

Energy Security and Net Zero Committee

Oral evidence: [Keeping the power on: our future energy technology mix](#), HC 1723

Wednesday 25 October 2023

Ordered by the House of Commons to be published on 25 October 2023.

[Watch the meeting](#)

Members present: Angus Brendan MacNeil (Chair); Vicky Ford; Mark Jenkinson; Mark Pawsey; Dr Dan Poulter; Lloyd Russell-Moyle.

Questions 1 - 106

Witnesses

I: Tom Quinn, Head of Analysis & Insights, Offshore Renewable Energy Catapult; Ana Musat, Executive Director, Policy & Engagement, RenewableUK; and Chris Hewett, Chief Executive, Solar Energy UK.

II: Jonathan Selwyn, Managing Director, Bluefield Renewable Development (BRD); and Duncan Clark, Senior Vice President and Head of UK and Ireland, Ørsted.

Written evidence from witnesses:

- [Offshore Renewable Energy Catapult](#)
- [RenewableUK](#)
- [Bluefield Renewable Development](#)
- [Ørsted](#)

Examination of witnesses

Witnesses: Tom Quinn, Ana Musat and Chris Hewett.

Q1 **Chair:** Welcome to the Energy Security and Net Zero Committee. This is our first session on keeping the power on in this inquiry, looking at wind and solar. We have two panels today, one at 10.00 am and the next one at about 10.45 am. We have three guests in the first panel and I will ask them to introduce themselves on their own terms, name, rank and serial number.

Chris Hewett: My name is Chris Hewett. I am the Chief Executive of Solar Energy UK, which is the trade association representing the solar energy storage industries in Britain.

Ana Musat: Good morning. I am Ana Musat. I am the Executive Director for Policy & Engagement at RenewableUK, which is the trade association representing renewable energy. We have over 470 members in wind and storage flexibility as well as associated supply chains.

Tom Quinn: Good morning. I am Tom Quinn. I am the Head of Analysis & Insights at the Offshore Renewable Energy Catapult. We are the UK's leading innovation and research centre for offshore renewable energy.

Q2 **Chair:** Excellent, thank you all for being here. This is a question to all of you generally with just a brief response, which I know is difficult. Can you give us an overview of the place of wind and solar in the electricity system and how we balance the system and keep the power on—to quote the name of the inquiry—at the present time? Is anyone particularly keen?

Ana Musat: I can start. We have a series of targets of what the future energy system needs to look like. On wind—and Chris will cover the solar side a bit more—the Government have a target of 50 GW of offshore wind by 2030 and 5 GW of that will be floating wind. We know that we need to decarbonise our electricity system by 2035 and by then we will need to have a more diverse generation mix online. We have the net zero target by 2050, so at that point we will have significant volumes of wind on the system. According to the Government's aspirations, wind will form the backbone of the future energy system. We will need that as well as a mix of other technologies to balance the system.

We are quite focused on ensuring that as we bring on intermittent generation, we have the right infrastructure to support that in ensuring the transmission grid is adequate, but also that we bring on online flexibility and storage solutions. We know that we will need that as we bring more intermittent power online. It is crucial that in balancing the system we also have short and long duration storage coming online interconnected, which we are already building and we are expanding that capacity, and a diverse form of generation geographically as well as by technology.



Q3 **Chair:** Given what you said, do you think that net zero will be hit in 2050?

Ana Musat: I think that we will if we stick to the interim targets that we have and we accelerate the actions that are already in train. It is an ambitious target and we know that quite a lot of investment needs to come from the private sector and the policy and regulatory framework needs to be in place from the Government side. I think we have a good chance to do that if we keep on track with investment and do so in a gradual way, so not having boom and bust cycles, where one year we have quite a lot of capacity coming online in investment and one year we don't. We are a mature market and the investment is already coming in.

Q4 **Chair:** From a solar perspective?

Chris Hewett: There is a Government target for solar of 70 GW by 2035, which as an industry we are very confident we can reach, with the caveat that we sort out particularly the grid. At the moment with wind and solar, sometimes half of the electricity on the grid will be powered by renewables. There will come a point in the next decade, in the next five years or so, where we will reach points where there is a surplus, where there are more renewables in the system than there are fossil fuels. At the moment we balance it by simply turning down gas-fired power stations, basically. When we get to that point of surplus, when there is a very windy day in summer in May, we will see 50% of solar quite possibly in a few years' time. That is when the energy storage kicks in.

We are already starting to invest in a lot of battery storage for short-term flexibility. We will get on to long-term storage because we need both, but I am confident that the global investment is flowing into solar as well as wind. We need to sort out a few barriers but the technology is there to deliver the net zero target we talked about.

Q5 **Chair:** Do you envisage that in 2050 there will be gas-fired power stations going on?

Chris Hewett: If it has carbon capture and storage, maybe, if carbon capture storage can be proven to work. We don't know. With the way that the energy transition is happening at pace, it is hard to predict where we will be in 2050 and 2035 is an easier horizon to look at. If you look just 10 years back with solar, you would not have believed how much is being deployed. The International Energy Agency say that \$1 billion a day is being invested in solar globally at the moment.

Chair: \$1 billion?

Chris Hewett: \$1 billion a day globally. That will be more than \$300 billion this year. The International Energy Agency is predicting that there will be more investment globally in solar than in oil production. That has happened in the last few years and it is growing very fast.

