HOUSE OF COMMONS

Environmental Audit Committee

Oral evidence: Accelerating the transition from fossil fuels and securing energy supplies, HC 109

Wednesday 22 June 2022

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Watch the meeting

Members present: Philip Dunne (Chair); Sir Robert Goodwill; James Gray; Caroline Lucas; Cherilyn Mackrory.

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Witnesses

I: Charles McAllister, Director of Policy, Government and Public Affairs, UK Onshore Oil and Gas; Jake Rigg, Director of Corporate Affairs, National Grid Electricity System Operator; and Dale Vince OBE, Founder, Ecotricity.

II: Sonya Boodoo, Vice President Upstream Research, Rystad Energy; and Graham Kellas, Senior Vice President, Global Fiscal Research, Wood Mackenzie.

Written evidence from witnesses:

UK Onshore Oil and Gas

National Grid Electricity System Operator

Examination of witnesses

Witnesses: Charles McAllister, Jake Rigg and Dale Vince OBE.

[*This evidence was taken by video conference*]

Q109 **Chair:** Good afternoon. Welcome to the Environmental Audit Committee, where we have our second oral evidence session in our inquiry into accelerating the transition from fossil fuels and securing energy supplies. We have two panels this afternoon and I am delighted to ask the members of the first panel to introduce themselves to the Committee, starting with Dale Vince, who is the founder of Ecotricity.

Dale Vince: Yes, thank you, that was the first thing I was going to say: I am the founder of Ecotricity. Back in the mid-1990s we were the world's first green energy company. We have pioneered in wind energy, solar power, green gas, and we are now working on smart grids and battery storage as well.

Chair: Thank you, Dale. We are also joined in the room by Charles McAllister, who is the director of policy, government and public affairs at where, Charles?

Charles McAllister: UK Onshore Oil and Gas. We are the trade body for the onshore oil and gas industry. We represent all of the shale gas companies, some conventional onshore oil and gas companies and a range of supply chain companies.

Chair: Thank you. We are joined online by Jake Rigg from the National Grid. Jake, could you say what you do for the National Grid?

Jake Rigg: Thank you, Chair. Apologies again for not being able to be there in person because of the rail strike. I am director of corporate affairs at the Electricity System Operator, which is the part of the system that balances the system day to day. We also do a lot of long-term planning and our role, which I am sure we will come on to later, is about to change quite significantly through the passage of the Energy Security Bill that is forthcoming to the House. I want to talk about that more.

My own background is in corporate affairs and government, and indeed I worked in Parliament for a time. As an energy entrepreneur, I developed a prototype electrical generating hydroturbine, and Dale Vince's company was incredibly helpful to us—I will declare that at this stage—and very supportive of innovation.

Q110 **Chair:** Thank you very much. This inquiry is designed to look at the role that fossil fuels on the UK continental shelf have to play in both providing energy during the transition and, as we transition to a net zero Britain

over 2050, the extent to which we are reliant in light of the recent energy shocks on supplies from the North Sea. Perhaps I could start, Jake, with you in answering that question. At the moment we have a heavy dependence on gas for generating electricity. How much of that comes from the North Sea?

Jake Rigg: A relatively small proportion comes from the North Sea. I would need to double check the exact numbers. It is important to say that we are in the middle of a transition. I worked in government about a decade ago on energy security matters and energy policy and there have been huge strides. We are one of the fastest decarbonising systems in the world. There is still plenty of room to go.

I am sure that the Committee will be aware that the ESO we have been working on at the request of the Secretary of State to look at bringing continuing coal generation, for example, on the system for a further winter as a backup to that gas in case the events in terms of the Russian reinvasion of Ukraine were—a pretty extreme risk—to materialise, so that there is additional resilience in the system.

That is a short-term measure and there is a massive need for buildout—and I am sure we will get into this in more detail—of a number of different parts of the generating potential mix: offshore wind, 50 gigawatts by 2030 is government policy. We will be announcing in the next few days a major piece of network infrastructure, a plan around that to help to deliver that. It is a complex system and moving quickly. For the time being, gas is an important part of that generating mix.

Q111 **Chair:** You have just touched on the Secretary of State's announcement about asking the industry to consider whether coal would be available or necessary in order to keep the lights on this winter. Are you or is anybody else able to elaborate on how realistic that is, given that we have been on a trajectory to eliminate coal from electricity supply by 2024?

Jake Rigg: The ESO is the body that at the request of the Secretary of State is negotiating contracts with the three coal-fired power stations. The Government remain committed to their target. Their request was done very much on the basis that coal would still be off the system in 2024. The three generating plants in question were scheduled to come offline ahead of 2024. However, because of the position with Russia and the massive instability in the global gas market as a consequence of the Russian reinvasion of Ukraine, the Government have requested the ESO to enter into negotiations with those companies. It is a matter of public record. Because we have not finished negotiating all of those contracts yet, I cannot share too much detail because it is commercially sensitive. However, it is a matter of public record that the basis on which that coal will be used would be in addition to the normal functioning of the capacity market and the electricity market. It would be at the instruction of the ESO on the basis of the resilience position not being normal.

Q112 **Chair:** Would it involve recommissioning plant that had been shut down from coal or switched supply or is it just continuing—

Jake Rigg: No, it is a continuation. It is a continuation, yes.

Q113 **Chair:** Turning to the issue of gas storage, because we continue to rely on gas significantly, as I understand it the Rough field was closed shut for gas storage by Centrica some time ago. How feasible is it and how helpful would it be for maintaining energy resilience in the short term if gas storage was reactivated at Rough? I am asking you that question but it may be slightly unfair because I know that you are not speaking for Centrica.

Jake Rigg: I can give a partial answer, Chair. I would very much defer to both the gas system operator, which is a separate organisation to us, and indeed Centrica and Government on that. I am aware that the BEIS Ministers will be appearing before the Committee in future weeks.

From our perspective, the scenarios that we are looking at alongside Government include a more prolonged gas supply situation than the matter of a few days that my understanding was that the Rough storage would provide or did provide. That does not mean to say that it is entirely without use in having it, of course, but it would not be a complete solution. I think that it is important across all of this to think that there is a wider system and there are no one or other silver bullets, but there may be lots of smaller silver bullets, if I can use that kind of phrase.

Q114 **Chair:** What sort of silver bullets do you have in mind?

Jake Rigg: We are looking at things on the electricity side, including coal. We are looking at very close co-ordination. Indeed, we do co-ordinate incredibly closely with our system operator counterparts in continental Europe to make sure that, for example, if the French were to have a situation on their side on one day, we were managing flows between electricity interconnectors very carefully to manage the system on both sides.

In addition to that, we are doing a lot of work on, and I am a huge advocate for, a flexible energy system. We are looking at flexibility and doing a huge number of trials at the moment that we are exploring ourselves as well to reduce demand but, critically, to make peak demand more flexible. That is going to be an enduring feature of the system and I am sure that we will come on to it later. It is something I am very keen to advocate for.

Q115 **Chair:** Thank you. Can I turn to Dale and look to some of the alternatives to fossil fuels, in particular the capacity that the sector has to scale up in the short and medium term? The long-term plan set out in the energy security strategy and elsewhere is clearly heading in a direction of travel that you, among others, kicked off some years ago. What capacity is there in the more immediate term to be able to upscale electricity generation through renewables?

Dale Vince: You are not focused with that question on the coming winter, I presume?

Chair: I am focused on that winter and the succeeding winters. My impression is that it takes about 10 years to get anything on stream and we are not going to have 10 years if this current conflict continues.

Dale Vince: No, and that is one of the problems with the Government's energy security strategy. A large component of that is directed to nuclear, 25% by 2050. It takes 10 years to plan one of those, 10 years to build and another 10 years to get your carbon back. Renewable energy, onshore wind and solar can be built within one to two years. It is not 10 years. It is very fast and we could make it faster. I think in the Government's energy strategy they talk about making offshore wind faster, down to one year. We could easily do that with onshore.

Q116 **Chair:** Does that include the planning process?

Dale Vince: Absolutely. They are referring to the planning process when they say one year, not the building but the planning process.

Onshore wind is our cheapest, fastest form of renewable energy and it is currently shut out of the planning system by the Conservative Government. That is a real problem. It is a political decision and it does not make any sense, given our need to get to zero carbon and to do it as cost effectively and as quickly as possible. Onshore solar, the field version, not the rooftop version, is as equally fast and cheap, or almost as cheap, as onshore wind and has enormous capacity as well.

Both of those together could power our whole country 20 times over. To get to 100% green electricity using the wind and the sun onshore, we need 1% of our land area, just 1%. People often say that we do not have the room for it. We easily have the room: 75% of our country today is used by farming. As our diets change to get to zero carbon, which we need to do—the Climate Change Committee has made that clear, as have other experts—we just need a small percentage reduction in animal agriculture to make room for renewable energy.

In the Government's energy strategy, tidal and geothermal are mentioned as something that they want to support. I think that is a good idea, but that is not a near-term thing. That is something that will come back to us in the medium term. Right now, staring us right in the face, is onshore wind and solar, the fastest, cheapest, cleanest form of energy that we can make. Against that, we have nuclear, the slowest, dirtiest and most expensive form of electricity we ever tried to make. It should have no part in our zero carbon planning. It cannot help us keep bills down. Fossil fuels cannot help us keep bills down either. This winter, 50% of the gas we used in our country came from our North Sea, but it did not save us a penny. We let global commodity markets set the price for fossil fuels even when we make them here, so it does not make sense to frack

our way out of this problem or squeeze the last drops out of the North Sea. We will still pay the same globally inflated prices.

It cannot help us with our price security and, in any case, they are running out. The Oil and Gas Authority says that the North Sea will be empty by 2030 and that if fracking was up and running now it, too, would be gone by 2030. All we are doing if we dive into fossil fuels to try to solve this problem is kicking the can down the road. We know that we have to get off fossil fuels on to renewable energy. Every pound we spend now and every day we spend now investing in fossil fuel development is wasted.

Q117 **Chair:** You said then that this is an inflated domestic price. What do you mean by that when it is an internationally traded commodity?

Dale Vince: The price of fossil fuels is set by the global commodity market. There is no shortage of fossil fuels in the world. There is no reason why this winter we paid up to 10 times more for gas from the North Sea than we did last winter on certain days. There is no reason for that at all, except global speculation and the functioning of commodity markets. We allow that. If we were powered entirely by renewable energy, and we can do that with gas and electricity—I think that I will be talking about gas later—we can set our own price and that price can be fixed to the cost of production, not to global speculation in energy markets. There is no commodity market in wind and solar globally because it gets used where it gets made.

Q118 **Chair:** There is a global price for solar panels, is there not, which is not determined here, it is determined where they are made?

Dale Vince: Yes, and that has fallen 85% in the last decade. We are building solar projects now with no government money, no public support at all. We could do the same for wind energy if it was not banned in the planning system. This is the madness of our current energy strategy. Onshore wind and solar require no funding. They will not put our bills up and we have enough of it to power the country completely. I believe that we could within 10 years be 100% green electricity on the grid and green gas.

Q119 **Chair:** Charles, we have heard Dale's view on the energy security strategy. What is your view?

Charles McAllister: Yes, it is funny, I would disagree a lot with what Dale has said, probably unsurprisingly.

