

Scottish Affairs Committee

Oral evidence: [Hydrogen and carbon capture, HC 83](#)

Monday 4 July 2022

Ordered by the House of Commons to be published on 4 July 2022.

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Members present: Pete Wishart (Chair); Andrew Bowie; Deidre Brock; Wendy Chamberlain; Alberto Costa; Sally-Ann Hart.

Questions 60-139

Witnesses

I: Clare Jackson, Chief Executive, Hydrogen UK and Will Webster, Energy Policy Manager, Offshore Energies UK.

II: Louise Kingham CBE, Senior Vice President Europe and Head of Country, bp and Bethan Vasey, Energy Transition Manager, Shell UK Upstream.

Examination of witnesses

Witnesses: Clare Jackson and Will Webster.

Q60 **Chair:** Welcome to the Scottish Affairs Committee and our second evidence session on hydrogen and carbon capture in Scotland. We have a couple of sessions this afternoon. I will let our guests for the first session introduce themselves, say who they represent and make any short introductory remarks. We will start with you, Ms Jackson.

Clare Jackson: Good afternoon. My name is Clare Jackson and I am the chief executive of Hydrogen UK. We are the UK trade association for hydrogen and we represent all the organisations that are really excited about the role that hydrogen will play in delivering net zero and economic prosperity for Scotland and the rest of the UK.

Will Webster: Hello. I am William Webster, energy policy manager at Offshore Energies UK. We represent the oil and gas industry and other energy producers in the North Sea and the UKCS as a whole. Our members are all interested in hydrogen. It is a really important part of the North Sea transition deal, alongside CCS. I think that was probably the first time that the industry as a whole expressed its view that that was an area of the net zero pathway that it could really get behind and commit to, hence I am here today.

Q61 **Chair:** Thank you for being so concise. Let's get things started. We are as excited about doing this, I think, as you guys are about representing your sector. Perhaps you can start by telling us what you believe the potential of hydrogen is for the UK. What, roughly, do we have to do to ensure that we make the most of it? And is Scotland in a unique or specific position when it comes to production of hydrogen? We will start with you, Ms Jackson.

Clare Jackson: Hydrogen has a really critical role to play in delivering net zero, for a number of reasons. The first is that it diversifies our energy production sources: there are a number of different ways you can produce hydrogen. The second is that it will deliver, alongside electrification, a more robust and resilient energy system by enabling us to store energy in large quantities, for long periods of time, at relatively low cost. The other reason is that it gives us a mechanism to decarbonise some of the parts of our energy system that are particularly difficult to decarbonise. We are talking about things like heavy industry: steel production, cement production—lots of production. We are talking about areas of heavy transport: trucks, planes and maritime applications. There is also domestic heat, which is probably one of the hardest areas to decarbonise and where hydrogen can play a really key role.

So hydrogen has a really important role to play in decarbonisation. It also represents a really exciting economic opportunity. The opportunity that is



presented by hydrogen has not gone unnoticed around the world. Many countries now are heavily investing in hydrogen and recognising that it is not just a decarbonisation opportunity but an economic opportunity. The UK is really well placed, and Scotland is really well placed, to take a leadership role. We have a strong foundation that we have built on in this country. But we need to get on and keep building on that foundation—build the house on top of the foundation—and actually make sure of some of the millions of jobs that will be created. I think the Hydrogen Council estimated that 30 million jobs would be created in hydrogen by 2050, and we want to see some of those—as many as possible—delivered in Scotland and in the UK. But we have to act fast; we are in a global race.

We have some really key areas of strength in the UK. We are really well positioned for hydrogen. We have a large offshore wind capacity. We have oil and gas assets. We have a huge amount of expertise that is able to deliver on hydrogen. We have some companies that are genuinely world leading. We also have projects that, if we can get them from plans on paper through to FID, will honestly be the envy of the world. We have some really exciting things happening in Scotland and in the UK, but we need to move quickly if we are going to take that position globally.

Q62 Chair: What about you, Mr Webster? I saw you nodding along with most of that. You think we have great opportunities here in the UK?

Will Webster: Yes, I think there are. If you look at what is now going on in other countries, you see the level of interest in hydrogen is really starting to grow. If you look at the European Union REPowerEU initiative, you see the role of hydrogen rising up the agenda. Likewise, if you look at any of the nationally determined contributions that were submitted by countries at COP, they are variations on a theme but they are all along the lines of, “Yes, we’ll have renewables and we’ll have electrification.” That might be 50% or 60% of the pathway to net zero, but you really do need carbon capture and hydrogen for the sectors that Clare mentioned that are difficult to decarbonise, and to give you a resilient system. You need more than one club in the bag, so to speak.

The thing I would really emphasise is that if you look at our existing infrastructure, supply chain and expertise, particularly from our perspective as oil and gas companies thinking about the production and processing at the beach, we have the locations there already: St Fergus, Grangemouth, and down the east coast, effectively—Teesside down to Bacton. The pipelines are there, and quite a few of them can be repurposed. We have our world-class oil and gas supply chain, not just the operators but the tier 1 contractors—the likes of Wood, Aker, Petrofac and so on—and they are already really active, both in the UK and across the world. So it is also an export opportunity, not just for hydrogen—that will almost certainly happen from Scotland—but for the services that go with it. That is where quite a lot of the value to the economy is, both in Scotland and across the whole of the UK.

Q63 Chair: Excellent. Thank you for the suggestion to have a look at some international examples, because we already have. The Committee visited



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the REFHYNE plant in Germany; I could not make that trip, unfortunately, but colleagues were there, and they will probably want to speak about their experience and what they learned.

One of the things that came away from that visit is that the German Government are adopting a policy that is almost exclusively green hydrogen, whereas in the UK Government, there seems to be a twin track approach of blue and green hydrogen. Does that help us, and will it help support North Sea transition? Are we doing this basically because—as you mentioned, Mr Webster—we have that infrastructure out there? Maybe you could talk us through your views about the UK adopting this particular approach; maybe you could help the Committee with that.

Will Webster: Obviously, the energy markets are going through a lot of turmoil. Quite honestly, I have been in the sector 20 or 30 years, and nobody has seen anything like it, so we have to pause and reflect a bit on that situation. It probably rebalances a bit in favour of green hydrogen, to some extent, but I do not think it invalidates the parallel approach that we have been going for, because what we really need to do over the next five years or so is get the industry at scale.

We are at the demonstration phase at the moment. We need to accelerate this and to achieve scale quickly—let's say between now and 2030—and the objectives and strategies to do that are there. You have to have blue hydrogen to do that: the surpluses available from renewables generation are not going to be that great in that timeframe, because we are going to be using electricity for a lot of additional things that we were not previously using it for, like vehicles. That is really taking off, so there will be some surplus renewables at certain times of day or year, but those volumes are not going to be particularly big in the next decade or so. After that, yes, they probably will be, and when ScotWind is going through, there will be the need to deliver that in some form. That will not necessarily all be through the grid, because there may not be enough capacity. Because you have uncertainty about both blue and green, it is better to do both.

If we look at the gas market at the moment, as I said, the price levels are unprecedented, but we are not going to be buying and selling gas for hydrogen based on the price right now. These projects are long term over the next 15 or 20 years, so the timeframe will be from the mid to late 2020s when the volumes of gas are being bought and sold up until the 2040s. I would not like to guess exactly what the contractual structure will be, but there will probably be longer-term arrangements rather than buying gas on the short-term markets, which is where we have seen all the volatility. In summary, blue is going to be important.

- Q64 **Chair:** Is there any tension between investment in blue and investment in green? Would one compromise or offset the other? Given that in most of the European countries—not just Germany—there is an EU directive that tends to promote the production of green hydrogen, are we going to be a bit of an outsider when it comes to the way that we are approaching this with the mix? I will leave that with you, Ms Jackson.



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Clare Jackson: Certainly, Europe's REPower policy is that they are going to have 40 GW-worth of domestic green hydrogen production and then import another 40 GW-worth of hydrogen, so there is very much a green focus in a lot of mainland Europe. We are not the only ones looking at blue but, in Europe, they are mainly looking at green. There are a number of reasons—Will outlined some of them—why blue makes particular sense for the UK. We have the assets. The projects that we have in the UK pipeline will deliver deep decarbonisation over the 2020s. Blue is able to scale a little bit more quickly than green, which will enable us to get those demand sectors going faster and to invest in the enabling infrastructure—networks and storage—faster if we have this twin-track approach.

The other thing that is worth considering is not underestimating the amount of hydrogen that we will need to deliver net zero. Depending on how you like your scenarios—whether you like them a bit more National Grid or a bit more Climate Change Committee; it doesn't really matter too much—we will basically need around 70 GW-worth of hydrogen to deliver net zero. To give a bit of a sense of scale, our electricity generation capacity at the moment is around 75 GW, so we are looking at delivering the amount of hydrogen that we currently have in our power domain at the moment. That is a huge amount of hydrogen. If we have a number of different sources—whether that is electrolytic from offshore wind or nuclear, or having some CCUS enabled using gas—it de-risks net zero and the role that hydrogen has to play in net zero. At the moment, I think optionality is really important in net zero in general, not just in the hydrogen space. We want to have as many different options on the table and as many different baskets that we can put our eggs in, so to speak.

Q65 **Chair:** The UK Government announced its hydrogen strategy in August 2021, and there has been a subsequent announcement from the Scottish Government. When you look at those strategies, do you think they are adequate to support the ambitions of the industry? Will they get us there, and is there anything else that we need to think about? Could we do more to meet our ambitions? Let's start with you, Ms Jackson.

Clare Jackson: We have been working closely with Ministers and officials at BEIS over the past few years on the UK hydrogen strategy, and I would say that it is a great start. There has been a really detailed focus on production and the policies that we need to put in place to stimulate and support production. We now need to make sure that we have a similar level of focus and attention to detail when we are looking at the various different distinct end-use sectors, the policies and regulations that we need to put in place in those end-use sectors to stimulate demand, and the policies and regulations that we need to put in place to unlock investment in the enabling infrastructure in networks and storage. I would say it is a good start.