Q6 **Chair:** I am going a little off-piste here, but hopefully not for long. The



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question I often have about solar—and you have talked about the global investment—are there latitude limits for solar? I know they don't need it in Iceland, for instance, but at 68 degrees north?

Chris Hewett: It goes surprisingly far north. The economics of solar works in the far north of Scotland very easily and it works in Scandinavia. It obviously works better in other parts of the world but it is such an efficient technology and it is produced so far north that it is now the cheapest form of electricity generation in pretty much any country in the world.

Chair: I suppose in some places, the land of the midnight sun or wherever, okay.

Chris Hewett: Yes. There will clearly be a point where it stops, but it goes surprisingly far north.

Q7 **Chair:** What do you think will be happening in the offshore area, an overview from you on how the system will be balanced?

Tom Quinn: I think that we will be able to meet all of our energy demands, not just electricity demands but energy demands, from UK-generated renewable energy, including balancing the grid. The Royal Society published a report last month on large-scale electricity storage. It has done some very thorough modelling on what this might look like.

Q8 **Chair:** When you say meet the demands, are you including gas, for instance?

Tom Quinn: Yes. It is looking at different storage options for different durations, so battery storage for short term. The intermittency with wind and solar does not just happen on a daily or hourly cycle but over a decade cycle as well. You can have periods of years with much more wind and periods of maybe a decade with slightly lower wind energy. It has looked at this over a period of 37 years and worked out that if you use green hydrogen production, which is produced using UK electricity, offshore wind and so on, that supplies around 15% of the electricity mix, the rest coming directly from wind and solar. For resilience, storage comes at a cost, it is more expensive, but if it makes a small proportion of what our energy mix is, with the remainder being made up of very cheap offshore wind and solar, overall the consumer pays less. It has worked out this should come in cheaper than nuclear power as well.

Q9 **Chair:** Do you need nuclear power in the mix?

Tom Quinn: According to this report, if you add nuclear power it increases the cost to the consumer. It gets quite technical. Part of the reason for that, it is saying if you take away from the baseload—nuclear is not flexible—and if you add that baseload in, you are left with intermittency on top, which is harder to manage. You need more storage for it because you would need less renewable energy.



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The other interesting thing in that report that is worth drawing out is that we do not need to get the optimisation of the capacity of renewable energy and the capacity of storage perfectly right. If you add more renewable energy, you are meeting more of your demand because we have more diversity around the country. If you have less, you need more storage, but overall the cost to the consumer ends up being about the same. I thought that was quite an interesting fact.

Chair: Can you name that report again for me?

Tom Quinn: Yes, it is "Large-scale electricity storage".

Chair: Thank you very much. I will move on to Mark Jenkinson.

Q10 **Mark Jenkinson:** I want to pick up a couple of points on nuclear particularly. You said nuclear is not flexible. Of course it is infinitely more flexible than renewables if we look at shifting output to hydrogen, for example, as they did wind. Of course there is no wind on the bars today. Any wind on the bars today is three times the cost of any nuclear on the bars today per megawatt hour without factoring in constraints as well. You talked about cheap wind but obviously there is no such thing at the moment. We have seen nothing under about £120 a megawatt hour on the balance currently.

Tom Quinn: Dogger Bank has just come online at £39.75 in 2012 terms.

Mark Jenkinson: Which is?

Tom Quinn: Roughly £45 to £50.

Mark Jenkinson: Slightly more expensive than the current nuclear fleet.

Tom Quinn: I think it is cheaper than what—

Q11 **Mark Jenkinson:** £45 is the current nuclear fleet and that is obviously the only one that is online currently, just by a week. My substantive question, which we have dealt with, was about how the expansion of wind and solar affects our ability to balance the grid and balance the system. We have touched on that a bit. Unless we start to take action, how soon might we start seeing the resilience problem we have just talked about with big wind farms? Dogger Bank has just come online; others are due to come online soon enough for the big renewable projects. How soon might we start seeing resilience problems driven by solar and wind if we don't deal with those issues?

Tom Quinn: We are not market specialists in understanding supply and demand in the long term. We are more focused on innovation and meeting cost reduction targets in the short term. Part of our role has shifted from looking at how we reduce the cost of renewable energy and offshore wind, because it has succeeded. Yes, we might see a deflection point that comes up but it is still much cheaper than it was 10 years ago when we started. Now a lot of the focus is on capturing the economic



opportunity here. The benefits of the Royal Society's solution of having UK-built renewable energy with UK-manufactured drivers and having it all basically being self-sufficient manufacture in the UK is that there is a huge economic opportunity and a lot of job creation there as well. I am not sure on the intermittency. Maybe one of my colleagues can—

- Q12 **Mark Jenkinson:** On hydrogen, I think there is something in using excess or surplus electricity, when we have it, to create green hydrogen but it is an incredibly inefficient way of managing dispatchable load if that is the way we choose to go, isn't it?

Tom Quinn: The round-trip efficiency, going electricity to hydrogen and back to electricity, is about 40%. That is not ideal. Ideally if you are producing electricity, you are using the electricity directly, but if it is being used for the storage component in meeting the demand and it is only 10% or 15% of the total energy mix, overall on average the cost to the consumer will still be less.

- Q13 **Mark Jenkinson:** Ana, do you have anything on that? Unless we take action soon, when might we start seeing resilience issues?