To start off with, I think the most important thing is the shortfall between gas demand and supply—the evidence that I provided to this Committee—which in the central scenario is about a trillion cubic metres of natural gas. At Q1 prices, that is about £1 trillion we would send overseas. Demand is there, there is no question. This is not a demand debate; this is a provenance debate: where do we get it from?

Dale was talking about building windfarms and how quick they are. One windfarm might be quicker than one shale site, but we can deliver infinitely more energy per site than we can from one windfarm. For example, one shale gas site, 10 wells, two hectares. To produce the same amount of energy from a windfarm you need a land area 750 times the size. Dale will talk about his green gas as well. In the document that he put forward, I think they propose using about a quarter of the UK's landmass. We can make the UK self-sufficient in shale with shale gas using 0.003% of the UK's landmass. In terms of delivering kilowatt hours, per kilometre squared per year it is the best technology in the UK, no question.

There is enough gas in the Bowland Shale for 50 years at a 10% recovery rate, and that is BGS numbers. Even if we get 5% for 25 years, that is still pretty good. That is 25 years assuming no North Sea production. As I said, it is the best technology out there. The idea that shale will be gone by 2030, I do not know where you are getting your numbers, Dale.

Dale Vince: The Oil and Gas Authority.

Charles McAllister: It has produced no documentation saying that the shale will be gone by 2030. The BGS document says very clearly the resource—because there is a difference. The oil and gas industry loves to use words that sound similar but have radically different meanings. The resource under the north of England is 37.6 trillion cubic metres of gas; fact. That is enough for 500 years. The question is recovery rate. How much can we get out? A typical recovery rate is 10%; 3,760 billion cubic metres, 50 years' worth.

Q120 **Chair:** We had evidence from the BGS that it had not looked at this since 2013 in terms of making its calculations, and they were very hedged around. You say that this is a fact, the scale of the reserves. Is it not the case that onshore fracking in continental Europe and particularly in Poland—which the president at the time, about 10 years ago, indicated would account for 90% of its energy needs—has not established commercially extractable wells anywhere in Poland, as I understand it?

Charles McAllister: That is correct. That is geology. For shale to be successful, you need good geochemical characteristics, high total organic carbon content, and it needs to be brittle. It needs to be shatterable. In Poland, quite frankly, it was like trying to frack playdough. Once you fracked it, it sealed up again immediately. You got this spike but then production dipped immediately, so it was not economic. The data that we have seen from the cores, especially in Lancashire in Preston New Road and in the East Midlands, Springs Road, those two sites, the cores look excellent: low clay content, high organic carbon content, which makes it suitable for hydraulic fracturing.

Q121 **Chair:** Has anybody reassessed the reserves since you have taken those cores out?

Charles McAllister: There have been some academic studies that have been terrible, quite frankly. There was one from Nottingham University that said that there was barely enough at all, but it took a core sample from a well that was drilled by a company on the very edge of the Bowland Basin. It was drilled. They took the core. The company said, "Don't like that; not even going to frack that well" and then they sealed it up again. Then these academics took that and extrapolated across the entirety, so it is the worst-case scenario. I have not seen any further material.

Q122 **Chair:** The company that had done the cores in the centre of it, had it provided material that is publicly available as to its analysis of the reserves?

Charles McAllister: Yes. Cuadrilla has put out publicly available information before. I am not sure if IGas has. I can tell you that if we get a successful result with this BGS review, we will be more than happy to share everything.

Caroline Lucas: Can I just quickly—

Chair: Yes, and I am then going to bring Robert in for his farewell appearance at the Committee.

Q123 **Caroline Lucas:** Very quickly, you have not challenged the point that Dale Vince made about the fact that were we to go ahead with this domestic fracking there is no guarantee that it would be used in the UK. That it would be sold on global markets. How does that help our energy security?

Charles McAllister: I have seen this argument being mentioned. Some groups are saying, "Let's take the North Sea where we have exported 25% in certain months". That is a gross exaggeration of what is going on. The volume of gas being exported in any one year is a function of total gas supply into the UK system. If you take a pro rata basis, about 6% of the gas produced in the North Sea in any one year is exported. We would say a 94% retention of shale for the UK is pretty good. Name me a country on earth where they have massively increased gas production and then simultaneously increased imports.

Caroline Lucas: I am not sure that I have seen corroboration of those figures.

Charles McAllister: I will happily send them.

Caroline Lucas: I would love you to. Thank you very much.

Charles McAllister: Yes, absolutely.

Chair: James Gray has a quick question.

Q124 **James Gray:** I am keen to let Robert in shortly. I just want to pick up on a point there. You were talking about the international gas and oil

markets and you indicated that they were run largely by speculation and the figures were incorrect or fake in some way or another. Is that right that they are not related to supply and demand but—

Dale Vince: More precisely, they are not related to the cost of production. The international oil and gas markets are openly rigged by cartels like OPEC. They control supply in order to put the price where they want it. Then they are subject to the speculators in the market, the people who do not use energy themselves, who buy and sell energy. They trade off potential global instability.

This winter we saw a particular spike before the Ukrainian war. Energy prices went crazy and there was no shortage of fossil fuels in the world. There was no reason for it. The worst part of that for me is that half of our gas was coming from our North Sea and we still paid those crazy high global prices for it, which I don't think we should allow.

Q125 **James Gray:** I take that point but, if I can, I want to focus on your thesis about the prices. You are right in saying that, of course, supply and demand can be changed by the suppliers. OPEC can cut it off. That is perfectly true. None the less, your second point, which was that speculators by some means or another were inflating the price artificially, surely if that was the case there would be a massive sell. Any market that is artificially inflated by speculators collapses. There are thousands of examples over history. Markets are all driven by supply and demand. Without speculators, surely it is a fake market.

Dale Vince: I do not believe that the problem this winter was supply and demand. I think that the war in Ukraine makes that clear as well. Only now has Russia started to turn off the gas to Europe, but it was fear of that that drove the market at the start.

James Gray: That is supply and demand, fear of that, yes, sure.

Dale Vince: Fear is not supply and demand. It is something else. It is fear of a lack of supply but it is a fear, not actual. It is not physical. The non-physical traders in our energy system caused this problem. We have them here buying energy that they cannot use and they make the market shorter and harder for real energy companies to buy the energy they need. They hold that energy and they sell it looking to make a profit. They only make money when there is volatility in the market, up or down.

James Gray: What is wrong with that?

Chair: We are going to move on to Robert Goodwill.

Q126 **Sir Robert Goodwill:** My question is to Mr Vince. Obviously, the UK has made considerable progress in transitioning away from fossil fuels, particularly coal, in electricity generation. However, we are still a long way behind countries like France with big nuclear capacity or some of the countries with hydroelectric. We have not made that same transition on

transport or heating. I recall in the Committee hearing that seven times as much energy goes into the typical house through the gas main as through the electricity wire. How can we accelerate the transition from fossil fuels across the board and which technologies should we deploy to do that?

Dale Vince: It is a great question, thank you. Can I first just say the one point I did not make, which I think is really important when you are looking at fracking versus renewables, is that renewables will never run out. It does not matter if you are talking 50 years or 500 years, renewable energy is with us for ever.

The Government currently plan a heat pump programme to decarbonise home heating. It is a terribly flawed concept. It has not been worked out. The cost will be enormous. I can dive into the details of that now if you like. We have an alternative, which is to make a different kind of gas to put into the grid. At the same time, what is missing from the energy strategy is energy efficiency. I think if we did energy efficiency properly, then we could do away with the need for somewhere between one or two Hinkley nuclear power stations, for example. We could save ourselves an awful lot of money and an awful lot of time by making our homes more energy efficient. Then we reduce the demand for the green electricity and the green gas that we need to make.

In a nutshell, the Government plan to replace gas boilers with heat pumps. They have a coefficient of performance of annual average maybe between two and 2.5. This means that if you put one unit of electricity in you get two to 2.5 out in terms of heat. They have a problem in the winter in that when the temperature drops towards zero the efficiency drops massively.

The other problem is that gas demand in the winter can be eight times higher than it is in the summer, and that is a proxy for heat demand. They will be called upon much more in the winter than in the summer. Typical homes in the UK today use 3,000 units of electricity and 12,000 units of gas. If you put a heat pump in instead of a boiler, you will turn that into another 6,000 units of electricity, making 9,000 for the whole house. That is a tripling of the electricity consumption of that home.

That means we need to make three times as much renewable energy to get to 100% green on the grid. That is a massive cost, over £100 billion. Worse than that, we have to strengthen the grid to deliver it, to deliver massive spikes of electricity demand in the winter. Worse yet is that it will put up the average household total energy bill by nearly 50% every year because electricity is much more expensive than gas. That is a fundamental problem.

We also have to throw away tens of millions of boilers, which is a terrible waste, and effectively scrap the national gas grid. If we just changed the gas in the grid, we can solve the problem.

Q127 **Sir Robert Goodwill:** How are we going to generate all this gas if it is not fossil gas from fracking?

Dale Vince: From grass. At the moment, we are building a project in Reading that will make enough gas to power 4,000 homes a year and it just uses grass. We have done a couple of studies. We published one last week. We commissioned Imperial College to do this for us, to give it a little bit more authority. We have looked at the availability of land in our country, the suitability of it, the proximity to gas grids and all the other factors that are important on a desktop basis. There is enough grass in our country to produce twice what the North Sea produces now. Without touching farmland, we can make enough gas to power all of our homes. If we had a 2% reduction in animal product consumption, we could add on to that enough gas to power all of industry. We could be energy independent in green gas from grass.

Q128 **Sir Robert Goodwill:** We are not currently using land under agriculture. We are drafting in other land?

Dale Vince: It is grassland. What we do is we introduce a bunch of different herbal leys into the grassland. It improves the biodiversity of that land. It improves the soil in that land because they are nitrogen fixing, so there is a biodiversity gain. We are looking at 160,000 jobs in the rural economy and £15 billion into that same rural economy. It is a transition for farmers and landowners away from animal agriculture, homes for nature—

Q129 **Sir Robert Goodwill:** Therefore, we are replacing agriculture, replacing sheep, cattle, milk production with gas production?

Dale Vince: We could. We do not have to. We obviously need to reduce animal consumption anyway to get to zero carbon, so I think the two fit well together. The gas is almost 90% lower carbon than North Sea and fertiliser production today. With some tweaks to the process, we can get to 99% lower carbon than the North Sea and fertiliser production.

I say that last part because the one by-product of a green gas mill, as we call them, is a natural fertiliser. We need no inputs on the land, no fertiliser, no pesticides. It is an entirely organic process. The way we design them is we use land around the gas connection point so that we do not transport grass through the roads, just with tractors and trailers.

Q130 **Sir Robert Goodwill:** You are using high clover grass leys to obviate the need for nitrogen fertilisers?

Dale Vince: That kind of thing, yes.

Q131 **Sir Robert Goodwill:** How much land? If we were going to make a substantial dent in the gas market, how much land? Are you saying all the land that is currently being used for livestock production would be switched to gas production?

Dale Vince: No, there is 6 million hectares, I think, not acres, of grassland that is not being used for horticultural or animal production purposes in our country. There is 18 million that is being used for farming. Three-quarters of our country is used for farming and one quarter is not. That is how it is at the moment.