In terms of the targets that have been set out, initially, in the 10-point plan—the 5 GW target was the first time the UK had a hydrogen target, so that was a landmark in itself—they were probably too conservative and did not really match the levels of ambition within the industry or, indeed, the project pipeline that we had in this country. I would say that the 10 GW



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target in the UK, and the 5 GW target in Scotland, is probably more in the right ballpark for what can be delivered, in the sense that it is ambitious but achievable. I think that if we can put the right policy frameworks in place to deliver that, we can not just meet that target; my challenge to the industry and the Government is that we can smash that target.

Q66 Chair: The same question to you, Mr Webster—and in responding, could you talk us through the storage issue? Do we have adequate storage for this? Do we need to do more, and should this be a national asset?

Will Webster: The target that we have for hydrogen—I agree with Clare—is commensurate to the challenge. We have a hydrogen industry already that is used for feedstock. Hydrogen for energy is essentially a new industry that will have to be created almost from scratch. There are a lot of chicken and egg issues with that. You need to be able to produce and you need the infrastructure, and then you need people to use it. To some extent the storage and networks part is still a little bit more work in progress than the production models. BEIS have made a lot of progress on those and the contracts for difference model that they are actively setting up. There is going to be an electrolytic hydrogen round next year, which is really great news.

The storage question is a wider question as well. Over the years, gas storage generally was left to the market. That probably worked quite well for a while. It is perhaps not what is needed now. There is a strategic element to primary energy storage generally, which is now a big question, especially as we used to store energy with big piles of coal next to power stations and now we will not be doing that.

So primary energy storage is important. Hydrogen storage is going to be a part of that. I don't know about national asset, but there will certainly be a lot more Government involvement in the storage of gases than there has been in the last 10 or 20 years.

Q67 Alberto Costa: I have a question about storage and the existing infrastructure across the UK for piping natural gas. As natural gas is phased out, can the existing piping be used as is, or do some modest tweaks need to be made? Might that help on the question of storage, given that there is a vast amount of pipes already laid across the country?

Will Webster: One of the advantages of gaseous fuels generally is that you can store them in the pipelines, whereas you can't with electricity, which has to balance second by second. Within the National Grid gas transmission network, there is quite a bit of storage capacity, which they call "linepack": you basically increase and decrease the pressure in the pipeline. Most of the transmission network, it is thought, can be reused for hydrogen. There are various research projects that have been going on over the last five or 10 years on that. Scottish gas networks are doing a project on the local transmission system, which is in between the national and the distribution networks.



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On the distribution networks, there has been for some time an iron mains replacement programme going on. That has had a couple of drivers, one of which is health and safety. The other is that the new materials that you can use—uPVC, basically—are a lot more suitable for transporting hydrogen. So, yes, there is capacity to use the existing assets, and it offers an element of storage within the network that is quite valuable.

Q68 Andrew Bowie: Good afternoon. Thank you for coming to the Committee. We have already spoken about the various documents that we have had published and the plans and the ambition. In the past two years alone, we have had the UK Government's pithily named "Ten Point Plan for a Green Industrial Revolution", the "British Energy Security Strategy", and the Scottish Government's "Hydrogen Policy Statement". I was interested in what you said, Ms Jackson, about the ambition. Reading those documents, the ambition seems quite large—it seems that the Government's ambition is ambitious—but you said it didn't match the ambition of the industry. What did you mean by that?

Clare Jackson: I think it didn't when it was 5 GW, but I think it is more in line now that it is 10 GW. Also, it is important to remember where we have to get to. Jumping from 5 GW to somewhere in the region of 70 GW between 2030 and 2050 in the UK—2045 in Scotland—is quite a big jump, so 10 GW is a bit more of a platform from which to scale up. I think we have the projects in the pipeline to be able to deliver that 10 GW.

Q69 Andrew Bowie: Is there enough detail in these documents and enough ambition in the industry to make the 2045 target in Scotland and the 2050 target in the UK?

Clare Jackson: There is a long way to go from where we are now to where we have to get to. We have some of the puzzle pieces. The hydrogen business model is a massive piece of the puzzle, but it is not the only one. That policy, with a few tweaks, is pretty much there, so we actually need to see it now and get those projects through FID to the point of production. As I said, other parts of the puzzle now need to be focused on, including the infrastructure and the demand side. At the moment, there has not been enough attention on them yet.

Will Webster: We should compare the targets against the number of projects that we see out there. BEIS published a really interesting document recently called "Hydrogen Investor Roadmap", which has a map of the various projects that are going on at the moment. The potential is enormous: there are 40 or 50 projects. The blue hydrogen projects tend to be larger—large-scale investment at particular locations, often where the gas processing terminals are—so there is considerable scope there.

The Government is going to have to make its phase 2 decisions for the CCS-enabled projects—not just hydrogen, but industry, power plants and so on. We are hoping to see quite a lot of them go into the next phase. On track 2 CCS, obviously Acorn is a massively important project. We are hoping to see that very early in the next round of allocations.



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If you look at the hydrogen and CCS levels of ambition, the adjustment upwards has been really helpful, as Clare says. The other additional thing from the CCS perspective is having the 50 million tonnes target by 2035, so the gradient of the S-curve is starting to be looked at. It would be quite useful to have a 2035 target for hydrogen too, so that the upswing of that S-curve is in mind.

If in 2035 we have 50 million tonnes of CCS per annum going on, the licensing round is being run by the North Sea Transition Authority, and we are stepping up towards the 70 GW target for hydrogen, that is more than just a platform; it is a long way towards where we need to be, so that would be helpful.

Q70 Andrew Bowie: Mr Webster, you obviously represent the OEUK. How does the Roadmap 2035 vision complement what we are seeing Governments in the country—

Will Webster: Roadmap 2035 and the North Sea transition deal are our agreement with the Government on what we can offer these new sectors. The offshore environment will be really important for net zero. That is for fixed and floating wind, CCS and hydrogen. That is part of why we did Roadmap 2035, and why we had the discussions with the Government and made the North Sea transition deal last March. It is the future of the sector. Oil and gas production will continue, but when we invest in new projects, that is just to maintain levels of production. There will probably be a decline over the next 20 or 30 years.

These new areas are really critical for the sector. A lot of them are adjacent to what we are doing already—pipelines, processing, safe operations, and fixed and floating platforms offshore. Some of the jackets that they are putting the wind infrastructure on at substations look pretty similar to the jackets we are using now. If we can't make the most of what we have, which is one of our most successful industries, something is going wrong. That is really the philosophy behind Roadmap 2035 and the deal.

Q71 Andrew Bowie: You are quite confident that the managed transition to this new hydrogen-based, renewables-based future doesn't pose a threat to the oil and gas sector, and that continued investment in oil and gas doesn't pose a threat to its future; they are complementary, and the skills are transferrable between the two.

Will Webster: That is absolutely the case. We are actually anticipating employment from the offshore sector—defined fairly broadly—to go up and investment to go up as well, once you take into account the offshore wind projects that have been given acreages and so on. It will be a challenge because these kinds of work are a bit different, but the thing to remember is that a lot of the employment in the oil and gas sector is with the contractors and in the supply chain, who have seen this coming from quite a long way out and have been adjusting their business models accordingly. Now, what you are seeing is the operators doing the same, because everyone has got the email about where things are going.



Q72 Andrew Bowie: Something that we on the Scottish Affairs Committee often find is that there are areas where both the UK and Scottish Governments could work better together to make life simpler for whatever sector it is that we are talking about or proposing an investigation into. How do you as an industry—or as people involved in the hydrogen industry—see things right now for operators who want to invest in this in Scotland? Are the two regimes complementary and are we working well together? Or are there things we could improve upon, Ms Jackson?

Clare Jackson: I would say that things are working well. I think there was a bit of an issue when there was a 5 GW target in Scotland and a 5 GW target in the UK; that caused some confusion and, perhaps, demonstrated that there wasn't particularly joined-up thinking. In general, though, the fact that UK policy on the hydrogen business model, the net zero hydrogen fund and the UK hydrogen standard will be common across the different countries involved in the UK, including Scotland, is really positive. International co-operation across the board on hydrogen is going to be really valuable. A lot of nations are facing the same issues and challenges when it comes to hydrogen, so making sure that there is communication internationally—between not just Scotland and the UK, but the UK and Scotland and the EU and the rest of the world—will be really important. As a general comment, I would say that we are doing a lot better than perhaps we were a couple of years ago.

Q73 Wendy Chamberlain: I thank both our witnesses for appearing today. If you asked most people to think about renewable energy, I suppose they would think about wind turbines. One of the things I found when we visited REFHYNE in Germany was how big of an issue curtailment is—that we look at potentially 20% to 50% of producers not producing wind power because there is nowhere for it to go.

Are the market mechanisms that are being outlined by both the Scottish and UK Governments encouraging that use of curtailment in relation to producing green hydrogen? That is clearly one of the very attractive things about it, alongside the environmental implications.

Clare Jackson: They will do, yes. Curtailment will increasingly be an issue. If we want to deploy more offshore wind, then we effectively need hydrogen to make that economically viable. In the short term, while offshore wind is still in the process of scaling up, as Will said, there will be less curtailed energy available. In order to be economically viable, electrolyzers need to have a certain uptime, so it will need to be curtailed wind alongside something else. At the moment, most of the projects we are looking at in terms of larger-scale green energy are dedicated renewables. In the future, once we have a slightly more dynamic energy system and dynamic energy mix, I think we will see electrolyzers that take energy from different sources at different times.

Q74 Wendy Chamberlain: Is that twin-track approach one of the arguments for blue hydrogen? You're saying that there will be a more limited capacity from a wind perspective for a short time as they ramp up.



Clare Jackson: That sort of twin track basically enables you to scale production faster. It will actually support green hydrogen in the long run, because it will get those end-use sectors going and, essentially, almost provide an infrastructure and a hydrogen energy system that green hydrogen production in the future can sort of plug and play. That is why the twin-track approach is really helpful. As I said, green hydrogen and electrolyzers have a huge amount to offer in terms of balancing our energy system and supporting and enabling greater deployment of offshore wind.

Q75 **Wendy Chamberlain:** Is there anything else you want to say about market mechanisms, Mr Webster?