Ana Musat: Yes, sure. Obviously the National Grid ESO has an important role to play in balancing the system and ensuring that supply meets demand at any given time. We will not necessarily see the problems, but its job will become more complex because as the energy system transforms there is a bigger range of technologies that we need to manage. It is no longer the case that the system is just driven by supply. We also need to look at demand and see if we can flex that.

On what we need to do to balance the system, we need to think about how we replace the key plants that were traditionally gas and fossil fuels in the future energy system. We have green hydrogen as a solution to that and that provides flexibility on both the demand and supply side. We have long-duration storage where we have some of it online but with the right business models we can bring even more online. I have mentioned interconnectors. We already have interconnectors to countries like France, Norway and Belgium and we are building one to Denmark. That will be an important way to ensure that we have good balance and we can also manage intermittency when we have different weather patterns.

As I said, it is important to look at the demand side and ensure that we can flex that, that we give consumers the right incentives to consume when power is cheaper, not at peak times, and also we give the same sort of flexibility to industrial users and other large users. I think that it will not be impossible to manage. All of this change occurs gradually, so the system will not change overnight and National Grid ESO will adapt that, depending on how quickly those technologies come online.

It is also worth highlighting that we have the balancing mechanism that is used by the ESO to balance the system in real time. In addition to ensuring that we have the diverse technology mix on the grid in the long



term, there is also this balancing mechanism, which is effectively an auction that is open continuously and matches supply and demand minute by minute, second by second, so you can effectively buy from that market as well in case there is an unpredicted level of intermittency or a system fault. There is quite a lot of layers to guard against—

Q14 Mark Jenkinson: I have heard stories that that market has cost us £9,000 a megawatt hour in the London region. It should not be relied upon.

Ana Musat: We use it today as well, so it is not just dependent on renewable penetration but you are right, it is used more as a last resort. What I am trying to say is that if there is an issue with a fault or an unpredicted weather event, we can fall back on that to ensure that households and businesses don't see the impact.

Chris Hewett: If I can jump in on that short-term balancing and flexibility point, yes, we do have that balancing mechanism. Most of those effective subsidies through the capacity market are currently going to gas generators. There is lots doing baseload but they are also turning out—

Q15 Mark Jenkinson: Through the capacity market but it is driven by absolute necessity.

Chris Hewett: Yes, absolutely. There is a reason to do that but most of it is currently funding fossil fuel generators to do the balance. What is coming very quickly up the rails is battery technology. The National Infrastructure Commission's report last week recommended 60 GW of short-term flexibility to deal with the renewable system. There is currently 3.3 GW of large-scale batteries on the market with another three being built. There are another 20 that have planning permission. We can easily get to that 50 GW target by 2035 with batteries and that is just the short-term flexibility. That is just the stuff on the grid. The batteries will be standalone; they will be put next to solar farms and wind farms. There is also the behind-the-meter battery market, which is also growing very quickly. We estimate that there will probably be 100,000 residential batteries installed this year, mostly alongside solar systems. They will deliver another 1 to 1.5 GWh of storage and that market will grow as well.

We will see a very different way of dealing with resilience. It comes back to the issue that we will have surplus renewables in a very short time and that is where batteries come in. They absorb the excess offshore wind and solar and then bring it back through the balancing mechanism.

Q16 Mark Jenkinson: Those behind-the-meter batteries, the schemes—the ECO4, the local authority flex schemes, for example—don't allow you to factor in battery storage. Do you have a view on that?

Chris Hewett: If we are looking at retrofitting our building stock we need to look at all the technologies. We need to look at solar, batteries, EV charging, heat pumps and energy efficiency, of course.



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Q17 **Mark Jenkinson:** Do you think energy efficiency grants would allow for potential—

Chris Hewett: Yes. If you are looking at social housing, those people should have access to these technologies. You are seeing some of it through the public sector decarbonisation scheme and so on, but yes, absolutely.

Q18 **Mark Jenkinson:** I would like to follow up on the flexible demand. As an Octopus customer, I took advantage of its pilot on flexing demand but I don't want to be forced to do it. What does the future of flexible demand look like? How do we encourage users?

Ana Musat: There has already been a few trials to that extent. The point is that up until now we have not engaged with that question very seriously. In 2022 we worked with a series of suppliers to offer a demand flexibility service, which I think over 1 million customers took up. Effectively that means you get a preferential tariff if you do your washing or plug in your EV outside of peak times, so instead of doing it at 6.00 pm you do it at 8.00 pm. We are far from the question of whether anything like that is forced on consumers. It is more about providing the right incentives and getting the consumer to understand you can make savings if you are able to flex your behaviour. For some people it will not be possible and I think everyone accepts that, but if they can, it is good to provide that incentive.

Q19 **Mark Jenkinson:** Do you think that there is big enough flexibility in there to manage some of the problems in the grid?

Ana Musat: Obviously we need to build the grid, so that is not a substitution for sorting out the grid problem, but if we engage with that more seriously there could be a much bigger take-up. The engagement around the country has been fairly limited and it is just a pilot now. As Chris said, the energy efficiency piece is another important one to ensure that we can reduce demand and save on bills for households.

Chair: Now I turn to a man in great demand who will pick up the pace, Lloyd Russell-Moyle.