To take an extreme scenario, if our entire country were plant based and did not eat animals, we would free up three-quarters of that 18 million or so hectares. Roughly half of our entire country is used to grow crops to feed animals and to feed people, which is a very inefficient process. I am not saying that we need to do that. I am saying that we need a 2% reduction in animal products and to use our grassland that is not in food production. We could power the whole country with green gas and create an incredible wildlife habitat as well as a transition for landowners and farmers and hit our carbon targets, not throw away millions of gas devices, not raise everybody's energy bill by nearly 50% every year, which is madness in the current circumstances anyway.

Twenty per cent of homes in our country are not suited for heat pumps at all because they are flats. Another 20% need major intervention for heat pumps to work. Heat pumps deliver lower temperature water than gas boilers do. It is not a plan but it is fundamentally flawed as a concept.

Q132 **Sir Robert Goodwill:** The Committee has already heard in the past that the small bore pipes in many new houses are not big enough for the 65 degree temperatures and you need bigger radiators as well, so I take your point on board.

How much land? Obviously, there is a lot of land in this country that is used for livestock production, where you could not harvest the grass. There is a lot of very steep fields. Most of my constituency on the North Yorkshire moors is livestock production, but if they could make silage on that land they would. The problem is that they cannot because it is too steep, too many rocks, and the soil type is not the type that would take the traffic.

Dale Vince: We have excluded that land. Anything with a 12 degree slope or more has been excluded for that precise reason.

Q133 **Sir Robert Goodwill:** Mr McAllister, do you want to comment on that?

Charles McAllister: Yes. I did not think that I would say this but I agree totally with Dale on the heat pumps point. I do think there are serious issues with it. There is no question that they will work in certain households but they are not a total solution.

Where I am slightly going to differ is, as you have said, you have 6.24 million hectares for the green gas, which is three times Wales equivalent. I think that in your document you said that your proposal was the antithesis of fracking. In land use terms that is for certain because, as I said, we can deliver all of the UK's gas needs and be a net exporter again with 0.003%, a big difference.

Where will that gas go in the future? The demand in the Committee on Climate Change's scenarios has natural gas demand being mostly for blue hydrogen production. That can go for industry. It can go for transport. It can go for home heating, and there are a range of scenarios that show different levels of blue hydrogen. Ultimately, that will have to come down to consumer choice.

I am not anti-biomethane by any means. I absolutely think that there is a role for it. We do need an energy mix here.

The Committee on Climate Change—an important point—in its Sixth Carbon Budget report showed a chart on the emissions reductions moving from unabated natural gas home heating to blue hydrogen production. It identified the biggest variable in the carbon intensity was the upstream emissions. That is, where you get the gas from. The precombustion emissions associated with shale gas in the UK is about a quarter of that of liquefied natural gas. If we do not develop shale gas or increase production in the North Sea, what we are effectively doing is locking ourselves into a more carbon intensive, more expensive form of natural gas.

Q134 **Sir Robert Goodwill:** If I could turn to Mr Rigg and talk about nuclear. We have heard the long timescales to build the plants, commission the plants or even get planning permission in some cases. In your opinion, is nuclear essential to supply baseload power or could a mix of flexibility measures replace the need for large baseload power?

Jake Rigg: At the ESO we take the scenario-led approach and try to take an adaptive approach because, as I am sure the Committee is only too aware, quite understandably and for quite obvious reasons, people will advocate for all sorts of different individual technology types. We need to look across the system in the short and long term, and increasingly as a whole system, across generation and demand types and locations—and I will come back to geographic location on this—but also across different what are called vectors: electricity, heating, transport and so on.

In terms of nuclear, to be really specific, we publish every July—there will be another one at the end of this July—something called the "Future Energy Scenarios" or the FES. That is the biggest scenario-led planning exercise in the electricity system. Within that, we have a minimum of one nuclear power plant in 2035. That will effectively be the Hinkley plant that is being built at the moment.

We have a range of different scenarios to account for the fact that we cannot guarantee that X, Y or Z will definitely be built on time or, indeed, that the demand scenarios that we forecast and the flexibility in the system will definitely come online. In effect, we don't put all our eggs in one basket.

It is a slightly difficult question to answer in that sense, in that not all scenarios require the 24 gigawatts, I think, in the energy security

strategy. However, nuclear to be direct does have a role in all of those scenarios, even if it is a much smaller role than in the energy security strategy in some of those scenarios.

Q135 **Sir Robert Goodwill:** If we do have more nuclear, how do you see that we would utilise the off-peak at night and in the middle of summer? Are you looking at hydrogen production or using it in other sustainable ways?

Jake Rigg: Yes, absolutely. It is a good point both in the context of nuclear but more broadly. We see in 2035 in some of our modelling it is plausible that in a given week we would see almost continuous excess generation at a level of about 38 gigawatts, which is about 10 Hinkley Points. This is because of the extreme growth in intermittent generation. It means that some weeks we are going to have windy, sunny weeks and you can see this day by day. We sometimes have guests come into our control room on two following days and they will say, for example, "How can wind generation be so high as a percentage of the system one day and so low the next? How the heck do you manage that now, let alone in the future?"

We see location of demand, as well as location of supply and generation, being absolutely pivotal to equipping an affordable, green, low-cost system of the future. In fact, the Committee on Climate Change did some interesting research I think a couple of years ago now, which we have been looking at quite seriously. That is around the costs of the overall system if you have a very flexible system versus a much less flexible system in terms of when your demand can come on or off. The Committee on Climate Change estimates that, as a whole, the value of flexibility to the energy system could range from £7 billion to just over £8 billion to £9 billion a year. That would radically bring down the cost of the overall system, compared to a much less flexible system.

The key thing for us—and we are seeing this on an almost daily basis at the moment already—is that understanding, forecasting and incentivising, both within the electricity market but, more broadly than that, the location of demand to alleviate constraints within the electricity system is absolutely pivotal to achieving the policy goals that I think probably everybody shares.

Dale Vince: One of the great things we can do, if we keep our gas grid and we change our gas from fossil to grass-based, is we can absorb the hydrogen that we can make from excess renewable energy. As we increase the size of our generation fleet from renewables, we will have to oversize it to minimise the times of not having enough.

It means that we will create more times when we have too much. We can turn that into hydrogen and the gas grid today can take 20% hydrogen. Everybody's boiler can take 20% hydrogen because since 1996 that has been a regulation on the system. We can put 20% hydrogen into the gas grid. We can make that at the site where we make the green gas. We can store it. We can arbitrage between power and gas on a needs basis. We

can turn that hydrogen into electricity or we can put it into the gas grid. It creates a wonderful opportunity to deal with the surplus hydrogen that we will make from our renewable energy fleet.

Charles McAllister: I agree with that, too.

Q136 **Sir Robert Goodwill:** To follow up, grass does not grow in the winter. You do not have to be a farmer; you just have to have a lawnmower to know that you do not cut the grass in winter. Are we going to be storing 40% of our gas needs from the previous summer so we can pump it into the main in February and March when there is no grass growing?

Dale Vince: It does not look like an issue to us. It is silage, isn't it? Farmers use silage to get their animals through the winter. It is not any different.

Q137 **Chair:** On the geographic nature of the grid and what you are proposing, I still have not got my head around quite the scale of what you think might be achieved. Your website talks about one five-megawatt anaerobic digestion plant requiring 1,200 hectares of grass. Generally speaking, the consumption of gas and the gas grid is built around industrial centres, where there is much less land available, rather than in rural areas where the grass is. You would have to install a very significant expansion to the gas grid to make this work, would you not?

Dale Vince: We don't think so. My background is in onshore wind and there, when we do a desktop study for a suitable site, we look for the proximity of a grid as well as other factors like distance to housing and that kind of stuff. In this study we have looked for the proximity of the gas grid in the same way that we have excluded sloping land where you cannot crop the grass. We think that it is entirely feasible.

Charles McAllister: We do exactly the same for shale gas sites. We will do proximity to either high pressure or local grid system as well as a range of other factors. The good thing about shale gas as well is because we are using the marriage of horizontal drilling and hydraulic fracturing it gives us more flexibility in site selection.

Q138 **Caroline Lucas:** I want to come back to Mr Rigg on the issue of flexibility. Would you agree that when it comes to nuclear one of the perverse impacts can be that, because nuclear is much less flexible in terms of turning it up and turning it down when you do not need it, it can mean that you are getting some of the green energy off the grid because you cannot turn the nuclear down? When there is too much green energy and the grid is full, then you end up having to turn the green off, not the nuclear off?

Jake Rigg: Yes, it is a good question. I have come on a journey myself on some of these issues over the last two decades. In the grid of the past, that was probably a very strong argument indeed and probably one that I have certainly advanced myself in the past. I think it is also fair to say that in the grid of probably even now but certainly over the next 10

years the grid will become much more flexible to soak up a lot of that generation.

It is the scale of the ambition, and I strongly advocate for the scale of the ambition on offshore wind, for example. That demand issue would be there regardless of nuclear on the system. It is important to understand. The grid today, there will be about 300 terawatt hours a year of electricity demand on the system. In the future, we see in 2050 about three times that because of electrification of a number of different things, particularly transport. In reality, in that grid of the future, depending on the exact scenario of how these things get built out in different configurations, I think there would be more than enough demand to soak up that baseload as well as the intermittent generation.

It is then really important to emphasise again, forgive me, the nature that you need to geographically locate insofar as is possible demand with supply. To give an example of that, at the moment on a peak day Scotland's demand would be in the order of magnitude of four gigawatts.

In the current ScotWind leasing round for offshore renewable energy, it is 25 gigawatts, which is in addition to at least another 10 gigawatts of renewable energy, which is fantastic but you can see the mismatch within a country within Great Britain. That energy needs to be brought nearer, transmitted obviously, to the demand centres. The more demand we can create in Scotland for energy, for example, it is much better. Of course, that also opens up huge industrial regeneration opportunities in different parts of Britain.

Q139 **James Gray:** Before I start, can I come back for a moment to the grass solution, which I had not heard of before? Forgive me for not being familiar with it. Just remind me of the figures you gave for agriculture versus grassland that is not being used for agriculture for the maximum use?

Dale Vince: Three-quarters of our country is under agricultural production.

James Gray: Is that hectares or acres?

Dale Vince: I think it is hectares. We have 24 million or 25 million in total and it is three-quarters of that, roughly 18 million.

Q140 **James Gray:** Where are the 6 million hectares that are not currently being used for agriculture?

Dale Vince: I guess they are all over the place. I do not actually know. I did not do the study. Imperial College consultants did it for us, and I can happily share it with you.

Q141 **James Gray:** They are all over the place and you need one biodigester for 1,200 acres, or 1,200 hectares even. It is going to be spread out across Britain. There is not going to be a central place where you will

have one biodigester surrounded by 1,200 acres, is there?

Dale Vince: I disagree in terms of each biodigester or green gas mill. I think we can find the land around that.

Q142 **James Gray:** Where?

Dale Vince: The beauty of this is that it is decentralised. We need about 5,000 of them and they will be spread across the country. Each one will put 30 jobs into the local economy and contract for £3 million worth of grass every year.