Will Webster: No, I think your question and Clare's answer are correct. You will be aware that there is curtailment as well as market prices. There is a different hourly price for electricity—8,760 hours a year—so there will be opportunities that come out from the pricing in the electricity market. Sometimes they are negative, so you actually benefit from producing. Because you are contributing to the system, you don't have to start and stop a conventional plant. There will be computer models and clever people doing optimisation around all the different energy sources as we go along this path. We will hopefully have hydrogen there as something that is relatively flexible. There are obviously limits. You don't want to be starting and stopping complicated equipment. It is always costly. The more you can smooth it out, the better. That is where a lot of the challenges are in the sense of building out this new infrastructure.

Q76 **Wendy Chamberlain:** You want your kit to be running as much as possible—like manufacturing lines?

Will Webster: Exactly.

Q77 **Wendy Chamberlain:** One of the things we have seen in written evidence is that there are some concerns that the supply side needs to be well financed and supported—from a Government perspective as well. But on the demand side, there is potentially less attention. What support is available for businesses wanting to use green hydrogen but which aren't producing it? Ms Jackson, I would be interested to hear your thoughts.

Clare Jackson: There are a few things, particularly on the demonstration side of things. We have just had the industrial hydrogen accelerator competition, which is looking at end-to-end green hydrogen—not just green, but mostly green—production in the industry, and there is a fuel switching programme, but these are very much short-term demonstration projects. We need to be thinking more about the long-term policies.

Q78 **Wendy Chamberlain:** A bit like the H100 that we saw in Fife, which was a particular project for a limited number of actors for a limited period of time?

Clare Jackson: Exactly. Taking the H100 project as an example, there we have a global project, the first of its kind, looking at end-to-end green hydrogen for use in homes. However, what we need is a mandate on hydrogen-ready boilers, which is a no-regrets, no-brainer policy that would



significantly decrease the cost of conversion when that actually comes about.

- Q79 Wendy Chamberlain:** That is one of the concerns we have heard in our other evidence—that potentially this rush to hydrogen could exacerbate costs to our consumers even more than what they are seeing at the moment.

Clare Jackson: If we look at hydrogen-ready boilers, the boiler manufacturers that are developing them—Baxi, Bosch, Viessmann, Vaillant—have all committed that a hydrogen-ready boiler will cost the same amount as a natural gas boiler. In the UK, we have 1.6 million boiler retrofits a year. That is 1.6 million hydrogen-ready boilers that we could be deploying every year. If we have 23 million homes in the UK, it would take 15 years to get that stock into homes.

As well as significantly decreasing the cost of conversion, I think we also need to be looking at greater clarity around the 2026 decision that the Government have committed to. What is the framework by which that decision will be made? We don't want to get to 2026 and say, "Now what?" We need to have all the puzzle pieces in place by the time we get there. I guess that is on the heat side of things.

On industry, we need to be looking at how we support it to switch to hydrogen. There are a number of different options there. We should be looking at public procurement of energy-intensive materials. We should be exploring the use of carbon CfDs. I was very pleased to see the consultation on carbon border adjustment mechanisms. I think that will be really important. There are a number of things we should be looking at on the industry side of things. Looking at transport, I would say that we did some good work on transport a few years ago—maybe five years ago. We haven't done a huge amount since.

- Q80 Wendy Chamberlain:** We picked up in Germany that we very much had a focus on that.

Clare Jackson: I think we need to be targeting refuelling infrastructure. Our view is that we should be targeting 100 refuelling stations by 2025. We need to be investing in HGVs, maritime and aviation—all areas that will be really key for hydrogen. We need to be demonstrating and supporting that demand uptake as early as possible really.

- Q81 Wendy Chamberlain:** It feels like there were bigger chunks—one being industry-driven, with consumers potentially coming afterwards.

Clare Jackson: The really positive thing is that we are expecting a huge cost down on hydrogen over the decade and by supporting hydrogen for use in industry up to about 2030, we will then be in a place where hydrogen will be a much lower cost when we are looking to use it and roll it out at scale for things like domestic heat. Again, it's a really positive story that we are putting together on hydrogen.

- Q82 Wendy Chamberlain:** Mr Webster, do you have anything to add?



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Will Webster: I want to say something about the industrial use of hydrogen and the emissions trading scheme. The ETS allowance price over the last couple of years, both in the EU and the UK, where we now have a scheme that is run with BEIS and the devolved Governments, is now £80 a tonne, so that is quite a driver.

The other angle to that is that the Exchequer is making £6 billion to £7 billion per year from the auction of the certificates, which is not necessarily going where it should in terms of helping industrial processes to decarbonise, and it's not being reinvested. We are behind the European Union in the amounts of the auction receipts being invested, in that there's a much larger decarbonisation fund in the UK and then there's a requirement on member states to invest 50% of the auction receipts in decarbonisation projects, so that is a little bit missing in terms of what's going on in the UK.

We and other industries, not just in our sector but those in the manufacturing sectors—glass, steel, polymers, refineries, chemical industry and so on—are all going to need serious investment up front to develop the demand for hydrogen and to be able to compete in their energy-intensive sectors. If I had one ask on that side, it is for better accounting of where the ETS money goes. It is only going to get bigger, because the reform of ETS will mean fewer certificates available, and the price will probably be higher and revenues to Government will probably be higher. That is an important area of policy that needs quite a bit of development, we think.

Wendy Chamberlain: We will be asking the Government about that when they come to see us. Thank you, Chair.

Q83 **Chair:** It looks as if the way this will proceed, roughly as you have identified, is using the contracts for difference model. We have looked at renewables on occasion in this Committee and we have always found that to be a relatively useful and productive way to do things. Is that your view? Will this model be adopted? Do you think we will see benefits from that or have you seen or identified any difficulties with using CfD?

Clare Jackson: Yes, the hydrogen business model is a CfD approach. We have been working with the policy officials at BEIS on this mechanism for quite a while now and I think it is an effective mechanism. I think it will drive hydrogen production capacity. It is a slightly more complex system than with electricity because you are looking at a number of different counterfactuals because you are not just displacing a single entity. You might be displacing gas in one sector and transport fuel in another, which have different values. So it is a slightly more complex CfD than you might find in the electricity sector.

Q84 **Chair:** CfD is already very complicated when you try to explain how it works to people.

Clare Jackson: Yes, it is complex. What we have got at the moment is not perfect or forever, but the approach from industry and our plea to Government has been, "Let's get something in place so that we can get



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these first projects away.” That’s what we need to be focused on now: accelerating that timeline, making sure that we don’t have huge, long periods between bidding and getting contracts signed. We want to get those projects away as quickly as possible. If we want to hit our 2030 targets, we need to start that production as quickly as possible.

- Q85 **Sally-Ann Hart:** Good afternoon to our panel. I am going to ask some questions on skills and training. Looking at the North Sea transition deal, which sets out “a plan for how the UK’s offshore oil and gas sector and the government will work together to deliver the skills, innovation and new infrastructure required to meet stretching greenhouse gas emissions reduction targets”, do you think that the UK and Scottish Governments have given clear enough signals to the industry to start the workforce training transition? Mr Webster, I will go to you first.

Will Webster: You are correct: that is a key part of the North Sea transition deal around the supply chain and the workforce, and that goes across all the new energy sector areas. There are about 200,000 people working in the oil and gas sector at the moment. That is obviously a subset of the whole energy industry as well, so all those sectors will have to transition to the new world. That was a commitment we gave—working on developing qualifications, standard certification and so on—and we have been working closely with an organisation called OPITO, which is an international oil and gas training organisation. We are getting support from Governments in doing that. To some extent, industry probably has to take the lead on taking responsibility—

- Q86 **Sally-Ann Hart:** Is it?

Will Webster: Yes, that is a key part of the deal. That is probably an area where the governance of the North Sea transition deal is important. We have regular meetings at ministerial level with Government and regulators, and then there is a deal delivery group, which meets every couple of months. The way the deal is structured is we have asks and offers on what we are doing from the perspective of industry, then if we need something from Government in any area, including on the workforce side or the supply chain, that is a vehicle for having that discussion. That is how a lot of the other sector deals work, such as the offshore wind sector deal. It is not black and white in terms of everything is either going well or it is not, but the deal structure creates a dialogue where we can have those discussions with UK Government, devolved Government, providers and the industry and ask, “Are we doing what we can to make this transition as successful as possible?”

- Q87 **Sally-Ann Hart:** Ms Jackson, would you like to comment?

Clare Jackson: There are a few things that I would say on the skills piece. First, we need to ensure that we have a joined-up approach across net zero. There will be some pretty big demands on the workforce, particularly for the build-out of large-scale infrastructure. It may be that when we are looking at this in silos, we are all identifying the same people we would like to come and deliver our various parts of the net zero piece. It is important that we are joined up across these different net zero



sectors to ensure we are looking at things from a big-picture perspective. There is obviously the transition piece, which Will has spoken to very clearly. There is also the piece around how are we preparing our future workforce for the net zero transition and how are we getting more young people into STEM. It is about how do we get more young people into those kinds of university courses and how do we integrate things like hydrogen into the curriculum and degree courses, so we ensure that we are feeding that funnel. This net zero transition is not just the next five or 10 years; it is the next 10, 20 or 30 years, so we need to take that long-term view as well as transitioning the existing workforce, which, as I said, Will spoke to quite clearly.

Q88 Sally-Ann Hart: With a significant proportion of the jobs in 2030 projected to be filled by people transferring from the existing oil and gas job sector, what are the main risks of not retraining oil and gas workers for your members?

Clare Jackson: We have a significant delivery challenge on our hands—10 GW is a significant challenge. That is not just on the upstream; it is also on the midstream, the networks, storage and the downstream. We are looking at the creation of around 40,000 jobs in that sector over that time period. The risk associated with not transitioning those jobs well is that it will constrain the sector's ability to deliver.

Q89 Sally-Ann Hart: You just mentioned the future workforce and feeding the funnel. Will there be enough time to train new staff in order to deliver on those hydrogen targets, or will you be looking at getting as many transition oil and gas workers to feed that in as quickly as possible?

Clare Jackson: I would say it is both. We have to look at the short-term picture. The transitioning of oil and gas jobs is hugely important, but it is not just the next five or 10 years that we need to think about but that longer-term perspective. It is a question of both, and making sure that we put the pieces in place to transition the existing workforce and that we have a future workforce that is excited about the prospects and opportunities that net zero and hydrogen present.