Q20 **Lloyd Russell-Moyle:** Carrying on from what you were saying, you mentioned that the post-meter storage is not necessarily factored into some of the calculations at the moment. Do we know how resilient the system needs to be if we are to build it now for the future?

Chris Hewett: It is a philosophical question, isn't it? I think we will see resilience delivered by different means. It will be lots of different tools. It will be the hydrogen storage, the long-term energy side, the demand side, EVs being charged at a time when there is cheap variables on the grid and individual batteries in homes. It will be all sorts of different layers. Probably the attraction of putting a battery in your home is a bit of personal resilience. We see the volatility of power markets at the moment. With what is happening around the world, that will not change.



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Q21 Lloyd Russell-Moyle: There need to be some clear financial advantages for people to do that for energy pricing minute by minute.

Chris Hewett: Yes. I think that we will start to see more and more of those time-of-use tariffs come in. People will be rewarded to consume when there is a lot of cheap renewables on the system and that shifts the demand away from times when there is less.

Q22 Lloyd Russell-Moyle: Do we understand the odds of the UK experiencing long periods of low wind, low sunlight and the level of capacity that we need for long periods rather than short periods?

Ana Musat: In northern Europe there are times when there is very low wind speed and the sun does not shine quite as much, the so-called dunkelflaute periods. On average, we are looking in northern Europe at around 150 to 300 hours when we experience dunkelflaute.

Q23 Lloyd Russell-Moyle: Are we looking at averages or do we need to look at the worst-case scenarios?

Ana Musat: That is average.

Q24 Lloyd Russell-Moyle: In the worst-case scenario in the last 100 years just gone, how many periods and what are the longest periods that we have had? Is that a useful way of predicting what will happen in the next 100 years?

Ana Musat: Obviously there is a close connection between the job that ESO do and looking at the weather forecasting and trying to anticipate whether we will get any exceptional events or whether we can rely on the average. On average, even if we get 300 hours, they will not necessarily be 300 hours in a row. You could have a couple of days here, a couple of days later.

There was an interesting modelling exercise from ESO looking at an extended dunkelflaute period that we had over the course of two weeks in 1985. The generation mix was quite different then, but it looked at if we had the system that we have today and we had that weather pattern, how we could effectively manage that, then extrapolating that, so given the system that we want in 2050, how we could deal with a weather event like that. There is quite a lot of resilience testing behind the scenes.

Q25 Lloyd Russell-Moyle: What does that resilience testing tell us?

Ana Musat: What they have discovered is that during periods like that the heavy lifting was done by flexibility provided by green hydrogen. Again, you could use that quite a lot to—

Q26 Lloyd Russell-Moyle: Technology that is not yet in mass scale anywhere?

Ana Musat: Exactly. We definitely need to invest in that and we have the business models that have been confirmed now.



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Q27 **Lloyd Russell-Moyle:** Green hydrogen to me is a bit like CCS. It sounds very good in theory but it has not yet been applied anywhere. Chris has scepticism of CCS. I think we need the scepticism probably on both. To what extent do interconnectors play a role here?

Ana Musat: Interconnectors obviously play a role. As I have mentioned, we have the interconnectors that we are building with neighbouring countries. I think we need to consider to what extent we are interconnecting with countries with a different energy mix. Obviously if you are experiencing dunkelflaute in the UK, you might experience it in northern France as well, but we are looking at: are we linking up to different geographies; are we linking up with countries with a different energy mix? For example, the interconnector we have with Norway is very useful because it has a lot of hydropower on its system, which is not weather dependent. Likewise, France has nuclear. It goes both ways. If you remember the summer before this one, the nuclear French fleet was down for repairs and we ended up shipping quite a lot of power to France through the interconnector, but it goes the other way around as well.

Q28 **Lloyd Russell-Moyle:** Do we need more long-term interconnectors to help the stability? I am thinking about southern Europe, maybe even north Africa kind of level of interconnectors, or will that never be viable?

Ana Musat: There are people looking into that and it will depend on how the energy system evolves across the country. It also depends on the financial incentives. We have the cap and floor mechanism that has helped to bring interconnectors online, so continued support for that to provide revenue certainty will be important. There is also the permitting and how we get it built, because it needs to cross quite a significant chunk of land and sea. That will be very important, but on how we think about resilience—

Q29 **Lloyd Russell-Moyle:** What about Gibraltar, which we could perhaps arrange? Tom, I have not come to you and I know that we need to move on.

Tom Quinn: I was going to add that when we are looking at diversity of supply we are working very hard on floating wind and bringing that to market and commercialising it, driving the cost down as well. If we are able to deploy floating wind, that opens up far more of the seabed and it means that we have a reasonable distribution of wind. Sometimes it can be windy around the whole country, but that is less likely.

Q30 **Lloyd Russell-Moyle:** How long does the deployment of the first major floating wind require from now?

Tom Quinn: That is a good question. I think that is probably one for some of my colleagues who will be joining after and are looking at developing it.

Ana Musat: I can come in on that briefly. We know the technology works. We have an operational floating wind farm up in Scotland. The



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question for that is like it was for fixed-bottom offshore wind: how soon can we bring down the costs? I think that depends on the level of support and how quickly we can deploy in different regions so we can learn the lessons and start cutting costs.

Q31 **Lloyd Russell-Moyle:** Maybe I will ask the next panel. If we get those things right by the end of the year, how long does it take to get that energy into our homes?