Q143 **James Gray:** I want to focus on the feasibility of it. You were saying that you can produce enough electricity to supply all domestic electricity and if we did a bit more we could do the whole of industry as well. I am puzzled as to where this grassland that is not currently being used is. I would be very interested to see a map, for example. In my area I know very well that in the West Country, for example, I cannot think of any grassland at all, zero, which is not being used for agriculture. It is all being used for agriculture because it is very rare. It is very valuable. I am puzzled as to where this grassland is that is not currently being used.

Dale Vince: I can find out for you.

Q144 **James Gray:** How many biodigesters do you say for your scheme altogether?

Dale Vince: About 5,000.

Q145 **James Gray:** What is the carbon footprint of 5,000 biodigesters?

Dale Vince: To build them?

James Gray: Yes.

Dale Vince: I don't know.

James Gray: They are pretty big?

Dale Vince: What I do know is that if you take the wind and the sun, for example, they are carbon neutral within six to 12 months of operation. If you take all of the materials used in manufacture, the shipping, the construction and everything, and with a green gas mill it would be very similar. It would be a short time before you get your carbon back.

Q146 **James Gray:** I have one last question on this: how close to the grids would the excess grass you described be? In other words, how much land would you have to use to transport the electricity from your grass biodigester to the grid?

Dale Vince: The idea is to surround the gas mill with the land that grows the grass. Our site in Reading is the one I can speak to because we are building it right now. It will be making gas by this winter. It is surrounded by 3,000 acres of land and it will make enough gas for 4,000 homes. We won't transport that grass on the roads.

Q147 **James Gray:** I am sure you can do that on one site. Anyway, we have perhaps explored that. I have to admit to a degree of scepticism about how practical your scheme would be, but there we are.

I accept your point that the rollout of both solar and onshore wind is too slow. What are the barriers?

Dale Vince: It is planning. We could improve the planning regime for ground-based solar. The Government say they are going to do that in this energy security plan and I welcome that.

For wind, there is basically a ban through the planning system. It has been made impossible in the planning system to bring wind projects forward. One of the beauties of wind and solar ground based is that again it is a decentralised way of making energy. You spread it around. You put it close to the point where the energy is used. It is the most efficient place to make energy. You minimise transmission and distribution costs and losses.

Homes have a big role to play in this as well. Having solar panels on as many roofs as possible and bringing battery storage into homes is part of the smart grid solution, so that homes and businesses—and it is viable for both—become interdependent with the grid. This is the vision of the smart grid. That we do not all just take energy from the grid when we need it. We give and take at different times of the day.

Q148 **James Gray:** I entirely agree with that. However, I am quite interested in your point that you felt that the production should be close to its use. That would rule out remote rural sites for wind or solar, wouldn't it?

Dale Vince: I do not think that it does.

James Gray: If it is 50 miles away from the nearest industrial site or the nearest town, which much of England would be, that is very remote, isn't it? That is not near the use at all. You would require a large amount of transportation for the electricity.

Dale Vince: I think that is super rare to get 50 miles away from any habitation or industry, super rare in our country. It is very hard when you do a desktop study to get—

James Gray: Come and visit Wiltshire in that case.

Dale Vince: It is very hard to get a kilometre away from the nearest house if you do a desktop study for a windmill.

Q149 **James Gray:** Near a house, but if you are producing a large amount of electricity, as you described, we are not talking about a house. We are talking about a town or an industrial centre.

Dale Vince: I am not talking about massive windfarms. I am talking about windfarms appropriately scaled for the grid that is nearby and that is how they fit. In our case, we started building single wind turbines, for

example, out in the sticks, enough to power a local town, village or whatever. Scotland is an extreme example. There is a lot of land and a lot of wind and very few people.

For me, that is an example of where there is a great resource that we can use but we have to ship it a long way to use it. If we use the wind that is all around us in England and Wales, we can make the power we need near to where we live. We did this for industry as well. Many years ago, we built wind turbines for Sainsbury's, Ford and Michelin at their factory sites. It is the most economic place to make renewable energy.

Q150 **James Gray:** There is a very good one beside the M4, isn't there, in Reading?

Dale Vince: Yes, that is one of ours.

Q151 **James Gray:** That is ideal. That sounds perfect. You mentioned that the delay is caused largely by the planning system, and EDF said something similar. It reckoned that it took 10 years from flash to bang to put in a renewable site. If you cut the planning system in some way, if you found some way of going through it or bypassing it or hastening it up, surely by that means you are reducing the right of local people to object, aren't you?

Dale Vince: I will say two things there. One is that wind is not treated equally in the planning system. It is treated specially and it is made especially difficult to the point of impossibility. If you do that, you are effectively arguing that the planning system is not democratic because it can handle fracking and everything else, but it cannot handle onshore wind.

The second thing I would say is that the Government changed the rules of planning for fracking. They took it out of the hands of local councils and put it into the hands of county councils. They made it less democratic because they wanted to force it through. There is very unequal treatment in the planning system for wind and for fracking.

Q152 **James Gray:** I am not sure that county councils are less democratic than local councils. It is the same thing, really, but there we are. What about solar? Do you agree that it is right that local people should object to large solar farms if they want to?

Dale Vince: I think that local people object to most things that are being built. That is the nature of the human being. It is only in renewable energy that we let it become a thing. We do not let it stop nuclear power stations, waste incinerators.

James Gray: Sure we do, on housing.

Dale Vince: It did stop fracking, though.

Charles McAllister: I think that the planning system is fundamentally inimical to development in the UK and, if we are going to meet the goals

of the energy security strategy and net zero, there has to be reform. That needs to be across the board, not just what we want for shale. It has to apply to renewables as well. We are interested in coming into the nationally significant infrastructure project, but even if renewables got that as well, you still have to do a lot of local engagement.

What it does is provide consistency in the decision-making process. The number of applications we have put in, positive recommendation by planning officer, positive recommendation by planning inspector, and then rejected for spurious reasons. It happened two weeks ago to us.

James Gray: If that happens you go to appeal and the inspector then will overrule it.

Charles McAllister: Yes, and then MHCLG or whatever it is called now—the Department for Levelling Up, Housing and Communities—rejected it for reasons I am still not clear on. We are seeking clarity on that.

Dale Vince: That is a good point. In the past when mobile phones first came into the world, there was a real backlash against mobile phone masts, you may remember. What was done there was that they were taken out of the planning system and now there is a presumption in favour of them. You have to go through the normal studies and that kind of stuff, but there is a presumption in favour of mobile phone masts because they were deemed to be nationally important.

Q153 **James Gray:** Are you arguing for a presumption in favour of renewables?

Dale Vince: Yes.

Q154 **James Gray:** You would argue that there should be the presumption in the planning system that, despite the fact that local people do not want it, they should be allowed?

Dale Vince: Yes.

James Gray: I see. Thank you.

Q155 **Caroline Lucas:** I want to come back to Charles about the issue of the amount of gas we export versus using ourselves. I was looking at the BEIS "Digest of UK Energy Statistics" from 2020 and it seemed then that we export around a quarter, which seemed not to be in line with the figure that you gave us a little earlier.

Charles McAllister: No, that is what I said at the start. It is that 25% is exported of total gas supply into the UK. What I am saying has literally been happening in the last few weeks. The amount of LNG we imported in January is mind-blowing. In January, LNG became our dominant gas source. What is happening is LNG is coming in and then it is being sent across England and straight through the interconnectors and it is filling up the European supply. I think it is 34,000 gigawatt hours. To assume all of that is coming from the North Sea is incorrect.

You cannot actually tell with 100% certainty. I would love if you could seed gas and say exactly where it comes from, because then we would know exactly how much we get from Russia through the pipelines. On a pro rata basis, which I think is fair and I am very happy to share that with you, the average since 2010 has been 6% roughly that has come from the North Sea. Again, as I said, I am very happy to share that with you.

Q156 **Caroline Lucas:** That would be helpful. Thank you. More substantively, given that the UK's carbon budgets only give us around a 50:50 chance of limiting temperature rises to 1.5 degrees, in what scenarios would the UK have enough headroom to expand onshore oil and gas production?

Charles McAllister: It is an interesting question. What you are talking about is test 3 of the Committee on Climate Change's 2016 report. What it said is demand should not increase, fine; domestic production should replace imports, also fine. The third one is that we should make allowances, but if that was the absolute be all and end all, what we should do logically is shut down industry, kill all the cows and import everything because that gives us lots of headroom. We are trying, quite frankly, to push back against the use of a territorial footprint. We think it should be a consumption footprint. If you look at how much LNG we have been importing since 2010, I cannot remember exactly but I think it is 200 million tonnes equivalent we have been able to offshore off our books just because we are importing natural gas instead of producing it domestically, even though domestic gas is less carbon intensive. It is a totally perverse system. I think I saw that the Government are going to consult on CBAMs, carbon border adjustment mechanisms. We would fully support that.

Dale Vince: The same thing is happening with Drax. It is bringing woodchips over from Canada, I think, or North America and it counts them as zero carbon.

Q157 **Caroline Lucas:** Yes, I totally agree that we should be factoring in consumption emissions. We have done some work on that as well.

Charles, putting to you, for example, the conclusion of the International Energy Agency that there should be no new exploration of oil and gas if we are serious about getting below 1.5 degrees, in other words we do need to have that global perspective that you were talking about in a sense.

Charles McAllister: I have two things on that. If you read page 163, it says, "Producers which offer credible emission reductions", are less carbon intensive, "than suggested sources can credibly claim theirs should be preferred". Again, I can send that to you as well. That is one. Secondly, that was done pre-invasion. If you look at the—

Caroline Lucas: The climate does not care about the invasion, does it?

Charles McAllister: Of course it doesn't, but the reason why it was saying that is that it was looking at identified reserves globally. The biggest reserves are North America, Middle East, Russia. If it is saying we should not produce here, we need to use identified reserves, that is continue importing from the Russians, that is politically not acceptable.

Q158 **Caroline Lucas:** The UK as we know, if we wanted to stop importing from the Russians, could be, for example, on gas massively rolling out the energy efficiency programme that has been missing from the energy strategy and so forth. There are much quicker, cheaper, more effective ways of making up that shortfall from Russia than having a whole set of fracking.

Charles McAllister: I do not know why it has to be an either/or. I do not know why it is black or white. We do need a shade of grey here. If people say, "No, we should not do fracking. We need to do total insulation", no scenario, as I have provided to you, even under the most steep decarbonisation scenarios, shows that we can manage the shortfall. This term "managed decline" from the North Sea, there is no scenario where they can massively increase production enough to address the shortfall.

Caroline Lucas: One of the Climate Change Committee's scenarios absolutely showed that we could. It means a lot of change for sure, but—

Charles McAllister: It goes to zero in 2050, that is correct, or near zero in 2050. That is quite a long way away. I will nearly be retiring by then.

Q159 **Caroline Lucas:** If we are serious in talking about net zero by 2050, I would agree with you that 2050 is too late, but none the less there are scenarios that do not require a massive investment in fracking. Indeed, only one of the five scenarios of the CCC I think did foresee significant—

Charles McAllister: Shortfalls? No, I disagree.

Caroline Lucas: No, not the shortfalls but the requirement for fracking.

Charles McAllister: They put it in the widespread innovation scenario. The reason for that is—

Caroline Lucas: In other words, one out of five scenarios or one out of six.

