stations have to be provided on demand, without the gas supplier knowing when the gas will be required. The result is that the cost of capital and the cost of supplies of gas go up. The more wind, the higher both of these gas costs.

The conclusion that follows goes to the heart of an energy policy which is fit for a decarbonisation transition. Gas is not going to be available as back-up unless it is paid for, and paid for as an on-demand insurance. This requires that the system operator has at its disposal a gas reserve to call upon to meet the possibility that there is little wind generation available. It requires a capacity payment, and the larger the penetration of intermittent wind in the share of total capacity, the larger and more expensive the strategic reserve will have to be. That is why the current gas price shocks represent what I have called the ‘first net zero energy crisis’.¹

Once this is recognised, there is a nasty shock in stall for those who keep telling us that the net zero transition is going to be very low cost, and possibly even no cost at all, because they assume that the cost of the transition is summarised by the falling costs of

¹ See Helm, D. (2022), "[The first net zero energy crisis: someone has to pay](#)", 7th January.

renewable technologies. Put aside for a moment that the costs of wind in particular are no longer falling now that the industry is bigger and more mature, by failing to take seriously what intermittency means these advocates have led the politicians and the public to believe that arresting climate change is all upside. A moment's reflection on the obvious fact that we are not paying the price of the pollution we are causing, and if we were, the costs of carbon-based energy would be much higher. If the polluter – ultimately you and me – pays, the price goes up. A deeper moment of reflection tells us that disaggregated, low-density, intermittent wind generation is bound to require a much greater installed total capacity to instantaneously meet electricity demand.

These inconvenient facts tell us three things: that the continuing role of coal is unsurprising; that switching from a high-carbon 80% fossil-fuel world to net zero is going to be expensive; and that in the transition a great deal of attention should be paid to how first to switch securely from coal to gas. These facts help to explain why for the last 30 years there has been no progress in reducing the increase in the concentration of carbon in the atmosphere by 2ppm every single year, and why coal is so resilient to so-called phase-out policies.

If a coal to gas switch is a necessary part of the transition to net zero, then the coal question morphs into a gas security and price challenge. It should not be difficult: gas is so abundant in the earth's crust that it is best to regard it as infinite for all practical purposes. There are lots and lots of gas reserves. Gas is also very cheap to extract, and pipelines are cheap too. LNG has higher costs, but it also has higher flexibility.

So why is there a problem? The main answers are: that gas is still a relative newcomer to the electricity generation scene; and that Europeans allowed themselves to be extremely vulnerable to one supplier: Russia. There are also the consequences of Japan's and Germany's fast-track exit from nuclear.

The newness of gas is often ignored. Until 1990 it was illegal to burn gas in power stations in the EU and the US. Gas was regarded as a scarce premium fuel to be reserved for the petrochemical industry. Electricity generation was typically 60–80% coal, backed up by 20–40% nuclear. The dash for gas started in the 1990s using pipeline gas supplies. It is only after 2000 that shale gas makes an inroad, and LNG becomes a serious way of supplying gas, notably from countries like Qatar and Australia,

geographically isolated from final markets. Up until then, the US was supposed to become the big importer of LNG from Qatar. Now it is a big exporter in less than 20 years.

Like any mineral, gas reserves take time to develop, and in the early days there is a lot of investment risk. In the case of US shale gas, there have been the sort of booms and busts that are all too familiar in commodity markets. What has made it all the more difficult is that much of Europe remained uninterested. Europe had the Netherlands, and then the North Sea, and it had Russia and Gazprom. The case for buying LNG remained weak, except for those countries more remote from both Russian and North Sea pipelines, notably Portugal, Spain and to an extent Italy.

The result was that the UK relied upon the North Sea supplies, and Germany relied on Russia, as did the other ex-Soviet Union states, and Austria became a central gas hub. It was cheap, there was no need to build LNG terminals, and the Germans in particular were naive enough to believe that Putin would follow Stalin in not using energy supplies as a political and military weapon. So instead of diversifying supplies, and building an LNG insurance, the Germans got on with doing Putin's bidding, with first Nord Stream 1 and then Nord Stream 2. As Chancellor, the architect of this policy was Gerhard Schröder, and as ex-Chancellor, Schröder remained the key political player, and without serious push-back from Merkel. Neither was alone: German business and the long shadow of appeasement that was Ostpolitik played out behind the scenes.