Ana Musat: I think you can bring it into your home straight away. The wind farms that are operational are already contributing to the grid. The question is how quickly we can build all those wind farms across the board. If you think about fixed-bottom offshore wind, since we started installing, in a period of five years we had already seen quite significant cost reductions and 10 years later it was substantially much lower.

Q32 **Lloyd Russell-Moyle:** Is there spare capacity to do that? We know in the solar market globally there is a huge spare capacity for building solar panels. We are using only about 60% of our capacity of solar power production. Is that the same in wind production?

Ana Musat: Do you mean in the supply chain?

Lloyd Russell-Moyle: Yes.

Ana Musat: We have some constraints in the global supply chain, but it is an important opportunity for the UK because there are some areas where we are doing manufacturing here. We are very good at it and we have a competitive advantage. There is huge scope to scale up those supply chains and there is a lot of money available in the market.

Lloyd Russell-Moyle: The danger is that scaling up takes time. On the time limit, I will return to the Chair.

Chair: A point was mentioned and I am just looking at the GridCarbon app at the moment. Wind is producing 11.8% of GB electricity and solar is producing 5.4%—that was about three minutes ago—with gas doing the big lift of 46%.

Q33 **Mark Pawsey:** We have heard a pretty rosy picture from each of our witnesses about the ability of renewables to grow and develop. Tom told us that we are generating so much with wind that we will use a lot of it to produce hydrogen and store it and Chris said that there will be a surplus in renewables very soon. That is based on supply. What are your assessments of demand and how much electricity we will need in 2035 and further on from that by 2050? What is your assessment of where we should be?

Chris Hewett: The National Grid assessment for where we think demand will be is about 50% more by 2035.

Mark Pawsey: Where would that take us to?



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Chris Hewett: It is 50% more from current demand.

Mark Pawsey: What will the demand be for electricity in the UK in 2035? What is your assessment?

Chris Hewett: I don't know the top number off the top of my head but it will be 50% more than we currently have. The one thing to point out though is the efficiency of our current electricity system is very poor, so we burn a lot of gas and most of that energy goes up the chimney.

Mark Pawsey: You have told us how great your sector is at developing new resource. I want to understand how much we need. There is no point creating loads if there is not that demand. Where do you see demand for the UK being in 2035 and 2050?

Chris Hewett: Like I said, the demand is expected to be 50% more in 2035 than it is now.

Q34 **Mark Pawsey:** Okay. What is it now?

Chris Hewett: Off the top of my head I don't know.

Tom Quinn: I can cover that. Today we are at roughly 300 TWh of demand per year. The forecasts for 2035 are around 450 TWh, so that is 50% more. Going out to 2050 is obviously a lot less certain, but it may be up as high as 700 TWh from 300 TWh today.

Mark Pawsey: Ana, do you agree with that?

Ana Musat: Yes. If we look at the future energy scenarios there is a range provided depending on how much we build of each technology and how much we manage the demand side and ensure that we have enough electricity.

Q35 **Mark Pawsey:** You have each told us how the industry is ready to do that. I want to understand what the opportunities are for UK manufacturing, because up until now on wind most of the turbines that generate our power are being manufactured elsewhere, partly because of inconsistent signals in that sector, and almost none of the solar has anything to do with UK manufacture. How can we seize the manufacturing opportunities of this massive growth that you are telling us about?

Tom Quinn: For offshore wind it is about giving confidence to the sector. We have various barriers at the moment in terms of grid investment, ports for offshore wind and particularly supply chain. They will need significant investment. You cannot make that investment without the confidence. One way of potentially providing that confidence is for the Government to have leasing rounds. Rather than just the annual CfDs, which are around 5 GW a year, maybe having a mega-round of 15 GW for large mega-projects. If you had that in various regions around the UK



that would incentivise developers to come and bid in and you would have the volume required to incentivise that investment.

Q36 **Mark Pawsey:** Do you think that could trigger manufacturing here? Are we always going to be importing solar panels from China?

Chris Hewett: You are probably aware that we are co-chairing a solar taskforce with the Government at the moment. There is a specific subgroup of that taskforce that is looking at the supply chain for the UK. The opportunities are very big in the battery market. We have members who are manufacturing residential batteries in the UK and want to build more. They may even move into the inverter markets. That power and electronic side of the renewable sector we could definitely move into.

Mark Pawsey: No prospect of these solar panels that you told us—

Chris Hewett: Solar panels are one element of a solar energy system and there are many others. Yes, the solar panels themselves—

Mark Pawsey: We do not need to be fixated on the fact that the solar panels are all coming from China?

Chris Hewett: Do we manufacture mobile phones in the UK? No, we do not. There are some things that other countries are better placed to do. What we should be doing as a country is focusing on where we can get a competitive advantage. Batteries, absolutely. UK steel is used in the solar mounting kit that goes into solar farms.

The next generation of solar is interesting. There is a lot of flexible solar and thin-film solar development happening in the UK. That is where we can start to look at the next stage. Rather than last decade's technology, let's look at the next decade's technology.

Q37 **Mark Pawsey:** Ana, you used the word "constraints" in the supply chain and Tom spoke a bit about those. Can I ask you about two specifically, which is the skill of the workforce to effect the massive number of installations that will be necessary, and your thoughts on where we are with the planning system and the changes that might need to be made to accelerate the installation of what is needed?