Charles McAllister: Yes, but if it is compatible with one I would argue it is compatible with all of them. The reason why they put it in that scenario, just for total clarity here, is they said that there would be huge innovation in techniques or technologies or understanding of the geology. They did not put it in that because they thought that it is only compatible with this one. The shortfall in that scenario is about 600 billion cubic metres. The shortfall in the balanced scenario is a trillion cubic metres. In the headwind scenario it is 1.2 trillion cubic metres. No, I would argue that shale is compatible with every single one of them.

Q160 **Caroline Lucas:** Your response to the IEA, then, is simply to say that you think it has been overtaken by the Russian invasion and, therefore, we need to be—

Charles McAllister: Not only that, I would argue actually that the IEA conclusion was wrong. Well, the overall concluding remarks were wrong, but, as I said, they then put in extra evidence to say if you can credibly prove that your resources are less carbon intensive, you can make a case for that production. As I said, I will send that to you as well. It is two sentences that I think should have got more attention but did not.

Q161 **Caroline Lucas:** The English countryside is very different from places like Texas. What makes you think that the industry could overcome local opposition and replicate some kind of shale revolution in the UK? I ask specifically because I was looking at some research from Cardiff Business School that suggested that just to replace half of current imports of gas we would need 6,000 wells. Given the unpopularity of fracking with the public, what assessment have you made around the popularity of building a new well every day for the next 15 years?

Charles McAllister: That study you are quoting from Cardiff University is pretty awful for the simple reason that the EUR—estimated ultimate recovery—that was assumed, which is how much gas is going to be got out of the well, is so low there would not be an industry. It is not profitable. The idea that that is how many wells we would need to cut it in half, if we were drilling wells and that is what we produced out of it, half a billion cubic feet, we would shut it down. It would not happen. The EUR, estimated ultimate recovery, that we are estimating in Lancashire is about five and a half to eight, so it is over 10 times that. I do not think that is a credible document. I can send you our updated ones, of course.

In terms of land use, 80% of the population in the UK lives on 7% of the land, so there is room for development. This argument that we should not develop shale because, for example, it will industrialise the countryside, if that was your view, then you would have to also oppose wind and solar because the energy densities of wind and solar are so much less so you need a lot more land.

In terms of local support, we did some polling. We said, "If we offered you 25% off your gas bill through our community benefits package"—which again we agreed years ago and we are considering increasing the amount that we give to local people—"would you support fracking in your local area?" and a majority said yes. Again, I can send you our press release and the details on that. I am very happy to.

Q162 **Caroline Lucas:** There is no independent polling that I have seen that would suggest that a majority of people support fracking.

Charles McAllister: Maybe the Green Party should do it.

Caroline Lucas: No, I am saying independent. I am suggesting that there should be some independent—

Charles McAllister: I would be happy with that.

Caroline Lucas: It is very convenient for you to be able to cite your own evidence on this, but it is—

Charles McAllister: Yes, but we got YouGov to do it. We did not just go around to people and say, "Would you support fracking?" It was YouGov that did the polling. Again, I am happy to send it to you. I am going to send you a lot; I will have to create a list.

Q163 **Caroline Lucas:** I have some of it, don't worry. Dale, what are your thoughts on the wisdom and necessity of fracking?

Dale Vince: I think that if you offer people a quarter off their gas bill, you are going to get a lot of people saying yes, but the opposition to fracking has been clear for a very long time. I would argue that the Government are independent in this respect to a degree, and the opinion polls that the Government have been running have shown consistently very high levels of opposition to fracking, almost the same as the levels of support for onshore wind.

It is a matter of fact, in my opinion, that we cannot afford to drill for new oil and gas and hope to meet our climate targets. Transition is talked about all the time and for a lot of people in the oil and gas industry it is a word they use to talk about slowing things down. They have finally acknowledged that fossil fuels are the cause of the climate crisis and now they have moved on to another approach, which is to say, "Yes, but we need to make a sensible, pragmatic transition and it is going to take some decades to do that". I do not think that it does have to take decades. I do not think that we have decades.

Pre the crisis, as a country we spent £50 billion a year bringing fossil fuels into our country to burn them. Fossil fuels are a single use form of energy. If we spent that £50 billion for two or three years, over a period of 10 years we could build all the infrastructure we need to make all of the energy we need from renewable sources. Then, after that, the £50 billion a year would stay in our economy instead of leaving our country. It would give us the most massive economic boost. It is like the Brexit bus promise of £350 million a week, except it is three times bigger, £1 billion a week, and it is real. This is the opportunity of energy independence done with renewable energy.

If I could come back to the planning, presumptions in favour in the planning system are not new. It is not just mobile phone masts where they exist but there is a presumption in favour now for fossil fuels, gas-fired power stations. They exist.

James Gray: Yes, but there is no presumption in favour of renewables.

Dale Vince: No, you were asking me if I advocated for that and the way that I thought you took it was to be an exceptional advocation. I was

wanting to say to you that it is already there for fossil fuels; why don't we have it for renewable energy?

Chair: I am sorry, we have to move on because are running out of time.

Q164 **Caroline Lucas:** I have a last point coming back to the beginning about the imports and so forth. Would you acknowledge, though, that irrespective of whether it is 24% or less or more that is being exported, the price is set globally? Any argument that would suggest that if we frack nationally, domestically, we are going to have lower prices is not going to be able to be stood up?

Charles McAllister: No, I disagree with that. We will ignore the community benefits package of 25% off bills because that is not a national thing. That will only be within, let's say, five or 10 kilometres of a site. It is still good for those people, but on a national basis there are two things. First, if you have a shale scenario versus no shale—that is LNG, the cost that there will be from this fingers crossed approach I call it—where we effectively send a high price out to attract LNG tankers, if you are more self-sufficient you have to do that less. You do not have to send off high price signals. That will have a depressive impact on price. That is one point.

The second point is that I have already got my board to agree it would be more than willing to sell gas, especially to large industrial users, at fixed contracted prices. That gives certainty to the phase 1 clusters because those clusters on the east coast and in the north-west that have been awarded funding, the Bowland shale is literally underneath it but the Government are potentially considering not using that, they are going to import it as LNG. We would be more than willing to fix the price into those facilities. That gives guaranteed price to those facilities and to the downstream users, be that other heavy industry, homes, transport, and so on. That is a plausible way of getting bills down.

Q165 **Cherilyn Mackrory:** I will be brief. Mr Rigg, the forthcoming energy Bill is due to give National Grid the role as the future system operator. What do you see as the main challenges and opportunities that the FSO will face as we electrify the economy and move towards net zero?

Jake Rigg: Just to explain the role of the future system operator as we have been exploring that with Government, the electricity system operator, which is already a legally separate part of the National Grid group, would become independent of National Grid completely. It would become a public corporation owned solely by Government to ensure independence from the rest of the energy system.

Within that, and we await the legislation with bated breath, I guess, set out in the Government's BEIS consultation response on creating a future system operator, the role would very much be about creating both independence for us as a system operator but also an enhanced role looking across the whole system. That is looking across different vectors,

particularly around gas strategy, which is something that we are on the edges of at the moment insofar as it impacts electricity. We would retain our role administering, developing and leading on a number of aspects of functioning of the wholesale electricity markets, which would remain important, and particularly strategically advising Government on technical aspects of developing that whole system. That is a huge challenge and one that we are proud to be asked to be part of, but one that we really do not underestimate.

You can see just from the debate that is being had today that there are huge numbers of different options and different permutations within them. Understanding exactly what needs to be done by when, and if it is not then you would move into a different pathway, is critical. I think that sometimes in the energy debate that gets missed. I say this with some hindsight, having been in government a decade ago and probably, if anything, having stepped out of that until relatively recently on joining the ESO.

You see, yes, decisions may be right for that particular time and that moment and may have encouraged certain things. You also reflect on what you might have got wrong at the time. Then you see that times have moved on and we need to move with the times. I think that whole system role, as I say, is going to be a huge challenge but an important one in taking that view.

However, I should say that the other challenge—and I will be very brief about this—that I get asked a lot, "Does this mean that you guys become the fat controller in this system?" I think it is important that we not only do not become that or try to become that but we are not seen as that. In my view, the energy system is market led. It needs to be market led to keep costs down for consumers. We are all hugely aware of costs for consumers of the energy system as it is today and the crippling effects that that is having across our society. As I said, it is important that we focus on that to make sure that we do not become some sort of central dictator within this.

Q166 **Cherilyn Mackrory:** The ESO is developing a demand-side strategy. For example, in Cornwall you can go down the A30 and one side of the road will have wind turbines turning and the other side won't. It is because we have too much electricity to send back to the rest of the grid, and with the advent of the Celtic Sea floating offshore wind that becomes an even bigger problem. How much scope is there for dynamic demand to improve energy security and reduce costs for consumers in the country? How reactive will it be, do you think, and what effect will that have on people's bills?

Jake Rigg: There are a couple of things within that question. Flexibility and dynamic demand absolutely has to be a central part of any strategy within all of this. I do not want to speak for the other panellists, but it is possibly one of the things that it sounds like we might be able to agree on. As I said earlier, that is significant in terms of cost reduction for the

overall costs of the system. It is absolutely huge as a proportion of total cost. I think that it affords big potential for industrial growth in different parts of Britain that are really crying out for it and have been for some time.

There are a number of questions about how you then go about doing that. I probably won't try to venture too much into this debate right now because I know we are coming to the end of the time, but we published a study two months ago, I think it was, about market reform. The Government are coming forward with a consultation on reform of the electricity market arrangements. We published a lot of evidence about the power of locational signals within the wholesale electricity market being really significant to facilitate exactly that kind of change at a local level.

The last thing I would say is that it is true that, even if you went into our control room right now, the number of balancing actions at the margins of the system by our control room engineers, who are absolutely world class in what they do, is significantly greater than it would have been 10 years ago.

I can send the Committee some statistics, but that will grow—I hesitate to use the word "exponentially" because I know that a lot of my engineering colleagues will criticise me on technical grounds for saying that, but it will increase really dramatically over the next few years. That also presents a big digitalisation and technology challenge that we all need in the energy system to get round and get across.

Q167 **Cherilyn Mackrory:** Thank you. Mr Vince, given that and given the timescales we have just had laid out there, do you think the Government and National Grid are acting quickly enough to upgrade the grid to incorporate the renewables vision that you see or that we are heading towards?

Dale Vince: My concern is that we are not moving fast enough to bring more renewables on. We know what we need to do to balance the power grid. I think the gas grid can help us there in a world where we use grass to make gas and we have the arbitrage between hydrogen, grass gas and electricity.

We run a smart grid platform ourselves. As an energy company, we have to balance the needs of our customers with our own generation and the generation we buy in every hour of every day of the year. We are well used to the need to balance on a smaller basis than National Grid does, and we know that the tools are there to do that. We are just building some battery storage ourselves as well, as part of that demand-side response from industry is new.

The grid in our country has been quite dumb compared to what is coming with smart grids. We all just flick switches and demand power when we want it, and that has been a real challenge for the National Grid. This is a

new kind of challenge and a new opportunity. The load factor of the grid, for example, which some people think of as a measure of efficiency—it is not quite—is about 50%. We have this huge grid and on average we are using it 50% of the time. We can be smarter and get more out of the grid that we have.