This naivety has finally been revealed for what it is. Germany is pretty naked now Russia is turning off the gas. Worse, and from a climate change perspective pretty stupidly, Germany has prematurely closed its existing nuclear power stations, ignoring the obvious fact that there are over 50 nuclear power stations over the border in France. Germany's nakedness is all too painfully revealed: it has no LNG options; its storage facilities need gas to fill them; and there is the extraordinary result that its Green Party minister is helping to keep the coal mines open, including the really dirty open-cast brown coal mines.

You might believe that the UK is better placed. In some respects it is. It does have LNG terminals; it does still have some gas production in the North Sea; and it has a friendly Norway to supply pipeline gas. It directly relies on only about 4% gas supplies from

Russia. This is why the UK Secretary of State and the officials from the Department of Business, Energy and Industrial Strategy keep telling us that there is no gas security of supply problem.

This is naive too. There is always enough gas for supply to equal demand, provided the price is high enough. If the UK is prepared to pay the highest prices for LNG cargoes, it will get them, and as prices go up, demand goes down. It is, as they say, the most elementary economics. It is at best disingenuous to ignore the price dimension of security of supply.

Just for a moment assume the Secretary of State's reassurances are indeed reassuring. How then does he explain that the UK has been very hard hit by the developments in the European and global gas markets. Why is it so bad in the UK? The answer is that the price impacts in the EU are magnified in the UK. The UK has to pay the highest prices for global LNG cargoes, and it has to pay the European price for its Norwegian supplies. But on top of this, its large wind capacity renders the intermittency problems noted above especially expensive in a tight European and global gas market. It has nothing to absorb the price shocks. It does not have any serious storage, and it does not have flexible contracts with North Sea producers (as British Gas once had). It does not have lots of nuclear, like France. No wonder DRAX's dirty coal is being called upon.

Faced with the above, there are two responses gaining political traction. The first is to produce more oil and gas, and even open new coal mines. The second is to slow down the net zero transition. They are of course intimately related: the first would help to cause the second. Let's take each in turn.

The medium-term question: should the UK return to North Sea oil, gas and coal mining?

The fact that cannot be avoided is that the world relies 80% on fossil fuels. It is the same number as in 1970, and the world's economy is much larger now. It is likely to rely on fossil fuels for decades to come. To imagine otherwise is to envisage the sort of global breakthroughs in future COPs that only the most utopian activists believe in. It is all about the profile of the exit, and so far there has been no exit at all.

It makes a lot of sense from an environmental perspective to focus on producing the fossil fuels we are going to use in the least damaging ways, and at the lowest costs, given that the transition will in any case be expensive. It also makes sense to incentivise the exit by incorporating into the price of fossil fuels the pollution costs their production and use entails. Polluters should pay, and a carbon tax is the obvious way to do this.

With a carbon tax in place, whether more oil and gas should be produced in the North Sea is a matter of economics. The question is whether it is cheaper than the alternatives, once account has also been taken of security of supply.

For oil, there is no real argument that there is a security of supply problem from relying on global supplies. In a tight market the price might go up, but then it will from the North Sea too. There is a global price for oil. What's more, it can be stored. Only if a 1970s-style OPEC embargo of physical supplies is on the cards, and such an embargo could be effectively imposed on the UK or Europe should we worry. There are more serious and more immediate problems to be concerned about. The implication is that North Sea oil production should be left to market forces.

Refining oil (and gas) raises its own security of supply problems and given the immediacy of demand for petrol and diesel, and in the case of food and agriculture, fertilisers and carbon dioxide production, there is a case on security of supply grounds for retaining a minimum refining capacity.

For gas, the market is not yet global. Specific pipelines matter, and storage is much more complex than for oil. Whether this means that new gas fields should be encouraged in the North Sea depends upon when the UK (and Norway) can attach conditions to these supplies which make them "British" or "Norwegian". When British Gas started contracting for the early North Sea gas supplies, there was a legal requirement that all gas should be landed in the UK, and since British Gas was a monopoly, in effect that meant that gas supplies had to contract on British Gas's terms. These turned out to be very clever from a security of supply perspective: effectively British Gas insisted on the right to manage the offtake, and hence the gas fields became a form of gas storage to match the growth in demand.

The case of new gas developments in the North Sea should be considered not just in terms of whether or not to produce gas, but the precise contractual terms, and with regard to the intermittency of wind generation of electricity.

What about coal? The UK government is not just trying to keep existing coal power stations open, but also contemplating opening a new coal mine. The reasoning is that a specific type of coal is used to make steel, and this coal is currently imported from Russia. So why not produce it at home, given that coal will be burnt anyway? Add to this the claim that it creates jobs in the north of England.