Ana Musat: Maybe if I start with the workforce point. Obviously it is a growing sector and we know that we will need more people. If we look at our sector, by 2030 we need about 70,000 extra people to come into the sector.

Q38 **Mark Pawsey:** Do we have colleges and FEs training the people who are needed?

Ana Musat: There is a mixture of looking at the people who are currently in the education system and ensuring that they have the right skills, but it is also using the people who are already in the workforce in other sectors, doing a bit of reskilling and bringing them into the sector. We have a lot of partnerships looking at whether workers from the oil and



gas industry can transition into offshore wind, which is already happening but we could do it on a bigger scale. We also have partnerships, for example, with the military, looking at bringing veterans into the sector. If we look at the skills gaps that exist in engineering, electronics and welding, those are skills that we can bring from other sectors. We do not need specialist skills for everything. Again, if we look at people who are currently in the educational system, there are a lot of partnerships that our members have—

Q39 Mark Pawsey: Are you confident that we can meet the numbers that Chris and Tom are telling us about with the workforce?

Ana Musat: We can, but we need a more programmatic approach. Right now it is very much that each developer does its own engagement and its own support for skills. We need something to encourage less competition in this area and bring people together a bit more, because it is a workforce that we all need, ultimately.

Q40 Mark Pawsey: The massive obstacle is the planning system. What do we need to do to enable that to deliver?

Ana Musat: There are some reforms that we are looking at in terms of the national policy statements to ensure that we can fast-track critical infrastructure. That is very good and we welcome that. However, there is much more that needs to be done on how we engage the communities and how we engage their acceptance of certain types of infrastructure. Onshore wind is a good example in England, but we also need to build quite a lot of grid. There are certain areas of the country, in East Anglia and Scotland, where a lot of that infrastructure will come to.

Q41 Mark Pawsey: Do you think that residential resistance is more important than the vagaries of the planning system?

Ana Musat: Yes, but there is also a question on how the planning system deals with community opposition and what counts as community opposition. Right now if you have one person who objects to development, it makes it difficult to pull the project through, even if the rest of the community is 100% on board. There is also a question as to how we deal with community benefits. As you know, for any type of infrastructure that gets built—onshore wind and also grid—there is the question of how you reward the community for hosting the infrastructure on behalf of the nation. Right now that framework is not very clear and everyone is offering slightly different things. We need to make sure that we offer communities stuff that they need, not just money—other people might want something different—and that we have a unified framework. Again, it is not just our sector. In East Anglia you have the water sector, which needs to do quite significant investment.

Q42 Mark Pawsey: Do you think that we can get those changes in in time to enable the delivery?



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Ana Musat: I think so, but it requires fast-tracking the programmes that are already being done. The good news is that we have already started, so we are not starting from scratch.

Chris Hewett: Can I jump in on the planning point? The narrative around public perception of renewables—I will talk about solar farms but the same applies to onshore wind and to grid—is that residents do not like them. However, all the opinion polling that we have done and that independent companies have done has shown that there is a very large majority, even in areas where there is a solar farm being built, in support of that project. There will always be some people who are against it and make a noise, but it is not proportionate to the actual population in that area. There is a proportionate response, which is important.

The other thing to add on planning is skills in the planning system. We need more planners who understand these technologies. It is something that is new to those people. That is something the Government can support to pump-prime the planning system itself to allow those approvals to be put in.

Q43 **Chair:** Very briefly, when you say that some people are for and some people are against, have you profiled the people who are for and against? Do the “for” tend to fall into the economically active in the area and the “against” is economically inactive? Has anything been done on that?

Chris Hewett: Not that I have seen. It is across the board. First, probably the largest amount do not care. The next biggest number is those who support it, sometimes strongly support it. There is 10% or fewer than 10% who oppose a scheme in their area that is being constructed or is under planning. We also see that when you poll people after they have been next to a solar farm for a number of years, the support for that project goes through the roof. It is 80% and most people forget that it is there.

Chair: If you were to take it away, they might object, which reminds me of the red telephone boxes when they came. First there were letters to *The Times* saying they were a blight on the landscape. When they were taking them away two generations later, the grandchildren were writing to *The Times* saying that something that was quintessentially part of rural England was going.

Chris Hewett: Solar farms have beautiful biodiversity: wildflowers, more bird populations and more pollinators. I expect that when the life of those plants come to an end, there will be campaigns saying, “Save our solar farms”.

Chair: I am laughing about the point that it is similar to the telephone boxes, if you are correct.

Q44 **Vicky Ford:** Are the deployment of renewables, new grid infrastructure and balancing technologies all keeping up with each other? Is one rushing



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ahead and the others are not catching up? Please, all three of you are speaking incredibly quickly.

Chair: I like that, by the way.

Vicky Ford: I would rather have quality answers.

Chair: We need your auditory skills to improve.

Tom Quinn: I will keep it succinct. Grid is lagging behind. This is not just a UK issue; this is a global issue. The IEA just published a report on grid issues around the world, saying that they need to effectively double the size of the grid by 2040, so that is probably the one that is falling behind.

There are alternatives to using the grid and we are investing in what they call Power-to-X technologies. That is producing hydrogen directly from a wind turbine, for example, rather than putting it into the grid and then into an electrolyser. There may be ways of bypassing the grid or reducing the reliance on it. It is worth investing.