Q90 Sally-Ann Hart: Mr Webster, do you have any further comments to make on that?

Will Webster: There is a demography aspect to this. Retention will be important. There is a certain bias in the age profile in the oil and gas sector; keeping people working in the sector and bringing on some of those new skills will be important. Not all of it will be new, though. A lot of the skills spaces around asset maintenance and safe operation ought to be an extension of some of the skills that those people have already, and if you are thinking about dealing with a CO₂, hydrogen or a methane environment, which is what they are used to, to a certain degree.

As I said at the start of the session, a lot of the investment will be co-located with where the main gas-receiving terminals are now. I am not saying it will be easy, but some natural evolution will occur. With a bit of sensible planning for retaining people, and bringing new graduates and



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new employees into the sector, to some degree that should happen naturally, but with a certain amount of steering and support from Government entities. It should be something that can be made to work.

- Q91 **Sally-Ann Hart:** It looks like there will be a skills gap. Is enough work being done? What more can the industry or the Government do, whether it is the Scottish Government or the UK Government? What more can they do to fill that gap to ensure that we get the right hydrogen production for the demand and the supply?

Clare Jackson: We first need to identify exactly where the gaps are. We need to look at archetypal hydrogen projects; what kind of jobs will we need, and where is not just the skills gap but the attention gaps. A lot of work is being done on jobs and skills across the value chain. At the moment, we are looking at where are the cracks: are we in danger of certain areas falling through the cracks and not being looked at? The first thing is to identify where exactly those constraints might be. Then we can look, as an industry, at how we transition and train people into those specific roles or try to bring new people into those roles.

Will Webster: One thing we need is better data on all this. That probably goes across all the energy transition. If you look at how economic data is collected, it has not really been adjusted.

- Q92 **Sally-Ann Hart:** Who is responsible for collecting that data?

Will Webster: ONS—the Office for National Statistics. BEIS did quite a lot of energy data, too. They do a great job, but a little bit of catch-up is needed. Just as with the IT revolution and when the economy changed then, it will change again in the same kind of way. Some of these definitions and the way that data is collected is very backward-looking. That is quite an important area. BEIS, the ONS, and perhaps the Treasury, could get a handle on—

- Q93 **Chair:** What sort of data are you referring to?

Will Webster: Job types, economic contribution, GDP data, the sectoral splits—ensuring that that data is collected.

- Q94 **Sally-Ann Hart:** So more granular data is needed.

Will Webster: Yes, it needs to be more granular, and the new definitions of an electricity generator, for example, need to be brought into it. You need to separate it out a bit more. The categories are electricity, gas and water, so it is all lumped into one number, and we are not quite sure of how many people work in different bits of the sector, and of how many we will need. You have put it well: the granularity of the data does not match up to what we will need to assess in terms of where the gaps are.

- Q95 **Sally-Ann Hart:** On offshore workforce, you have talked about gas terminals, but we also have oil platforms in the North Sea. Is work being done to skill up that workforce to fill the requirements of the hydrogen sector? Or is it the same?



Will Webster: I think it is the same to some extent, but the oil and gas sector has itself been going through quite a bit of change over the last 10, 15 or 20 years. There are fewer people offshore generally. The type of situations in which that might happen have changed. There are a lot of developments such as “Walk to Work”, so there are fewer helicopters. There are also a lot more on-land installations and people, and things such as artificial intelligence and digital twins. That is, to some degree, a bit of a transition that has already been occurring. Obviously, there are still people going offshore, but the industry has already changed a little in that sense.

Q96 **Sally-Ann Hart:** Ms Jackson, do you have anything to add to that?

Clare Jackson: I don’t think so. Will has a better handle on offshore jobs than I do.

Q97 **Deidre Brock:** I want to talk about the possibilities for the export of green hydrogen. We do not have a huge amount of time left, but can you briefly talk us through your thoughts on the opportunities and challenges, and on whether the UK Government are doing enough to explore all the opportunities for the export of green hydrogen?

Clare Jackson: The market is definitely there for the export of green hydrogen. The EU has explicitly stated that it wants to import at least 10 million tonnes of green hydrogen by 2030, which is, as I have said, equivalent to about 40 GW.

The challenge is that we need a lot of hydrogen domestically. There is a question mark on whether there will be scope, certainly before 2030, for exporting excess hydrogen rather than meeting our domestic demand. The policies that the Government have put in place support only domestic hydrogen production that will be used domestically; we will not subsidise the use of hydrogen elsewhere, even if it is produced in the UK.

The extent to which the UK will be able to export green hydrogen will depend on the scale of our ambition in how much we produce and how quickly we can scale it. As I said, we need a lot of hydrogen in the UK, so we want to ensure that we decarbonise our energy system before we help our friends across the channel to decarbonise theirs.

The other piece on export is not just the export of hydrogen itself but the export of technologies and skills. That is a huge potential for the UK if we can move quickly and establish that advantage. Yes, the export potential is there both for green hydrogen, and for the technologies and expertise.

Deidre Brock: The UK Government are focused more on domestic production—to put it bluntly. I am sure they are also examining the potential for export. The port of Cromarty Firth and Norway’s Gen2 Energy have signed an import MoU. There is also a letter of intent signed between Scotland and Bavaria. I wondered what your thoughts were on the impact of those two developments with Scotland’s place in this. I was reading through some of the written evidence, and we got something in from PA Consulting. I recently met two of their employees, who are about as



enthusiastic as you, if not more so, for green hydrogen potential in Scotland.

Clare Jackson: Is that possible?

Q98 **Deidre Brock:** They were suggesting in their piece that Scotland is arguably the best place in the world to produce green hydrogen, because it has access to fresh water and to good-sized sources of renewable electricity.

Clare Jackson: It is about that short-term and long-term picture. In the short term, over the next 10 years, we have got an industry that is hungry for hydrogen. We want to ensure that, while we are scaling up, we are using that hydrogen to stimulate those end-use sectors and get our hydrogen energy system going. The sky is the limit in terms of Scotland's hydrogen production potential. In the future there is a huge export opportunity. My plea is that we do not lose sight of the need to decarbonise our own energy system, and that we are prioritising that as well. When it comes to the import piece, we import 28% of our primary fuel at the moment. If we can displace some of that with low-carbon hydrogen, as opposed to unabated fossil, then that is a positive thing. Ultimately, the market will decide the price point of hydrogen. We will not be supporting financially the use of hydrogen that has been imported in the UK over the next 10 years.

Will Webster: I do not have much to add on that. I think with any of the energy transition technologies, we must approach them with a growth mindset. Getting big quickly—with a potential to get even bigger—is important, because the challenges of climate change are enormous. We need all of these technologies to be able to deliver the large amounts of energy that we currently use in the economy. That applies in Scotland and the UK, and in our European neighbours as well. It needs to have the potential to be really big.

As far as imports and exports go, there is probably a bit of time to sort that out. As Clare says, we and other countries will need to develop our own hydrogen resources. The international trade aspect will hopefully build as pricing develops and it works to become mainstream. I think the EU has got ambitions in that department. It is revising the legislation—the gas directive—to be able to deal with decarbonised gases. As ever, the EU will be interested in cross-border trade and fair competition. There will be a discussion about how that will work in the energy systems of the future. Having a mind to import and export is a good thing, notwithstanding the fact that in the short term it is about providing for local demand.

Q99 **Deidre Brock:** I think it was you who mentioned that we are in a global race in developing green hydrogen. You have mentioned Europe, but who are the UK's main international competitors?

Clare Jackson: In terms of green hydrogen production? Australia, Chile, north Africa, Namibia, the middle east—areas that have very high solar gain are likely to be green hydrogen producers.



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Q100 **Deidre Brock:** If it is dependent on fresh water, though, Australia obviously has its issues with fresh water. I noticed that one of the pieces of evidence we received said that in some areas desalination plants would be required.

Clare Jackson: It has an impact on the cost of the hydrogen produced, but yes, Australia is making a big play in the green hydrogen area. Anywhere that has really high solar gain, and where the cost of renewables is likely to be low, are areas that are trying to position themselves as green hydrogen exporters. But again, there is the export and then there is also the technology side. The UK has one of the world's leading electrolyser manufacturers in ITM Power, which is really exciting. So it is not just about where geographically the hydrogen will be produced; it is also about where the value will be created, in terms of those technologies and that expertise. So there are two slightly different things.

Will Webster: I think that the blue hydrogen space is also pretty competitive, and it is a bit closer to home, so it is our neighbours around the North Sea, and Norway in particular; there is probably an announcement from Equinor every week or so about where they have signed their latest deal. The Dutch and the Danes are also both really interested in CCS and developing blue hydrogen too. So there are plenty of good examples of others moving ahead. I think we are still up with the pack at the moment, but there is no room for slow progress, because other people will jump ahead and get on with it.

Q101 **Deidre Brock:** Lastly, I have a quick question about the 10 GW target that has been reset by the UK Government. Does that include the 5 GW from Scotland, or is that additional?

Clare Jackson: That would include the 5 GW from Scotland.

Deidre Brock: Okay, that is helpful. Thank you very much.

Chair: Thank you for a fascinating session, as always. The more we get into this, the more familiar we are becoming with some of the issues, and that was a very helpful contribution. If there is anything further that you feel you could help the Committee with during the course of this inquiry, please forward it to us, as we are always interested in receiving further information. Thank you ever so much.

Examination of witnesses

Witnesses: Louise Kingham and Bethan Vasey.

Q102 **Chair:** Thank you ever so much for coming along today for the second evidence session in the Committee's inquiry into hydrogen and carbon capture in Scotland. I know that you both represent some of the big energy companies, but perhaps you could tell us who you are, who you represent and anything else by way of short introductory remarks. We will start with you, Ms Kingham.



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Louise Kingham: Thank you, Chairman. My name is Louise Kingham. I am senior vice-president for Europe and head of country for the UK for BP, and I have been so for the last 12 months. I joined during lockdown, after 25 years in the not-for-profit world, wagging my finger from the outside and telling the energy sector to do better. I think that might make me poacher turned gamekeeper; we can decide in the course of the conversation.