Q168 **Cherilyn Mackrory:** Thank you. Mr Rigg, how much more investment do you think is needed to deliver the goals, particularly of the energy security strategy? Are you confident that we can deliver it as planned in the early 2030s to the electricity system?

Jake Rigg: The investment numbers are big. I think that next week we will be publishing a major piece of work on this. I will not quote the numbers yet because they are still being finalised, but tens of billions in the actual electricity transmission network itself. Therefore, major investment is needed across GB to facilitate exactly these kinds of challenges, be they in Cornwall or be they perhaps at a more distribution level, potentially, but also the example I gave of Scotland, huge variations in the intermittent generation versus the current demand there.

As Mr Vince said, this is about creating a much smarter grid that we have been building for a time but has not needed to have existed in the past. It really needs to exist in that future. I think it is doable. I really do think it is doable, but a huge amount of investment is needed and a huge amount of real determination.

Bringing these different strands together—be it around time for planning, time for connection, policy decisions being made—I would again emphasise the real need, in my view, to get this right and to do this in an economically efficient way. We are strong advocates for the need for reform to the wholesale electricity markets to make sure that we do that in a way that maximises the benefit to the public and to consumers and keeps those bills down.

Q169 **Cherilyn Mackrory:** I could go into that a little bit more but I won't. We did not talk figures. Is there a projection of year on year investment that needs to be attracted to get that done? Have the figures been projected at all for that?

Jake Rigg: We do. I will get them wrong if I try to say them right now so, if it is all right, I will send them to the Committee. We are publishing a major piece of work on this next week and I do not want to jump the gun on that. I will write to the Committee.

Q170 **Cherilyn Mackrory:** We will look forward to reading that, I expect. Is there anything more any of you would like to see from the Government that we could potentially put into the forthcoming energy Bill to accelerate the transition from fossil fuels? What do you think we should be doing that perhaps we have not thought of yet or have not heard the Government say much about?

Dale Vince: I think we need to end all forms of subsidy for fossil fuels, tax breaks and the more direct subsidies. We should do this over some time, maybe three to five years, and we should switch those subsidies progressively from fossil fuels to renewable energy to speed up the transition. We should create at least parity between renewable energy and fossil fuels in the planning system. That means changing the planning rules for onshore wind. It is a massive opportunity for us.

Onshore wind and solar are generating now at pre-crisis grid prices. They need no money from the public purse. It is a terrible waste that we do not pursue those. We should offer some support for tidal, because there is a great potential for predictable renewable energy, and some support for geothermal because there you have baseload renewable energy, which is something unheard of. They are the ones off the top of my head.

Charles McAllister: I would mostly like the Government to lift the moratorium and facilitate the development of shale gas.

Another point: the energy levy is a deterrent to investment but one of the clauses in there says effectively, "Don't worry, we will give you tax relief if you invest in new oil and gas production". That is fine for offshore but we cannot do that for onshore because of the moratorium, so that relief is not on offer for us. I would like to see that addressed as well.

Cherilyn Mackrory: Mr Rigg? Anything to add?

Jake Rigg: The Committee has already alluded to pushing on the demand side. It has been done a number of times and it is difficult to get right. I think a determined effort across government and industry on the demand side is key, both on reduction and efficiency within homes and industry but also the flexibility side.

Q171 **Chair:** I have a final question for Dale Vince. You talked about the land use required for solar panels. Have you looked at rooftop capacity for solar and do you have a view about how feasible it is to use spare rooftops?

Dale Vince: I haven't. I think it cannot work for every home but it should be done where it can work, because the roof is a brilliant place to make the electricity that we all need at the point of consumption but I do not have any figures for you.

Chair: Thank you. I would like to conclude this panel by thanking Dale Vince from Ecotricity, Charles McAllister from UK Onshore Oil and Gas and Jake Rigg from National Grid. Thank you very much indeed.

Examination of witnesses

Witnesses: Sonya Boodoo and Graham Kellas.

Q172 **Chair:** Welcome to our second panel today. We are joined by industry observers rather than practitioners and I welcome Sonya Boodoo from Rystad Energy and Graham Kellas from Wood Mackenzie. Will you explain to the Committee your roles in those organisations? What does Rystad do, Sonya?

Sonya Boodoo: Rystad Energy is a data analytics and advisory company for the energy industry. My role within the company is to look at upstream activity, oil and gas activity, on the UK continental shelf. I have been analysing that activity for the last few years.

Chair: Graham Kellas, I believe you are an experienced analyst/economist at Wood Mackenzie.

Graham Kellas: Yes, that is right. My role is to oversee our global fiscal research and analysis. Our company also does data analytics. We date back to 1973. Our first reports were based out of our Edinburgh office on the first fields that were developed in the North Sea. We have since expanded globally and now cover all energy sectors. My role is to look at taxation and the contracts between the upstream industry and the host governments around the world.

Q173 **Chair:** In the previous panel, we heard a comment from Mr Dale Vince that it was speculators who were driving the pricing of oil and gas rather than natural supply and demand. My brief tells me that global demand will exceed 100 million barrels a day equivalent of fossil fuels later this year. Could you give us some context for how much the price hikes over the last 12 months have been driven by actual supply and demand?

Sonya Boodoo: I can speak a little to recent oil prices. We have seen a lot of extreme volatility in the past two years, from when Covid happened and prices sank to all-time lows and, more recently, the quite high prices as a result of the Russian invasion of Ukraine. We are now above $100 a barrel. We do not expect that sort of volatility to continue for much longer. The reason for that is that when prices are high swing producers can come into play and suppress them. OPEC can come in and turn production on quite quickly and easily and that would drive prices down because it increases supply.

Secondly, given the current high prices, US shale producers are ramping up activity quite significantly. We have noticed that the US shale players have already increased their investment by 35% compared with last year. That should increase their production by roughly 1.6 million barrels per day this year, compared to last year. To put that into context, that is more than the total production that we expect to see this year from the UK continental shelf. They will be able to increase production quite significantly to drive prices a little bit down due to the increased supply. Because of that, we do not expect to see the high prices being sustained. We expect Brent prices to be roughly around $77 per barrel next year and expect around $70 a barrel in the more medium-term outlook.

Q174 **Chair:** Could you comment on demand?

Sonya Boodoo: I have not looked into demand very much. However, we do expect global demand to peak within the second half of this decade and then start to decrease.

Q175 **Chair:** Is it the case that demand from Asian economies for gas, at least, over the last short number of years has increased significantly? That that has been one of the major drivers for the increase in price because supplies have been diverted to those economies?

Sonya Boodoo: Because Europe has been quite dependent on gas imports from Russia, European countries are now trying to wean themselves and are looking for alternative sources. This means that a lot more LNG is coming into the region and there are competing interests. Asian buyers and European buyers are competing for the same cargos of Asian LNG. That is driving up the prices. We saw historically high prices in March this year because of that.

Q176 **James Gray:** Following up on the Chair's question, the thesis advanced by one of our previous witnesses was that it was speculators who were driving the price up. Am I not right in thinking that for every single person that buys a barrel of oil at $100, somebody else is selling it for $100 and, therefore, there is no such thing as speculation of free international markets? The free international market should accurately reflect supply and demand. People speculate, of course they do. They speculate on the stock exchange too, but speculators lose money as well as make it and you cannot artificially maintain high prices or low prices through speculation. Is that reasonable?

Sonya Boodoo: That is my view as well. It is more dependent on supply and demand than on speculation.

Graham Kellas: I was going to pick up on that as well. In a sense, all these markets are speculating, everybody is speculating. When they buy and when they sell they are speculating on the future performance of that stock or the security of the supply in this case. That is fundamental. Where will those supplies come from? Can I secure them now? What price do I have to pay to secure them now for the next one, two, or three years?

Q177 **James Gray:** Would you go one stage further than that and say that speculation provides liquidity to the market? If you did not have people selling at a time when they thought the price was going up or buying when the price was going down, you would have no markets because there would be no liquidity and, therefore, speculators are an essential part of the oil and gas market. Is that correct?

Graham Kellas: Yes, it is. It is also very much at the core of the investment strategies of the oil and gas suppliers. What will the market do? What will demand do over the next 10, 20, 30 years? The most likely scenario is that current oil demand and consumption will stay roughly the

same out to 2050. To achieve the Paris goals, it needs to come down by 70% in that time. Yet we are one-fifth of the way through the timeline from 2015 to today and consumption is higher now than it was in 2015.

Therefore, it seems that the reality of oil demand globally is that it is at least stable over that period unless things happen, unless things change, some of which were being discussed earlier, to make a fundamental change to that demand position. From then you look at the supply side because once demand starts to disappear prices will fall naturally. That is when you will find that companies are not interested in looking for or developing new oil and gas fields.

Q178 **Chair:** Graham, is your assessment of demand based on your assumptions of economic activity or the take-up of renewables as a viable alternative?

Graham Kellas: All of that. We do scenarios. We look several decades into the future and so much can happen in that time that will in part be generated by government policies, individually and collectively, and by company activity, and how companies transition as well. Many things are in the mix but we are observing what is actually happening and putting them together in our various models and across sectors.

Take the metals and mining sector. There will be a very important role there in energy transition, getting all the right metals required for the batteries and so on, that will fuel the delivery of renewable energy. All these things are interconnected.

Q179 **Chair:** I will stick with you, Graham, and move on to what is happening for the UK North Sea operators—they are not all UK companies obviously. How have those companies been reacting to the profits that they have been making as a result of the increase? Costs have not gone up commensurately.

Graham Kellas: No. First we have to say, yes, their free cash flow and their profits are at record levels. That is what is happening now. If you cast your mind back two years, profits were probably at record lows. Oil prices were in the deepest doldrums, there were lots of layoffs and lots of debt was building up in these companies.

Q180 **Chair:** As a result of the pandemic slowdown?

Graham Kellas: Yes, exactly, and also a sort of projection forward. At the time everyone was saying, "Demand has now fallen by 10% or 20%. Are we now in that period of constant decline? What is going to happen?" so there was a very tight handle on capital. That sort of discipline is still very much at the forefront of the companies' thinking. Therefore, what they are doing is paying down the debt they accumulated, especially the smaller companies. They are also paying back their shareholders, with buybacks, with higher dividends, because in a sense they have been starved of those in many of the recent years. There has been a sort of counterbalancing and resetting of the stall and now, I think, everyone is

looking at how to spend the additional cash going forward and different companies have very different approaches.

Q181 **Chair:** We will come on to the investment plans and the tax implications in a moment but, before I hand over to James Gray, have you, Sonya, seen evidence of changes in supply into the UK as a result of the Russian invasion of Ukraine and sanctions? I think we relied on Russia for 20% of our diesel, for example, last year.

Sonya Boodoo: Are you referring to domestic supply?

Chair: Yes.

Sonya Boodoo: I have not noted that in any significant way yet. I think the reason for that is that it takes time to get a new supply online. Getting a new project online on average can take three years for some of the more recent ones from approval to producing. It is quite a long lead time to get a new supply up and running quickly, so it is a bit difficult to see that already happening.

Q182 **Chair:** Which markets we are sourcing our supplies from?

Sonya Boodoo: We have seen more LNG coming in.