Ana Musat: I would agree that the grid is lagging behind. We have started looking at how we can accelerate that and facilitate investment in transmission infrastructure but also building the network in a more co-ordinated way. That is good. However, the scale of the challenge is quite significant. We need to build significantly more in the next 10 years than we have built in the previous 30 years, so we need to make sure that we keep pace with that.

As Tom says, there are other areas that we can look at to ensure that we can transport the power across the country. We already have the western link and the eastern link that are being built now, which moves power from Scotland, where we have high levels of generation, to the east coast and west coast respectively. We could also build more of that to ensure that we move power to centres of demand more quickly.

Another point to make on grid is on connections reform. It is something that the industry and Government are looking at now, but because we have had a very different energy system up until now, we have a big queue of different types of generation waiting to connect to the grid. We need to move away from a first-come, first-served basis to look at whether we can connect as a priority the projects that will make most of a difference to our energy security and that will help us get to where we want to be for our future energy system.

To give you an idea of the problem, we have some projects that are currently waiting on a grid connection and they have been offered one in just over 10 years. Therefore it is a significant problem that we need to deal with. Also the queue is growing a lot. We have more projects in the queue than we would ever need in terms of capacity to get to 2035 and 2050. More ruthless prioritisation of what gets connected when is important. If we get that right, it will help us with the grid problem. It is not just the transmission piece, it is also how we connect and when.



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Q45 Vicky Ford: I know Dan will come in on some of the controversies about where you put new grid. Should we be doing more to also have local solutions that are off-grid, putting power generation where power is used so that you have less pressure on the grid? How do other countries do this?

Ana Musat: Chris will probably cover that more, but there is obviously a problem at the distribution side as well. It is not just the transmission structure that is strained. Yes, we can do more in terms of building power closer to demand. We have, for example, communities that host onshore wind, which is a good solution to that. However, it is difficult to do in England because it is difficult to build onshore wind. As we bring online more technologies like EVs, for example, as we build more solar panels, it is a better way to manage that at a distribution level. However, ultimately there is no getting around the fact that—

Q46 Vicky Ford: You could have off-grid being generated that does not need to be more widely distributed.

Chris Hewett: The most obvious way is onsite generation and solar on your roof, both residential roofs and—critically—commercial industrial roofs and warehouses, farms and so on.

Q47 Vicky Ford: Should we be pushing for more of that to happen?

Chris Hewett: We should, absolutely. A lot more is happening in the market already.

Q48 Vicky Ford: RenewableUK spoke about the difficulties for, “Developers co-locating batteries and hydrogen electrolyzers with wind and solar farms...because of the process RO certificates are paused”. Basically, as I understand this, you could build all your batteries and your electrolyzers and then you are told that that does not meet the requirements and you need to take it all off again. That seems to me a complete nightmare. How do we change that?

Ana Musat: It is also looking at the planning system so that we can more effectively co-locate. If you build a wind project now, you say that from a system perspective it is more efficient to co-locate with battery or with hydrogen transmission and storage. You need to start from scratch. Again that is time-consuming because it already takes a while to go through the planning system. If we think about co-location with hydrogen, which will play an important role in making the system resilient, we currently do not have business models to build that transmission and storage to ship hydrogen around the country, so we are looking at hydrogen production but we are not looking at how we will transport it. We need to look at those in parallel.

Q49 Vicky Ford: Should we be suggesting that you can get a predesign approval or will that just slow the whole thing down?

Ana Musat: I am not sure if that will be slower.



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Q50 **Vicky Ford:** You have identified an issue. Maybe RenewableUK could make some recommendations in writing about how to address that issue. It sounds to me as if it needs to be addressed.

Why are we not looking more at tidal stream, given that that is much more predictable, does not have dunkelflaute—however you pronounce it—and could be 11% of our energy?

Ana Musat: It is one of the technologies that we cover and right now we have some support through ringfenced CfD auctions. As with floating wind, for example, the reality is that that technology is less mature than solar or fixed-bottom offshore wind, so it is more expensive right now. That does not mean that costs cannot come down, but we need to keep deploying and see what the cost reduction path looks like. Also in terms of our resources, wind—

Vicky Ford: Tom, do you want to say anything about that?

Tom Quinn: Yes, just to add that tidal energy has some other wider system benefits. Like you said, it is predictable for the next 100 years in advance. It is an issue of cost at the moment and that is why we are working hard on innovation for cost reduction in tidal stream. But the latest CfD auction is a big success for the tidal sector.

Q51 **Vicky Ford:** Is it something that we should be pushing?

Tom Quinn: Yes, I think so.

Q52 **Vicky Ford:** In terms of balancing technologies, colleagues in the Commons have spoken about the fire risk associated with battery storage facilities. How much truth is there in the whole fire risk issue? Are they boxing at ghosts?

Chris Hewett: It can absolutely be overstated. These are sophisticated technologies and they need to be treated with care. There are plenty of guidelines out there to make sure that it is installed and maintained in a safe way. It is not the only technology that we put in homes or offices that have a fire risk. Every single home has a gas boiler, which is flammable.

Q53 **Vicky Ford:** How does the fire risk of a battery in my home compare to the fire risk of something happening to my gas boiler?

Chris Hewett: I will have to get back to you on that. I would suspect that gas boilers are probably more risky, but it is something that the industry is looking at carefully already.