As for BP, it obviously declared its net zero ambition—a big pivot towards becoming an integrated energy company. There are some quite significant targets, including ones for hydrogen, as well as for reducing oil and gas production out to 2030. We are busy reorganising ourselves and reshaping to get to that point. I am happy to share some of that in the course of the conversation today.

Bethan Vasey: Thank you, Mr Chairman; I am delighted to be here today. I am Bethan Vasey, the general manager for energy transition for upstream UK for Shell. I am based in Aberdeen—I managed to make it down this morning. I am responsible for leading our decarbonisation strategy, integrating opportunities across our energy businesses and leveraging our Aberdeen footprint as a heart of the energy transition. I am also a board member of OPITO, which was referenced in the earlier session, but I am here representing Shell today.

Shell is also committed to becoming a net zero energy company by 2050 or sooner, which means transforming our business, reducing the emissions from the operations we have, reducing the emissions from the products we sell, and working with our customers in hard-to-abate sectors to deliver net zero.

Chair: Thank you. Given the mention of Aberdeen, I suppose it would be appropriate to go to Mr Bowie for the first question.

Q103 **Andrew Bowie:** Thank you very much, Chair. Good afternoon and welcome to the Committee this afternoon. I am going to ask some questions about energy security to begin with, but I wondered, Ms Kingham, given that we are talking about hydrogen and given that Aberdeen has already been mentioned, whether you would like to expand on what BP is doing, in partnership with Aberdeen City Council, on the investment in hydrogen and becoming the UK's first hydrogen city, which has been quite historic and forward-looking. Is that correct?

Louise Kingham: Hopefully—that is the plan. Thank you for the opportunity. What we have done in partnership with the city council began with a strategic partnership about how we can look to develop an integrated energy plan for the city to be climate positive in 2045 or sooner, recognising of course that hydrogen buses have been an important part of the city since 2009-10, which signals that some of the opportunities were already there. We developed that advisory plan, and then the city council decided to run a public procurement exercise with a number of interested parties for the establishment of a joint venture, which would be known as the Aberdeen city hydrogen hub. BP was

selected after going through that procurement process, so in the early part of this year we set up the joint venture.

It is a four-phase programme. The first part is to develop the hydrogen production facility for the bus fleet, and then look to extend that to other heavy-duty vehicle fleets—rubbish trucks and other opportunities that the city can see. It goes all the way to four phases, picking up on Deidre's closing remarks about the potential for export. We look at a spectrum of opportunities, including industrial decarbonisation and potentially heating, as other uses during that journey. We hope to take a final investment decision in the early part of next year as we go through the joint venture development, and that could see green hydrogen produced as early as 2024.

Q104 Andrew Bowie: Thank you very much. I had better move back to energy security now, or I will be told off.

Obviously, since Vladimir Putin's invasion of Ukraine, energy security has been high up the agenda, and we in this building have spent quite a lot of time talking about investment in the North Sea as a way of improving the United Kingdom's energy security. I will start with Ms Vasey, because I have already spoken to you, Ms Kingham. What opportunity do you think hydrogen gives the UK to become more self-sufficient in its energy needs?

Bethan Vasey: Green hydrogen has a major role to play in the UK's long-term energy security, because it can reduce reliance on imports and potentially even create the opportunity for exports and a trade surplus, but that is going to require the unlocking of a transport and storage system, as well as investments in large-scale storage infrastructure. There have been recent developments in this area, which we welcome. Hydrogen can play a really valuable role in inter-seasonal storage of green electrons, so that should be at the heart of the UK's response to energy security issues at the moment.

As we also heard earlier, we should not be curtailing our green production of electricity during periods of low demand, but we want to continue that production and produce hydrogen. That hydrogen can then displace natural gas in the system, either through blending—which we can come to later—or through 100% conversion, when and where possible. It also has the possibility to displace liquid fuels, all of which can help with energy security. Also, electrolysis can provide an outlet for renewable electricity that is not yet connected to the grid, or may not be able to be connected to the grid for a long time. That can also play a role in the long-term development of offshore wind, so that you can capture those electrons before they are connected to the grid.

Louise Kingham: To add to that fantastically succinct description, we clearly have a lot of qualities and potential here in the UK, as Bethan has already articulated really well. Just to build on that, I think that, while we need to think about oil and gas security as the more immediate, short-term issue, making sure our moves there are hydrogen ready is really



important. That is also a conversation that is happening very much with our European colleagues as they look at building out infrastructure: what are the opportunities and the plan around that? Anything that brings more natural gas into play from different sources needs to be thinking about being hydrogen ready to boot. I think that goes full circle then back to the opportunities for the UK to move quickly, take the early competitive advantage that you were talking about in the last session—

Q105 **Andrew Bowie:** I am sorry to interrupt, but are we moving quickly enough?

Louise Kingham: No, we can go quicker. We have made a fantastic start and we are doing some great things, but we need to pick up the pace, because of the competition, which has been talked about, in Australia and the UAE. We will see that within our own companies; given the scale of operation, I certainly see that inside BP. We have gone early; we have started ahead of others, but there is a lot of catch-up in the system now.

The kinds of things that are really important, which I guess we will come to, are about how we make progress with the cluster sequencing, and not just track 1 but track 2 and other projects that can come along. It is a question of getting the customers of that transportation and storage system, alongside the carbon capture, but also the hydrogen production—getting all those organised and not delaying in making those decisions, so that we can actually make the right-size decisions about infrastructure development, which is probably our next big barrier to acceleration and progress.

It is not production. As Bethan says, we have the technology; we know how to do that. What is important now is the decisions that get made about the incentives to get on and do that, so we need the economics work to go quickly. Then it is a question of making sure we have the balance of interests on the demand side, so that we have the customer base. Then there is the potential to go all the way, as was described in the previous session.

Q106 **Andrew Bowie:** So there is no contradiction—I get that we need to move faster—between transition, a managed transition towards renewables and a more hydrogen-based energy baseload, and energy security. There is no contradiction in that at all; in fact, moving towards more hydrogen input is a way of improving our energy security.

Louise Kingham: I absolutely agree. We talk about it inside the company as a twin-track approach to energy security. Yes, very much so.

Q107 **Andrew Bowie:** When will blue hydrogen reach the market?

Louise Kingham: Our biggest blue hydrogen project in the UK is at Teesside, where we would like to do a gigawatt, which we are already investing in today. We have plans to get that through final investment and operational for 2027. So that is what we are hoping to be able to do.

Bethan Vasey: Blue hydrogen, from a technology perspective, is ready for deployment at scale now. Several large units are operational



worldwide. It is the policy framework and the tracks that at the moment are controlling the pace of deployment of blue hydrogen.

Q108 **Andrew Bowie:** They are already in use worldwide? Why are we not utilising them here in the UK? What is holding us back?

Bethan Vasey: Obviously, we have the track 1 and track 2 process. We have two major blue hydrogen projects in Scotland that we are working on, at St Fergus and at Fife. The hydrogen elements of the project have both qualified for track 1, phase 2, but obviously, with the link to the Acorn project, we are waiting for urgent clarity on how Acorn can progress through the track 2 process.

Andrew Bowie: We are all waiting on that urgent clarity. Thank you very much.

Q109 **Sally-Ann Hart:** I am going to ask some questions about skills and retraining the workforce. Bearing in mind that a number of the skills required for hydrogen production can be transferred from oil and gas, especially as regards blue hydrogen, which we heard earlier, and as we heard from our previous panel that the industry needs to be leading the reskilling and workforce training, are you reskilling your existing workforces for hydrogen production or are you recruiting new staff? Can I take Ms Kingham first, please?

Louise Kingham: Certainly. The answer is both. I thought some really good observations were made by the previous panel when you asked that question. A number of things are at play here. Clearly, we are in this twin-track approach, where we are still going to be investing in oil and gas production. Then we want to be hydrogen ready. We are also, in many of our organisations, investing in other low-carbon energy generation.

So we have to manage the transition and evolution of that workforce carefully, because these are long-range plans. In 2030, we still want to be operating in the North Sea, as we have been for 50-plus years, and we expect to be doing that, so we need that workforce to be in place, but at the same time there is a transition and reskilling exercise to do, as you observe. Having said that, we can do a lot of that within our existing workforce, as we manage that and move it over time. That is a particularly great case in point in Scotland. I mentioned the Teesside project, and a lot of our workforce in Aberdeen who work offshore, live in Teesside.

As we evolve our hydrogen and CCUS projects, which we would love to do, we have a workforce with capability that can be readily redeployed. There is some contextual knowledge and some additional skills to be developed for some of the elements of work, but as you heard mentioned in relation to the process of safety, the operations and the maintenance, there is quite a lot of crossover, and some light-touch skills development will be able to build upon that readily.

On future talent, many of our organisations, alongside the OPITOs, the royal academies and many other organisations—it is quite a strong ecosystem in the UK and Scotland—have been investing in the



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development of STEM skills, and the promotion of apprenticeships, TechX programmes and entrepreneurship programmes. There are many, many—almost too many—things that we are trying to support, in the sense of getting organised around it.

We need to keep doing all that work. We have a real opportunity with the promotion of net zero as a journey to present the energy industry in a very positive way and show it is at the heart of the solution. Although we recognise that we have done some things that have been challenging, we are where we are and we can be a real part of the solution. For people who are passionate about climate and want to help put that right, the energy industry is going to be a really important place to do that and go on the net zero journey.

Sally-Ann Hart: Thank you. That was really comprehensive.

Bethan Vasey: I will supplement that. As a significant employer in the UK, both directly and through supporting further jobs across the economy, we feel that responsibility around skills and development for the future. We have announced our intention to invest £20 billion to £25 billion in the energy system in the UK, 75% of which would be in low carbon. That is a statement of intent not just to stakeholders in the Government but to our employees, around where the investments in the company will be and therefore where the opportunities will be across the energy mix.

We started on the pivot today. Nearly all the staff seconded to our ScotWind venture, jointly with ScottishPower renewables, have so far come from our oil and gas operations in Aberdeen, so we are pivoting our skills. We are leveraging our infrastructure through projects such as Acorn and the supply chain, which we discussed earlier.