For a government which tried to claim global leadership on climate change at the Glasgow COP a matter of months ago, opening a new coal mine is one more step in reverse gear. The government is also reconsidering fracking, and thinking about reducing the commitment to biofuels. It looks ominously like a general step towards a retreat from net zero.

Yet there is a stark reality in the coal mine issue. Nobody is contemplating exiting from conventional steel in the short term. “Green” steel might come eventually, based upon “green” hydrogen, but it is way off. Not producing the steel in the UK would have the merit of reducing territorial carbon emissions, replacing UK emissions for example with Chinese emissions against the Chinese net zero target. But it would make no difference to climate change and could easily make global emissions higher.

How then to square the circle? The answer, as with oil and gas, is to properly make sure the costs and prices reflect the pollution. Steel production in the UK should pay the costs of its carbon emissions. The polluter should pay. The problem is an obvious one: it would lead to a shutdown of the UK steel industry. Why? Because Chinese and other steel producers will not be paying the true carbon price. The obvious retort is to impose a carbon tax at home and at the border – a carbon border adjustment mechanism (CBAM).

This means that there would be no competitive advantage to China, and that steel would pay its true cost. What would happen? There would be a push towards using gas rather than coal in steel production (even though gas would also pay its carbon price), and

there would be a push towards using other materials where possible. There would also be a strong incentive to speed up the shift to hydrogen.

Would this still make the coal mine economic? Probably not on economic grounds: its costs of production are likely to be much higher than a number of global sources. Russia might be ruled out, but even this sort of coal for steel-making is more widely distributed.

What about the jobs argument? This is a dreadful argument and for two reasons. The idea that we must pollute in order to keep people employed – or in this case to open a new mine – is not one that holds out much hope on climate change or indeed for biodiversity and other environmental economic goods. But it is also stupid. There is a story that illustrates this point rather well. Milton Friedman visited a dam construction site with Chairman Mao. The Chinese dictator, pointing to the digging by shovels rather than machinery, highlighted the jobs it was creating. Friedman is alleged to have replied with a question: why don't the workers use spoons rather than shovels? That would create even more jobs. It is a classic illustration of the lump of labour fallacy.

What about price, cheapness and the costs of the unilateralist transition – should we slow down?

The wider question that all this concern about costs and security of supply raises is a more profound one. Given that climate change is global, that the location of emissions does not matter, and that the rest of the world shows no signs of doing much to address the underlying 2ppm per annum increases in the concentration of carbon that has happened for the last 30 years, is not the Ukraine episode an opportunity to get real, slow down on climate change and invest instead in adaptation?

This is a question that has to be addressed head on. For a country like the UK, so-called climate world leadership is based upon the fallacy of focusing on carbon territorial emissions production as the measure of “leadership”, of swapping our emissions for imported carbon, and it is a country that is responsible for only around 1% of global territorial emissions. Contrary to Boris Johnson's claim that China and Russia will follow the example that his leadership has shown, there is no evidence whatsoever that China

or Russia are taking any notice, and that remains true for India too. Like it or not, and post-BREXIT, there is little evidence anyone is taking the UK very seriously.

Nor is it true, as Ed Miliband claims, that it is in the narrow economic interests of UK citizens to reduce territorial emissions. He claimed that the costs of mitigation are lower than the costs of climate change, but failed to notice that for the UK, its citizens will pay both for the costs of mitigation and the costs of climate change. Little UK will not turn the tide of the concentration of carbon in the atmosphere. Worse still, by raising domestic costs without a CBAM, the unilateral UK net zero target will reduce jobs as imports substitute for home production.

Neither of the two responses from activists hold much water in the coming decade. The net zero transition is not net zero cost, and it is not true that the new technologies will necessarily create a net increase in jobs. There will of course be new jobs, but there will be higher total costs and reduced jobs generally as well in the declining fossil-fuel industries if these are closed down on a fast track.

The case for unilateral action is much tougher. It is that the UK is responsible for historical emissions, and hence quite a lot of the carbon in the atmosphere put there since the Industrial Revolution. A moral argument is that the UK (and indeed the EU) should not cause more climate change. But to do this is vastly more demanding than simply reducing territorial net carbon production to zero. It means net zero carbon consumption. Only if it is net zero carbon consumption can it be claimed that the UK is no longer causing climate change. I wonder whether the Committee on Climate Change (CCC) and the next Prime Minister are willing to tell the voters what this actually means?



[Net Zero: How we stop causing climate change](#)

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