Q183 **Chair:** Is that mostly coming from the Middle East or from suppliers in the USA?

Sonya Boodoo: Quite a lot of it is from the Middle East but from the US as well. I think there is also some from pretty much the same general countries, probably Qatar.

Q184 **Chair:** Do you keep track of this in your firm?

Sonya Boodoo: I do but I would not be able to tell you off the top of my head.

Q185 **Chair:** Would you be able to write to us to illustrate the changes in sources of both gas and oil coming into the UK over, say, the last 12 months?

Sonya Boodoo: Yes, I can do that.

Chair: That would be very helpful. Thank you.

Q186 **James Gray:** One of the great debates is the issue of the tax regime and whether or not oil and gas producers benefit unduly. First, what is outlined in general terms in the tax regime for oil and gas?

Graham Kellas: I will try to keep this as entertaining as possible, or as entertaining as one can be for a tax discussion.

Every oil and gas company pays corporation tax, as does every other company, but in the North Sea, they pay under separate rules. It is called a ring-fence. The oil and gas extraction activity is ringfenced from any other economic activity that a company undertakes. It also is subject to a

different rate. Whereas the current corporation tax for most industries is 19%, in the North Sea it is 30%. However, there is a balance there which is that, whereas in most industries you will depreciate your capital allowance as a deduction over time at 18% of the remaining value each year, in the offshore oil and gas business you can offset 100% of your capital costs in the year that they are incurred. That was the quid pro quo in 2002.

The other thing that happened in 2002 was the introduction of a supplementary charge. This is an additional tax, only payable by North Sea oil and gas producers, which is currently at a 10% rate. There are slight differences in the calculation of the taxable profit, between that and the standard, corporate, ringfenced tax, and one of them is that they have an investment allowance. In general parlance, we call this an uplift in the business. Therefore, if you spent $100 on a piece of equipment in the North Sea, you will be allowed to deduct 162.5% of that before the tax starts to kick in. The reason for that is that that tax is designed to look at profits over and above what you would normally require as your return on that investment. It is a sort of proxy for that.

The rate of that supplementary charge has been going up and down more or less with the oil price since it was introduced in 2002. That is what we were sort of expecting to happen when there was all the debate around a windfall profits tax and it became likely that the Government would put in something but they have made quite a significant change with the energy profits levy that they have introduced so now there are three taxes. Their starting point is roughly the same taxable income, but the Government have made significant differences to this and also introduced another uplift allowance, which I know has attracted a lot of attention.

The upshot of the new energy profits levy is that if you have been investing heavily in the North Sea or you have been in an unprofitable position for several years, you have built up tax losses that you are carrying forward. That reduces your liability to tax in the current year or future years. The Government are disallowing that for those companies for this energy profits levy. They are also disallowing any deductions for decommissioning expenditure relief. The basis is that additional profits are clearly being made at these high prices, we do not want that taxable income to be diminished by the carry-forward of your historic activity and so, therefore, they are separating out this extra income for this special tax.

Q187 **James Gray:** Leaving aside what I will call the windfall tax for the sake of shorthand although some people would not like that, leaving that aside which one presumes is relatively short-term, how does the general taxation regime as it applies to the oil and gas industry compare with other industries onshore, particularly the onshore energy companies? Is it the same? Is it fair? Is it higher or is it lower?

Graham Kellas: There is a balance. A higher tax rate applies. Offshore oil and gas companies are now subject to a tax rate of 65% whereas

onshore it is 19%. That suggests that they are being much more heavily taxed than other industries. However, there are compensations in there flowing from the faster depreciation of capital allowances and these extra uplift allowances, which, for those companies that are investing, will help to reduce the actual tax that is paid.

Q188 **James Gray:** Leaving aside the technicalities—forgive me, I am a bit of an ignoramus about tax matters—would you say in general terms that fossil fuels from the North Sea are more or less heavily taxed than renewables produced onshore, more taxed than oil?

Graham Kellas: Yes.

Q189 **James Gray:** Therefore, the argument that oil and gas are subsidised by some means or other is bogus. Is that right?

Graham Kellas: Generally speaking, yes. A lot of things are called subsidies which I do not feel are accurate. One of the things about tax allowances, for example, a favourable tax allowance changes the profile, and the timing of the tax, but the overall tax would still be the same if the rates were the same but the rates are not the same, the rates are much higher.

Q190 **James Gray:** That is pretty much what the Treasury Minister told us, that there is no subsidy.

One final question. You mentioned decommissioning in passing. Does that not count as a subsidy, given that there is tax relief on decommissioning costs? Is that not a subsidy that does not currently exist for renewable energy companies onshore?

Graham Kellas: No. It is not a subsidy. Decommissioning is one of the costs of extracting oil and gas—exploration, appraisal, field development, production costs and decommissioning costs are all legitimate costs of doing business. A profits-based tax such as our corporation tax allows you to deduct the legitimate costs of your business before you pay the tax so decommissioning costs should be allowed as tax deductions.

Of course, what happens is the nature of decommissioning costs happening at the end of a project's life is when the taxable income from those projects is extremely low. Other companies with wider portfolios are able to offset those costs against their income from other projects but if that income from those other projects is very low—as it has been in previous years because of the low prices—it can create a situation where the decommissioning costs create a tax loss and tax losses can either be carried forward or carried back. If they are carried back, the Government will give them a tax refund but it is all a very legitimate part of the cost.

Incidentally, it could be prevented and it is in many other countries, where you pay into a decommissioning fund throughout the life of the project. This is something that happens in the nuclear industry and offshore wind, now, as well. The argument is that during the economic

life of the asset, the costs of decommissioning at the end should be contributed by all of those who benefit from that economic production. That includes both the producers and the taxpayer.

Q191 **James Gray:** Finally, just because you mentioned it and it is quite interesting, it is often said that the cost of decommissioning nuclear, when a nuclear power station closes down, makes the cost of nuclear energy disproportionately high by comparison with for example offshore wind or onshore solar. Is that argument correct? What you are saying, really, is that the cost of decommissioning should be discounted in the cost of energy throughout the life of the project.

Graham Kellas: Yes, it should certainly be included in the full cycle cost assessment of any new projects and is, I am sure, and there are funds available. Unfortunately, with the nuclear sector here, the first generation of generators did not have these funds in place and so now it seems to have fallen on the taxpayer.

I am not an expert in this area at all but, knowing that it was likely to come up, I have done a little bit of research on this. Your counterparts on the Public Accounts Committee have looked into this quite closely over the last couple of years and have produced reports that suggest that the taxpayer is contributing a fairly hefty sum towards the eventual clean-up or mothballing. It is a much longer process.

James Gray: However, not the new ones; for the first round of nuclear stations, yes.

Graham Kellas: I think it applies to even some of the newer ones. I know that EDF is paying into a fund but I believe that also the taxpayer is having to prop up the fund when the investment in that fund is not meeting its targets but I would refer you to the Public Accounts Committee notes.

Q192 **Caroline Lucas:** The issue of subsidies: I cannot let it stand, just to be given the impression that we have all agreed that there are no subsidies to the fossil fuel industry. You will know that there are big debates going on about an IEA definition of what constitutes a subsidy versus the OECD definition of what constitutes a subsidy. Notwithstanding saying that decommissioning costs are legitimate, a lot of people would suggest that it does seem rather perverse to be enabling it to be essentially set against tax, given that what we are looking at is an industry that is driving the climate emergency so we are effectively giving them a tax break through the position on decommissioning costs.

Graham Kellas: I don't think you are giving them a tax break. It is allowing legitimate costs of that business to be offset against the revenues for tax purposes.

Q193 **Caroline Lucas:** Are they receiving taxpayer funds for it?

Graham Kellas: Yes, in the sense that they have overpaid tax in the past and now they are getting a refund of some of that tax.

Q194 **Caroline Lucas:** You say "they have overpaid tax". Is it not the case that Shell in 2020 did not pay a penny of income tax in the UK?

Graham Kellas: On those profits—on whatever profits they had in that year—if there was no taxable income, yes. However, the decommissioning costs apply to fields that paid a lot of tax in the 1980s and 1990s, if it was Brent, for example, that they were decommissioning. That field that they are now decommissioning generated an extraordinary amount of revenue for the Exchequer when it was producing but because the tax rules did not provide for the forward provision of a fund to meet the decommissioning costs at the time, it is all happening now.

That is where the problem arises. Many other jurisdictions have realised this. They are in the same boat as the UK, and modern fiscal systems get round that by making sure that, just like in the nuclear and offshore wind industries, those costs are in place already when the decommissioning comes around.

Q195 **Caroline Lucas:** Does that help to explain why, for example in 2019, companies paid 12.5 times less tax for every barrel of oil produced in the UK compared, for instance, with Norway? Why is there such a big differential between the tax decisions of a country like Norway compared with the UK? Is it not the case that we are essentially incentivising oil and gas a lot more than, for example, a country such as Norway?

Graham Kellas: We have a different set of tax terms from Norway's and they have changed a lot over the decades. Norway has retained a stable 78% tax rate but has made some changes to the allowances underneath that and perhaps has better prospectivity in terms of the size of the fields that companies are looking for. Norway has provided new explorers with exploration credits. That mean that if they are drilling and looking for oil in Norway, they can get an immediate refund from the Government so they do have things in place that incentivise their oil and gas sector.

The fiscal policy in the UK has developed over time pretty much in line with the oil price but it is unpredictable. I know that that is something that upsets investors a lot. You will have heard that or you will hear it when you hear their dispositions. Not knowing what the fiscal terms will be from one year to another is what they find very difficult because, as any business would tell you, uncertainty is the thing they hate the most and the oil and gas business has a lot of uncertainty to deal with at any time. If fiscal uncertainty is added to the mix, it puts them off.

Q196 **Caroline Lucas:** On the issue of uncertainty, do you think the oil companies will still be earning bigger profits this year than in previous years even after the energy profits levy?

Graham Kellas: One thing about the UK tax system is that tax is levied on a company's entire activity in the North Sea and they are all at

different phases of their economic life. Some companies will be exposed to the full tax liability if they do not have projects that they can accelerate and invest in and they will be paying the full extra tax. Others at the other extreme may not have production yet.

There are still quite a lot of small companies that are in the very early stages of their activity and so it is essentially neutral for them. Other companies will be in the middle and some of them might benefit from the new tax because they will be immediately able to take advantage of the new investment allowance and when the tax is removed, if it is removed as promised at the end of 2025, the profits from their new fields will be liable to a lower tax rate than the tax rate at which—

Q197 **Caroline Lucas:** From a climate perspective, does that make a lot of sense? You are sort of saying it is incentivising.

Graham Kellas: There are a couple of things to say about that. From a climate perspective, and in terms of the new supplies coming on, those facilities will be much, much greener than they were in the past. Everybody is focusing on their scope 1 and scope 2 emissions, so there is that, which I suspect is probably at the margin of what you are talking about.

However, there is the second thing—and I will go back to this—it is a question of demand. If demand for oil and gas in the UK is going to stay at roughly the same level as it is now, does it not make sense to be supplying as much of that from the North Sea than importing it from facilities in other countries where production may well be much less green?