There is a huge opportunity, particularly for the north-east, but there is also a risk if we do not get it right. That is where this sense of responsibility and collaboration comes from. Aberdeen and the north-east can play a global energy hub role. A report from the Energy Transition Institute at Robert Gordon University outlined a potential 20% increase in jobs in the energy sector or, in the lower-case scenario, a 40% decline. Leveraging the skills and experience that we have and getting the timing and pace right are going to be key. We will need to collaborate with the Government. There is a role for industry on the skills side, but then creating the clarity of strong project funnels, whether it is hydrogen, CCS or offshore wind, on timing, scale and pace sends a signal to employees, operators and the supply chain so that we can be ready and get the skills ready in time across the workforce.

Sally-Ann Hart: Another comprehensive answer. Chair, I will leave the rest of the questions for anyone else who wants to come in, but I have to excuse myself. Thank you very much.

Q110 **Chair:** We have done several inquiries about renewables in Scotland over the course of the past years, and one of the key features that comes out is what we are describing—the transition. Some call it just transition, and



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some call it full transition. How many people from the old oil and gas sector have actually been transitioned into renewable technologies and are working in the renewable sector? I think Ms Vasey mentioned the collaboration with ScottishPower—ScotWind—and you gave an example of this happening. I think 37,000 people work in oil and gas. How many of them now work on renewable projects?

Bethan Vasey: I don't know the exact numbers on the campus, but we have a significant number of employees working. We have a ScotWind opportunity, the Acorn Project and so on. We also have functional departments—commercial, legal and so on—which are spending about half their time, if not more, on energy transition projects. For us, it is about having a mix of dedicated employees on specific projects as they emerge and as the funnel grows, as well as about taking a professional skillset that can then also be transferred across the mix. It will be a mix. There will be the continued role of oil and gas to 2050, so we are still going to need those suppliers in the UK, and we will continue to play a role in that.

As we also heard from Will earlier, there will be an increase in investment across the energy mix. It is going to be a mix. At the moment, we do not have those numbers outlined. It also depends on investment plans, of course. Coming together collectively—the industry and the Government—to get a sense of that scale gives the individual companies, as well as the industry collectively, a sense of the scale of the challenge and of any interventions that might be needed both within and beyond the campus to support employees to transfer, to make sure that it is indeed a diverse and inclusive transition for the future.

Q111 **Chair:** What would you say is your ambition with your current workforce—particularly in the north-east—who have been given the opportunity to transition across to working in the renewable sector? Is that how you are approaching this as managers of the workforce you currently have?

Louise Kingham: Yes. I will give you an example, to build on what Bethan was saying about Shell's experience. In response to our previous question, the figure for those we have moved across into different projects is in the low thousands. That is where we are. But there is also some quite significant additionality. When some of these projects get to the stage where they are going to be constructed, it involves 4,000 to 5,000 just doing the construction work on one project. Then there is building out the supply chain capability that we need. If we are to harness that opportunity, we need to be much more strategic about how we collaborate. For example, all of us who are investing in ScotWind projects need to come together around the table to work out how to do that effectively, so that we can build sustainable supply chains, which, again, are creating lots of additional job opportunities.

I can give you another example with actual numbers. We recently went out to recruit for 100 hydrogen jobs and 100 wind jobs, to build out against the projects that have recently been successful, and we had 10,000 applications. There is a lot of interest there. Whether the skills

meet our needs is another question, but the appetite to work in all those areas is there, and there is a lot of interest.

Q112 **Chair:** Thank you for that. I want to come on to the tension—if it is a tension—in the balance between the production of hydrogen and the demand that exists just now. I will read you a quote that you may be familiar with. Shell said: “The UK Government has made good progress on production (and we await a specific production strategy early this year), but we have seen limited movement on demand and infrastructure”. Is that the case? Are we getting the balance of this wrong, and what should we do to rectify and correct it?

Bethan Vasey: I think it is just that policy is needed along the whole value chain of hydrogen. We have seen really good progress in the production side, and what we now need to see is the rest of those pieces along the chain and on the transport and storage. We have had some conversations today around storage, which is going to be key. The infrastructure and transportation—whether by pipeline or shipping—will also be very critical. Then there is the demand side, which we have discussed. Whether it is in industry or transport, there are really valuable levers that can be pulled here to generate more certainty on the demand side as well as to incentivise industry switching. It is about linking all those parts of the chain together to underpin large-scale investments in hydrogen production, which will be multi-hundreds of millions of pounds. In order to make those final investment decisions on a number of different projects, we are going to need to see that secure customer-side demand.

Q113 **Chair:** What specifically do we need to do to build up demand for hydrogen? Obviously, it has to be there—that is what we are doing—but we seem to be a long way from actually bringing this to tap and having this installed in people’s homes.

Bethan Vasey: A lot of the projects at the moment have been relatively small scale—whether they are then linked to one or two turbines and a specific private agreement with one particular user—so how can we scale that up?

Q114 **Chair:** Is cost an issue?

Bethan Vasey: Yes, cost of switching is an issue. If you look from an industrial perspective, many of our industries would be challenged to be competitive internationally. These climate targets are making the choice for industry imminent and definitive—either decarbonise or close. These industries that could produce their products elsewhere more competitively will need some sort of incentive to invest to switch to hydrogen, and the scale of support required is beyond the current IETF scale of support.

Q115 **Chair:** Most of the evidence we have secured for the inquiry thus far has been very positive, and everybody is encouraged about what is possible and the opportunities and potential we have. But probably the one issue that people highlight to us as a difficulty is disproportionate costs—how expensive all this is and will be. Is that something that you recognise, and what is your company doing to address some of those things?



Louise Kingham: I do recognise it, and we are conscious of not wanting to see the end consumer take any more of the burden of that, which is really important as we go through this transition and not, given the previous conversation, around it being just—it is important for all. Our approach has been around building partnerships and relationships with potential customers as off-takers—building the demand through exploring bilateral arrangements. For example, we have a partnership with Daimler, where we are looking at supplying hydrogen for heavy-duty vehicles. We have got a partnership with BOC Linde, where we are looking at making their infrastructure hydrogen ready, and how we do that. We are trying to work out the commerciality of that between us.

To Bethan's comment, it is important that the customer is incentivised to refurbish or make the necessary changes to their kit and their infrastructure so that they are hydrogen ready. What we are trying to do is to create a nascent market from the get-go. Hydrogen might have been around as a feedstock for a long time, but this is something new that we are building. We have to make sure that the incentivisation is there for the customer and the supplier in balance, in order for that to work at the pace we want it to go.

Q116 **Chair:** On the previous panel you probably heard the comment that there are something like 1.6 million boiler refits a year. Surely we should be making sure that we factor in hydrogen ready to that refit programme—that is the most obvious thing to do when it comes to getting it into homes.

Louise Kingham: Absolutely. We have to take a really integrated energy system view of where we want this vector to be used and in which applications it makes most sense. Obviously the heating debate has been topical, and there are various views on how that can be done, but my view is that we have to have all of the solutions on the table to get to net zero. Saying, "This is better than that," is not necessarily the case—it is and, and, and. There will be better, more economic, more cost-effective and more customer friendly places and choices in which to use these different energy technologies.

Q117 **Chair:** I will come on to the second thing we have had in terms of difficulties with hydrogen and some of the more negative responses we have had. One is the safety issue. We have not seen any great evidence that suggests that there are any real safety issues. Is there anything that you are concerned about with the rolling out of hydrogen and putting it in people's homes?

Louise Kingham: Not anything that we would not be worried about with using natural gas or any other energy source into a consumer, whether industrial or domestic. All of our usual approaches to health and safety and environmental good practice stand in relation to hydrogen alongside other things. The answer in short is no, not from our point of view.

Q118 **Chair:** Is there the Hindenburg thing that people still have in their minds when it comes to safety?



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Bethan Vasey: Across Europe we have developed quite some expertise, particularly in the hydrogen refuelling space, so there are specific designs that are now almost off the shelf for hydrogen refuelling stations in mainland Europe. That safety expertise, which is absolutely still required, as per also our conventional fuelling systems, is applied, and there are very high standards controlling the training and standards.

Louise Kingham: And we have one of the best HSE regulators in the world. The bar is high, quite rightly.

Q119 **Chair:** I know all about that, because T in the Park used to be in my constituency. The big interconnector went underneath the festival, and our good friends in the HSE abandoned it because of that, closing God knows how much of a cultural benefit to the city of Perth. But we will leave that aside for now.

How do we make hydrogen exports work for Scotland? Is there anything we should be doing and thinking about just now, to make this something that we could really invest in and get the proper benefits from?

Bethan Vasey: A couple of things. First of all—we talked about this earlier—a big role to do with export is the excess of renewable power in itself, so anything that can be done to scale up and accelerate renewable power in the UK and Scotland will be key to this. For example, within the delivery of ScotWind, connection to the grid and clarity about timing for the sites that have already been awarded, as well as future phases, will all help to build confidence in the excess power capacity for the future that could be used for green hydrogen. We are involved in various hydrogen export initiatives around the world and a couple of trials—that global competition. One is in Denmark, where we have joined a consortium that is looking to bring distant offshore wind energy to an offshore hub and then convert it to hydrogen, which can be piped onshore. Another project is looking to export liquid hydrogen from Australia to Japan, and there was a maiden voyage within that trial.

One of the challenges at the moment with export is that there is limited co-operation and co-ordination around the actual infrastructure. What is the best way to transport hydrogen long distance? That has not yet been agreed. Therefore, agreement and co-operation would be required in the short term to enable the fluid market that we feel would be beneficial globally, and to really start the piloting and the supply chain pivots now. For us, there is a big potential for the UK and Scotland, but it is also about building on our LNG and gas interconnectors. We have talked about repurposing of infrastructure, and they could also be great value ways to support a hydrogen-expanded economy.

Q120 **Chair:** I have always wondered how you export hydrogen, but that has explained it to me perfectly. What I have in my briefing notes is that it could be through ammonia or liquid organic hydrogen, which is what you told us. It is fascinating how this is done. I think all of us are mystified about how you export energy around the world, but I suppose it is no different for hydrogen.



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The Scottish Government have said that if Scotland exported green energy to Europe, it could result in over 300,000 jobs by 2045, which seems rather encouraging and quite a lot. Is that something that you recognise? Are these figures that you think are possible if we get this right?

Louise Kingham: I couldn't talk to the number of jobs, because I have not seen the background to that, but certainly the potential is there, as you heard in the previous session. Building on your last question, probably the cheapest way for the transportation system to get up and moving quickly would be to repurpose the pipelines in the North Sea with some support from Government for changing of use, and with support from National Grid as a party to that. If we had enough renewable power that could create green hydrogen and was lower cost and so advantaged, you could absolutely see how it could then be exported at some scale, with the potential to create a lot of jobs.

I don't know whether it is quite that order of magnitude but, wearing my other hat in my role looking at Europe, there is a lot of interest in the import of green hydrogen and looking at how the infrastructure across Europe can now evolve as we worry about more shorter-term challenges. We need to think about being wired and ready, in a system sense, for hydrogen, regardless of whether it is blue. The preference is largely for green. My organisation has projects in the Netherlands, Spain and Germany, and as far afield as Australia and the middle east, where these are real conversations about the export opportunities and how we would do it.

Bethan Vasey: I do not have too much more to add. One of the things with infrastructure is whether there is a conversation in the UK about the role of blending if we want to repurpose our pipeline infrastructure.

Q121 **Chair:** Tell us, just for silly MPs on the Committee, what blending is and how it works. What do we have to consider when we look at this?

Bethan Vasey: We have talked about how to support and stimulate demand in different sectors. That, for us, is where the most value is as far as using hydrogen. As well as that, there can be a role for blending. Where there is not a firm demand, blending can play a really big role to support large projects. It would be good to get more clarity from the Government on their position around blending and what the objective is around economising the gas grid.

Q122 **Chair:** What would you like to see?

Bethan Vasey: It is that flexibility around projects like Acorn. The Fife hydrogen hub would be supported by a clearer position on blending, allowing then a volume of hydrogen to be produced, because hydrogen demand is likely to fluctuate. You need somewhere to export your hydrogen over time, and at the moment that is not clear. The pace of that scale-up, whether it is from 2% to 20% and ultimately to 100%, in the grid is not yet clear.



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Q123 **Chair:** Sometimes we would get hydrogen into the home, and at other times it would be other, more conventional, familiar energy sources. Is that roughly it?

Bethan Vasey: You can already blend hydrogen into the grid today, technically, and then it is the regulatory journey that needs to happen as far as increasing that percentage over time. In areas like Aberdeen, where there are higher ambitions to create a fully hydrogen gas grid, there is obviously a great opportunity to scale up projects like Acorn and really build out that hydrogen production. But without the clarity and understanding of that blending policy from Government, it makes it harder to scale up those investments.

Chair: You have helped us poor MPs who struggle to understand some of these concepts. But somebody who never struggles to understand concepts is Deidre Brock.

Q124 **Deidre Brock:** It wasn't my field when I was at school. It has been a long time.

We heard from previous witnesses about the important contribution that the right policies and regulations can make to hydrogen production development. Is the legislation sufficient for the needs of the sector? What might you like to see in addition to the UK Government legislation that currently exists for this field?

Louise Kingham: There is a number of things that we need, Deidre, and that is included within. We need the timely execution of the energy Bill. This side of recess is important; otherwise there is quite a considerable potential delay that comes in subsequently. From a legislative point of view, that is the big ticket that we are very focused on in needing to make progress. I mentioned earlier that if it is for the UK to be exemplary and to go first with these groundbreaking projects around hydrogen and CCS, these cluster programmes—the ones in track 1 but also subsequent tracks—need to, again, get moving with no further delays in decisions. There is already some slippage. I can understand some nervousness around that, because we are doing things for the first time, so there are big decisions to be made, and it is complex.

Q125 **Deidre Brock:** Sorry, but when you say slippage, do you mean in the first two projects that were selected?

Louise Kingham: We have the first two clusters that have been selected, and then there is Acorn and others that need to follow through. Within those first clusters we are now in another stage of competition where they are deciding who the customers are going to be that dock into the pipeline storage and infrastructure system for the CCUS, and they will also then potentially be the hydrogen production facilities, because they are all bidding in at the moment to another Government process.

The original decision for which selected projects would result was meant to be in May. That has now slipped to July, and there is talk of it potentially being a shortlist, not a decision. The danger with doing that and then, for example, the energy Bill not coming through this side is that suddenly you



are in real danger of projects, which are receiving millions of pounds of investment to keep them moving and to keep the momentum to get that early advantage, finding themselves in a wrapper with a ribbon and on the shelf. The delays are slowing things down to such an extent that, from a business point of view, you cannot go to the next stage, you cannot reach out to your supply chains, you cannot issue contracts, and you cannot get into feed, engineering and design stages, because you don't know who the customers of your facility are going to be or whether your projects are being selected. That is the challenge we are living in at the moment.

Q126 Deidre Brock: What is the Government's nervousness here? I am sorry, I do not want to put any bad spell on this, but I think of 2015, Shell's involvement in the competition and the way in which that was pulled very suddenly and with very little warning—I am sure that will not happen here, with things having moved on to the point where everyone recognises that it needs to take place. Are they just cautious because of what they see as a new technology, so they are not willing?

Louise Kingham: I am speaking for them, which is probably unfair. Observing from the outside, if you like, in a spirit where we are co-investing, because this is all new, so we are in a position in which we are co-investing—businesses and Government alongside each other—to build something new and to create some competitive advantage and the export potential that we have been talking about. So, I do think that there is a bit of nervousness about making those decisions, because they are complex and will carry some risk with them, but at the same time, we cannot afford not to. We just need to make those and not be afraid. If it does not quite work first time around, we will adapt and adjust it, and we will evolve, but we will be able to carry on, whereas not making decisions or really slowing things down just introduces the stop-start risk, and that is a bigger problem, certainly from the business perspective.

Q127 Deidre Brock: Sorry, Ms Vasey, you are nodding a lot—obviously, I was talking about the CCS competition back in 2015 that Shell was heavily involved in.

Bethan Vasey: Indeed. Building on a few of Louise's points, we were expecting an announcement on track 2 at the beginning of the year, which did not happen. We understand that there have been unimaginable external influences going on that have disrupted the timeline, but we also note the Climate Change Committee's recent comments around CCS in the UK being about a year behind schedule. Also, I think it has made similar comments to Louise on the need for a diversity of projects in the funnel. We have to be aware that we need to try a few things; we cannot just wait to back one horse. There will have to be quite a few projects for us to succeed in decarbonisation. Certainty on that timeline, therefore, will help industry to understand where the future opportunities are. That then helps to increase the confidence and the planning for that future opportunity and the joint partnership with Government.

For Acorn, the risk—the same risk that Louise just outlined—is that if there is not the clarity on track 2, as well as on a route to delivery, the

commitment from all the stakeholders and partners involved will be challenged, because it has been an ongoing process, which many different stakeholders have been engaged in. We are really trying to keep that momentum going, so it is challenging at present. Again, we are approaching recess without any announcement on track 2.

Deidre Brock: We went to see what Shell was doing in Germany with its REFHYNE project and the electrolytic production facility, which was fascinating. Shell's is green hydrogen, of course. There has been quite a lot of criticism of blue hydrogen. An academic study done last year by researchers at Cornell University and Stanford University suggested that blue hydrogen with carbon capture is a distraction from green hydrogen. What are your thoughts on that? I am hearing that blue hydrogen is a necessary transition period, if you like, as we shift to green hydrogen. What are your plans, too? REFHYNE was very impressive. The 10 MW project is being increased to 100 MW very shortly—or, at least, the planning has gone in. That is the sort of thing that I hope Shell—along with BP—would look at very seriously here as well.

Bethan Vasey: Yes, that is an exciting project. Indeed, they have received further European funding to expand it from 10 MW to 100 MW, as you have heard. We are hopeful for an investment decision later this year. We are looking at various electrolytic hydrogen opportunities in the UK, including Scotland. Obviously, that site is at a refinery, and we do not operate a refinery in the UK, so a different deployment model would be required here.

We welcome the ambition and the clarity of the split between green and blue hydrogen in the UK in the Government's ambition. We feel that green hydrogen with renewables has not yet been demonstrated at the industrial scale that we are going to need, so for deployment at the pace that we will need and in order for hydrogen to play the full role it can play as a net zero lever, we really believe that we are going to need to deploy blue hydrogen coupled with CCS. That can also meet the emissions reduction standard in the low carbon hydrogen fuel standard that was announced recently; we can meet that emissions reduction, so it is an opportunity to deploy hydrogen at scale and to build the market.

The fact that the demand for electricity and hydrogen will increase in parallel in the short term means that it is unlikely that we are going to have enough spare renewable capacity in order to both sustain the deep electrification of the system, as well as that mass adoption of hydrogen, which would be beneficial. Blue hydrogen can certainly help to bridge that gap in the UK and Scotland.

Louise Kingham: Similarly, for us, we are investing in green and blue projects for very similar reasons. We can see that blue can get to scale more quickly, which will help green along the way. Blue is helpful given that genuinely no-carbon blue hydrogen is going to get us to that 2030 target certainly and substantively towards the increased ambition, even with the allocation and the desire to have more green in the system as well.

I think it also makes great use of the infrastructure, the resources, the skills and the capabilities that we have already got to scale up at pace. It is making best use of the tools we have already got in the bag, and it will be 95%-plus cleaner than using unabated natural gas today. So it is absolutely a winner and it is on the way in, in parallel to many other things.

The Cornell study has been mentioned. I know similarly independent organisations—not mine—and other academics criticised the underlying assumptions of that study as being ill founded. That is not my comment, but we observed that others were quite quick to jump in and comment on the back of it. Those debates are healthy, and it is good to have other voices in the room, but from our point of view, in terms of proven technology and what we know can work, then that is why we are really comfortable with blue alongside green.

Q128 **Wendy Chamberlain:** Thanks, both, and also thanks for being here early, because it is clear that you picked up things in the previous session, which is really helpful. I want to continue a little on blue hydrogen. You have answered very comprehensively that this twin track is about having the technology for blue hydrogen that allows us to move forward quickly—I am assuming 2027 is quick in this timescale.

Louise Kingham: Super quick.