Q198 **Caroline Lucas:** On the issue of demand, though, it does not exist in a vacuum, does it? For example, if the Government had wished to use the money they are now going to forego through the investment allowance into insulating every home instead so that demand could come down, there would be a different outcome, rather than just sitting back and saying, "Demand is this constant and we need to meet it and, therefore, these are the different ways we could do that". Perhaps just park that, because it may just be a long observation and I can feel the Chair, even if I cannot see him, maybe getting a bit impatient.

Could you clarify the investment allowance? Do you think it is more likely to accelerate final investment decisions or new exploration? Do you have a sense of that?

Graham Kellas: I think it could accelerate some final investment decisions, where those projects are at a very advanced stage of design and what they have been lingering on is looking at the market dynamics and whether it is or is not going meet companies' criteria. Companies have a window between now and the end of 2025. If they can get a lot of their CAPEX into that timeslot, it may be something that would push a project over the line, so yes. Exploration, yes as well, if companies have prospects that are ready to be drilled but they are worried about the risk

economics of them and they will be in a taxpaying position—which does limit it to a smaller proportion of the overall number of producers—they may well be incentivised to go and explore some more, which is part of the NSTA's mission anyway.

Q199 **Caroline Lucas:** The subject of another debate. Sonya, how many more sea energy projects are in the pipeline and what major projects are we likely to see final investment decisions for in the coming months?

Sonya Boodoo: This year we expect to see around seven projects being sanctioned, the likes of Talbot, Murlach, Glendronach, Jackdaw and Tain. Next year we also see quite a few potentially earmarked. We think that the new investment allowance that was announced recently, as Graham Kellas said, is quite likely to accelerate some of these development-ready projects.

You will not see a huge number of projects far down in the pipeline being accelerated by this because of the timeframe of the allowance, which ends at the latest in 2025. It will probably accelerate some projects but not massively. Projects that we expect a few years down the line will not come up this year, for example. We think some potential projects that probably can be fast-tracked are the likes of Rosebank, west of Shetland, which has been on the cards for some time but there have been some delays. From what we have seen, the new investment allowance has massively improved the economics of these projects that have not yet been under development.

We took the example of Jackdaw and we looked at what the economics looked like under the previous regime and then what they looked like with the inclusion of energy profits levy. The valuation of that project increased by just over 50%. That is because of the investment allowance and the immediate tax relief from that investment allowance. Therefore, we do see potentially some acceleration but from the more mature projects in the pipeline.

Q200 **Caroline Lucas:** Do you have a figure for the number of energy projects in the pipeline? You talked about the seven that are closest to fruition.

Sonya Boodoo: Seven this year; probably another five or six next year.

Graham Kellas: Could I add a little point on that? All those companies that are making or potentially making those decisions do have to add in fiscal risk. One of the things the Chancellor said was that, if the oil price or prices return to historically normal levels, this would be phased out earlier. I am not sure if the Committee knows what the normal price of oil is but if you could let me know, that would be fantastic.

A second thing is that one of the attractions as an investor is that they get the higher rate of tax relief up to the end of 2025. Then, if the field comes onstream, the energy profits levy disappears and companies are subject to lower tax on the profits. That is conditional on it actually being removed at the end of 2025. There is obviously a scenario there where

there is a lot of new investment over the next few years; a lot of extra money coming into the Exchequer. It may be that the Government thinks, "This isn't broke. Why should we fix it?"

Q201 **Chair:** Is there any evidence the imposition of a new tax and fiscal uncertainty as you describe it, Graham, will impact the desirability of the remaining auction rounds for new licences? The Government have slated a large residual area, blocks in the North Sea, for new licences.

Graham Kellas: The sudden imposition of new taxes has a varied effect on different investors. Some are quite publicly very upset by it; others are less affected by it. You might expect those companies that will be hardest hit by it to perhaps be looking at their alternative opportunities a little more closely and looking at future opportunities in the UK a little more cynically, perhaps, or applying higher hurdles of investment criteria in order to go ahead. It always results in some downturn in sentiment towards the host country when it makes changes to taxes that impact current profitability.

Q202 **Chair:** The Government have estimated a tax yield of some £5 billion a year from this new levy. Has either of you made any assessment as to whether that is likely to be achieved?

Sonya Boodoo: We have had a look at what additional taxes can be derived from the energy profits levy and we did see an additional £5 billion, roughly, in the first year, so in 2022. Over the course of 2022-25, when it theoretically ends, we see a total of just over £10 billion being generated.

Q203 **Chair:** Over the subsequent three years?

Sonya Boodoo: Yes, over the three years.

Graham Kellas: Roughly the same for the first year. It is also conditional on what your assumptions are in terms of what will happen to oil and gas prices, how much of this new investment will actually be brought onstream or at least be given the FID approvals; all these things could fundamentally change those numbers, higher or lower.

Sonya Boodoo: Yes, agreed.

Q204 **Cherilyn Mackrory:** I know we have laboured the tax framework but could I ask you this, Graham: you mentioned consistency and predictability, but how could the tax framework in the UK be changed to future favour energy technologies with a lower environmental impact?

Graham Kellas: One of the things you could do reasonably quickly, I suppose—instead of higher taxes and improved investment incentives—is keep the corporate tax rate but set separate depreciation allowances, capital allowances and possibly even investment uplifts, for those technologies that you want to develop and give them those incentives. What that would be doing is saying we are happy to put off receiving any

tax from this project until you have not only recovered your capital cost but also some proxy for a return on it as well.

Q205 **Cherilyn Mackrory:** Do you know of any countries that you can draw on and we should be looking at where they are doing that already in a positive way?

Graham Kellas: I know there are several countries where companies get tax credits. The US is probably a very good example of where I understand the surge in investment in the onshore wind and solar industries is very much predicated, on the existence of what I think they call a 45Q tax credit. That was designed to apply for only a short time, a little bit like the energy profits levy. However, I think there is a lot of pressure for it to continue because it is doing what it set out to do, which is increase the amount of renewable energy in the USA.

Q206 **Cherilyn Mackrory:** Sonya, can I turn to you to help us understand a bit more about the ecosystem of the companies operating in the North Sea, on the continental shelf and the difference between reporting and regulatory regimes? Can you give us an overview of which companies are active in the North Sea and, also, the proportion of those companies that are listed companies and which are privately owned?

Sonya Boodoo: We did have a look at that and there is a very wide range of companies active in the North Sea. There are roughly 100 companies on the list of licence holders. Not all of them are currently producing. I think just over 50-odd of them currently have production. We have looked at the composition of the production. Around 15% of the production expected in 2022 comes from private equity-backed players, the likes of Neptune, Hurricane for example, and Siccar Point.

I guess you want to know what the difference is between those companies. The private, equity-backed companies are quite different from the listed companies. You can buy shares in the listed companies and they are listed on the stock exchange. The private companies are investors, so more privately held. Reporting is quite drastically different for both kinds of companies. Listed companies have to follow very high standards and comply with various regulatory requirements. Whereas the private equity companies do not have to comply with that same level of reporting and transparency.

In the North Sea we have not seen very much evidence that the private equity-backed players are hiding anything. I think they are quite open. We see a lot of reporting on their websites for example, so I do not think it is a disadvantage in any way.

Q207 **Cherilyn Mackrory:** Do you think the accountability and traceability of those privately owned, private equity companies are on a level playing field?

Sonya Boodoo: It is probably not level but I would not say it is terrible.

Q208 **Cherilyn Mackrory:** How many of the oil and gas firms operating in the North Sea are profitable enough to be liable for the windfall tax?

Graham Kellas: Probably about one third of the producing companies are paying tax at the moment but that number could be quite a bit higher. If you remember, I mentioned that they can make certain deductions against the existing two taxes that they are not allowed to make against the new tax. Therefore, they may be liable to the new tax now and more will be liable to the new tax but still not be paying much of the existing two taxes.

Q209 **Cherilyn Mackrory:** Is the investment allowance to effectively subsidise investment by state-backed Russian and Chinese oil and gas companies operating in UK fields in the North Sea?

Graham Kellas: Let's break that down into two parts. Will the uplift allowance subsidise new investments? Again, all these taxes are based on company-wide activity. However, if you were to look at a particular asset, if it met all the right criteria—that is, they can develop it within this timeframe, bring it onstream and the tax rate reduces and so on—at the margin there might be a situation where the pre-tax rate of return is lower than the post-tax rate of return. That could happen on that individual asset within a particular portfolio. It is probably very unlikely but on an individual asset basis, it is possible; on a portfolio basis, no.

The second part of the question is about who benefits from this. The rules are set for all players in the North Sea now. I know that one of the Chinese-owned companies is one of the top 10 producers. Did you mention Russia?

Cherilyn Mackrory: Yes.

Graham Kellas: Russia's presence is very small. There are others. I think Korea, Abu Dhabi and Iran also have oil companies there, and Norway and of course France, the EDF. That question is more about what is the policy for enabling different types of companies to invest in UK energy.

Q210 **Cherilyn Mackrory:** On the private equity-backed companies, you said the transparency was there. That they are not hiding anything. Does that also apply to their climate-related financial disclosures?

Sonya Boodoo: Some of them are quite forthcoming with that reporting as well, not all, but some, and we see it increasingly now.

Q211 **Cherilyn Mackrory:** Is there anything that the Government could or should be doing to make that more of a level playing field or should it be left as it is?

Sonya Boodoo: There are things that could be done to make it more standardised. That would help and would also help us as observers to make better analyses. There potentially are regulations that could come into play, but whether that would deter private equity investment is

another question. What we have seen in the UK market over the last few years is that the private equity players have been very active. They have been the ones driving a lot of the transaction activity in the UK space in the last few years. They have also been very good at following up with the maximising economic recovery strategy as set out by the OGA, so we have seen them working well towards maximising economic recovery and being active in the region.

Graham Kellas: I think I am also right in saying that all the companies have signed up to the North Sea transition deal, which does include a commitment to lower emissions by 2030. Presumably they are doing some sort of progress reports on that that those companies, as well as the larger traditional companies, would be feeding into the NSTA.

Q212 **Chair:** Is there any evidence that orphan assets or assets owned by private equity firms that are being sold are being acquired by either Russian or Chinese buyers?

Sonya Boodoo: I am not sure.

Graham Kellas: Not that I am aware of but that is something I can ask about.

Q213 **Chair:** It would be very interesting if you could see if there was any trend in that direction. I understand two of the top 10 producers are owned by the Chinese National Offshore Oil Corporation.

Graham Kellas: In the North Sea?

Chair: Yes.

Graham Kellas: Certainly one is. I can check on the numbers for the others.

Chair: That would be interesting. Apparently Gazprom has a subsidiary with interests in five fields in joint venture with a German operator, I think.

Graham Kellas: Yes. I think their net production, though, is very small.

Sonya Boodoo: Quite small.

Graham Kellas: Their contribution to North Sea investment is minimal.

Sonya Boodoo: Yes, minimal.

Chair: That has not been affected by the sanctions regime?

Graham Kellas: I do not believe they have had to relinquish their assets,.

Sonya Boodoo: I have not seen that yet either.

Chair: That is potentially of interest. I am slightly straying off subject but

I am very grateful to you. If my colleagues have finished, we will draw this to a conclusion. Thank you very much, indeed, Graham Kellas from Wood McKenzie and Sonya Boodoo from Rystad for joining us this afternoon.