Q129 **Wendy Chamberlain:** What are the timescales from a Teesside perspective for green, if 2027 is what we are looking at for blue?

Louise Kingham: For green hydrogen you are probably looking at nearer 2030. We have said that we would like to be doing the work with Aberdeen City Council by 2024, because it is smaller scale. Green hydrogen is not necessarily going to come any slower, but the green is smaller scale than the blue. That is the difference.

Q130 **Wendy Chamberlain:** On CCS opportunities, our special adviser has picked up that there are longer term opportunities in terms of depleted oil fields etc. that potentially give carbon capture beyond Acorn an opportunity. To pick up one piece of evidence we had when we were in Methil, from the offshore renewable energy catapult strategy manager, he said that some of the volatility in the energy market currently could have an impact on blue hydrogen. Our first panel said that that was not the case, but I am keen to get both your thoughts on that.

Bethan Vasey: I think we are seeing unprecedented changes and pressures on the energy system, which is also reflecting potential underinvestment in the past decades. Creating a stable environment encourages investment. We want to continue producing resources that are consistent with our emissions targets over time, and then pivot towards the greener sources as well. For us, it is always a mix, and there will be pressures in the market globally as well as locally, so being able to come up with the diverse mix that suits the UK's existing resources and skillset the best is obviously important.



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There is a pressure at the moment with unprecedented high gas prices, but these projects have very long investment cycles indeed, so understanding how the business models and the dynamics from both the production and the demand side will be set up for success in a number of different scenarios is going to be important. Some of the pivots, even in our conventional operations, where we tended to resend liquids from our gas plant at St Fergus down to Fife—that feeds into the ethylene plant value chain down there. Actually, because of the situation with the gas demand over the winter, the question was: can we put more gas in the grid, using the existing infrastructure we have? That, for me, also points towards the value of these interconnected energy systems. As the UK and Scotland, we have so many rich resources that we can kind of play tunes with the infrastructure we have in order to optimise that for the best energy security and economic outcome for the country.

Q131 Wendy Chamberlain: What I am hearing is that 2027 is super-quick, because we have the technology for blue hydrogen but the investment cycles around blue hydrogen are so long term that the current volatility we are seeing in the energy market offsets that and still makes the twin-track blue hydrogen a good start.

Louise Kingham: Yes, and remember: you are not thinking only about gas prices; you are thinking about electricity prices, too, in this new world. But yes, your point is right, in that these are long-term investments. The reason for saying I don't agree with the previous proposition is simply that they are so long range that I cannot tell you what the gas and the power price is going to be in 2027. We do know that right now, as has been said, it is unprecedented. They are global commodity markets, so there is a logic to saying, "Actually, we can over time, as we do more of this as homegrown energy, bring those costs and those prices down." That is what we hope to see.

Q132 Wendy Chamberlain: I think that is a very good point in relation to what the energy prices in 2027 will look like, because that plays into Andrew Bowie's comments about energy security; Ukraine is increasingly looking like a much more attritional war than perhaps people thought at the outset. Thank you for that.

On that, then, are stakeholders and consumers supporting the development of blue hydrogen? Is the support from the public there, Ms Vasey, and are you seeing that from an investment perspective as well?

Bethan Vasey: We have two large-scale hydrogen projects in Scotland and we have been having really great conversations with the kind of consumers that we are looking at linked to that, whether that is from the industrial point of view, looking at fuel switching within large plants—for example, in Fife, we operate a natural gas liquids plant, and adjacent to us is the Fife ethylene plant, so the hydrogen hub project there—

Wendy Chamberlain: Is that Mossmorran?

Bethan Vasey: Yes. The hydrogen partner project there can then help those industrial sites to decarbonise, but also provide hydrogen into the



local economy. Obviously, within the central belt, that is a really fantastic location. It can also generate significant CO₂ volumes, which link into Acorn through the Scottish cluster. Again, it is that interconnectedness, but definitely there are positive conversations with industry, transport and so on, because the hydrogen can be available at scale now and there is obviously pressure on industry to be exploring those decarbonisation options. To refer back to the earlier discussion on policy, what we then need to see are the policy levers around converting that interest in investigating the potential to switch to hydrogen into a real urgency and a desire to act from the demand side, so that then you get all pieces of the puzzle linking up. We can produce at scale, and then the question is how we can secure the demand at scale.

Q133 Wendy Chamberlain: So those net zero goals, at both UK and Scottish Government level, are really important in driving that blue hydrogen track just now.

Louise Kingham: Super so, yes; you are quite right. Certainly our experience—Teesside is a good example, but so is the Scottish system. In Scotland, obviously, the energy industry is quite well understood. It is a massive employer, and wherever you have that, you generally have a more rational conversation at customer level about energy and the opportunities that it provides—not just employment but in terms of wider service. One of the interesting conversations that we are very much enjoying in Teesside is that, given the depletion of industry in that part of the UK over decades, but with a number of energy-intensive industries still at play—petrochemical, fertiliser—they see the opportunity for moving very quickly to blue hydrogen, particularly, as a real opportunity for future sustainability for their businesses, and therefore for recruitment, local employment, community regeneration, and so on and so forth. There, you have families of four generations who would quite like their kids to be able to stay locally and have a good job—quality work—at home, as opposed to continuously having to think about leaving a region.

Q134 Wendy Chamberlain: That is always a challenge in Scotland, isn't it?

Louise Kingham: Yes, but there is a lot of opportunity, because I think the decarbonised energy world is a more local one. People and places just transition; it all knits together, maybe in a different way from how we have run the energy system of the past.

Q135 Wendy Chamberlain: That interconnectivity is certainly something that we have looked at in the past. Although we are looking at hydrogen particularly, we have looked at renewables previously, and there is no silver bullet; there are multiple opportunities.

Just on that, you talked about diversification and optionality. It is good to have a number of eggs in one basket, but one of the things that has come up as a slight concern is the “and, and, and”. When I think about energy from the consumer perspective, a lot of consumers stay with their original company, and we have seen the collapse of a number of energy companies and a default back to the big six. Is there a risk that that complexity—that “and, and, and”—scares consumers away from



movement?

Louise Kingham: The complexity that I was touching on was largely about industrial and commercial customers. Thinking of myself—putting on my consumer hat as a bill payer—what I want is clean, low-carbon energy. I do not really mind how that gets to me and how it is done, and I am probably relatively agnostic technology-wise as to how I get it. I want the services that come with what energy provides; if I am conscious of the environmental credentials of that energy supply, I want that to be the best it can be at the lowest cost; and I want it to be safe, reliable and secure. For those things, it is incumbent on the people at the retail supply end of the value chain to be in delivery mode. The “and, and, and” as to what those opportunities look like is a little bit further up the chain, but you have the retail business, not me.

Bethan Vasey: I think what consumers really want is the demonstration and the framework from government and regulators that is controlling the energy transition, so they can trust that they are getting low-carbon, affordable energy. They want that transparency; they want experienced players in the market; and they want to have high standards, such as the hydrogen fuel standards. Elements like that in the mix are all valuable for consumers, so they can say, “This is what I’ve bought. This is the label.”

Segueing a little bit back to the discussion around industry and Teesside, we talked about CfDs earlier in the session, but you could also have carbon contracts for difference that could be applicable to producers of products of various descriptions. Then, if you can create that low-carbon label of what industry is producing where there is a tradeability within that, it provides an incentive for them, but it also links back to the consumer so they can see how the energy system and the products they buy are also becoming lower energy, not just what they are using at home.

Q136 **Wendy Chamberlain:** They can make their simpler decisions.

Bethan Vasey: They can make their choice.

Wendy Chamberlain: Fitting boilers, for example, in the safety of the knowledge that the thinking further up the supply chain—further upstream—has been done.

Louise Kingham: It also drives the suppliers to behave in the right way, because they have the right levers. They are being incentivised to produce and supply the products that are being demanded, which is the ideal world that we want to get to.

Q137 **Wendy Chamberlain:** That is really helpful. Just going back round the full loop then, if net zero is driving this, from a UK Government and Scottish Government perspective, what else can we ask them to do support-wise when they appear in front of us to help drive that investment that makes those decisions happen quicker—that policy framework?

Louise Kingham: For me, it would be the conversation we were having earlier about going faster with the decision making and recognising that there needs to be some bold decisions. Then I think about the planning environment and the local regulatory environment. In an ideal world, we need to think that if there is a hierarchy, decision making is driven by net zero. Planning decisions and various other things, which lead to permitting and making projects come off the page and become real developments, need to have that influence where net zero prevails over other decisions that might get made. Again, working at pace is incredibly important there.

The other dimension, and I worry about this being a more local set of solutions as we decarbonise, is whether at local government level, rather than regional government level, there is the capability for delivery to work with businesses, investors and others, so that you get local integrated systems that make the most sense, and you get the best economics out of the other end. Those are the sorts of things where some time, effort and support are probably needed.

Q138 **Wendy Chamberlain:** So, from a Scottish perspective, I am upskilling within COSLA. Local authority and learnings from the Aberdeen—

Louise Kingham: Absolutely, and it is about getting us round tables, so that we do this in a system-wide way. To your point, it is not just about the hydrogen, but what we do with the EVs. It is all sorts of elements, including what will an integrated energy system that is the best value for the consumer look like? That is where Governments and local authorities can add huge value.

Q139 **Wendy Chamberlain:** That is really interesting, thank you. Ms Vasey, anything to add?

Bethan Vasey: Some of it recaps what we have already discussed. It is about creating that certainty around the project funnel and the tracks for CCS and hydrogen projects on the production side, then filling in some of the gaps around transport infrastructure storage and investment, as well as the demand side. On planning, to give an example from a slightly different part of the sector, we have our EV charging site in Fulham, and I think the planning process alone took four years. We do not have that time, but these sites are first of a kind, so it is about how we can become much more adept within that planning system to deliver what we will need to allow hydrogen to reach its potential.

Wendy Chamberlain: And getting communities on side while you are doing that. Great, that is really helpful. Thank you both.

Chair: That is all from us, and thank you ever so much for agreeing to appear in front of our Committee today. Again, if there is anything else you feel you could help us with on this inquiry, please get in touch. Two hours about hydrogen has just flown past! It is fantastic, and thank you for coming today.