Q54 **Dr Poulter:** Ms Musat, you talked previously about the improved resilience to the UK energy supply of interconnectors, which clearly go across the seabed. When we offshore wind and when we are thinking about future planning for a grid, how viable do you believe an offshore grid in some parts of the country would be? How viable is it in terms of bringing the wind energy from different arrays, for example, off the



Norfolk and Suffolk coast? How viable would an offshore grid be to connect those arrays and bring that energy in at a focal point?

Ana Musat: That is something that is being considered now as part of the Centralised Strategic Network Plan, which looks at both the supply and demand side in terms of what we will generate, where we need to ship that power and what we need to build in support of it. Obviously we need to build that grid. The question is: do we build it in a more integrated way against saving system costs? Instead of connecting each single wind farm individually, do we connect in bulk or do we do it as we have done it up until now, which is not necessarily as co-ordinated and it makes it more complicated? It adds to planning times that need to be factored in for every single wind farm and overall it adds to the system costs.

With some of the recommendations that have come from the Energy Network Commissioner, we are on the right track. We just need to consider how we implement that as quickly as possible and how we manage that with the seabed leasing and having some clarity on that. If we think about where we want to build in the future, we know some areas of the seabed will be open for development but we do not have the long-term certainty for the next 20 years or so. Ideally we would have that so we could plan the grid more efficiently and look at the long term.

Q55 **Dr Poulter:** In summary, what you are saying—correct me if I am wrong—is that there is a desirability in having offshore grid because it reduces the cost of having separate planning applications for each individual array of wind turbines. It is something, provided the seabed issues can be worked through, that is very viable and in fact desirable, from what you are suggesting, in terms of energy connectivity and the speed in which we could bring future energy from offshore wind into use and on to the grid.

Ana Musat: Yes, and we need to think about the two together because we also need the onshore grid. What is interesting about the Centralised Strategic Network Plan is looking at everything together, how we connect the offshore to onshore and then how we build the onshore infrastructure. It is that holistic picture that we need to consider.

Tom Quinn: Can I come in on that one quickly? The benefit of having that offshore grid is that it will likely unlock wind farm sites further north and further east, further from shore, where the wind resource is better. Ultimately your cost of energy will be cheaper coming out of the wind farm gate, as it were. You need to factor that into the cost of that transmission grid.

Q56 **Dr Poulter:** That is interesting on the costings. Are there any other benefits from offshore grids in futureproofing a reduction in costs of bringing onstream future energy production?

Tom Quinn: Yes, I think so. We are looking at other nations planning energy islands, for example. If we are able to have those offshore grids,



they may connect into those, either in the UK or overseas. That might be another way of balancing that.

Q57 **Chair:** Just quickly, there was talk in response to Lloyd Russell-Moyle of long interconnectors. I am thinking of maybe Morocco or Iceland. How technically feasible and realistic do you think they are, Tom? You are nodding knowledgeably, so I will go to you.

Tom Quinn: Yes, they are probably technically feasible, but I don't think that they will move the needle in terms of meeting the bulk of our energy demand in the future. These will be relatively small in my understanding.

Chair: In terms of gigawatts?

Tom Quinn: Yes, in terms of what we need in total.

Chair: Thank you, panel. Thank you very much for your time this morning. We will move on to the second panel shortly. No doubt we will cross paths in the future. We will have a temporary suspension.

Examination of witnesses

Witnesses: Jonathan Selwyn and Duncan Clark.

Q58 **Chair:** Thank you very much. We now come to our second panel of witnesses for this morning's inquiry on keeping the power on from the Energy Security and Net Zero Committee. We are in room 16 at the Palace of Westminster this morning. I will let the second panel introduce yourselves—name, rank and serial number—starting on my left.

Duncan Clark: Good morning, everybody. I am Duncan Clark. I am with the company Ørsted. We are best known for leading the world on offshore wind. We are also the UK's leading offshore wind developer, constructor and operator. We have been here for more than 15 years and have invested more than £15 billion in UK infrastructure. We would like to continue that and are ready to deploy the next £15 billion.

Chair: Ørsted is a famous Danish company, isn't it?

Duncan Clark: Danish headquartered, absolutely, but more than half of our business and our largest market today is the UK.

Jonathan Selwyn: Good morning, my name is Jonathan Selwyn and I am Managing Director of Bluefield Development. The Bluefield Group develops, builds and operates solar panels and battery storage on behalf of the FTSE 250 Bluefield Solar Income Fund. The fund is a £1 billion fund, which has invested in over 100 solar farms since 2013 and increasingly in battery storage.

Q59 **Chair:** We heard earlier that something like \$1 billion a day is being invested in solar. What sort of chunk of that are you involved with?



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Jonathan Selwyn: The asset value of the company, Bluefield Solar Income Fund, is about £1 billion at the moment. We have sufficient projects in the pipeline with accepted grid offers to more than double that, with the right conditions.

Q60 **Chair:** Very astute, as I would expect from financial people, to say, “in the right conditions”. To kick things off, apart from wind and solar, what technologies will you both expect to have a big role in the electricity system in 2035, which is only 12 years away?

Duncan Clark: The key thing is that offshore wind power will be the backbone of the new system by the time we get there. That is clear. That is because it is secure, affordable and it is deliverable. We have shown that it is deliverable at the scale we need. The scale of the change that we have in mind here, we need to appreciate that we are stepping up to multibillion pound capital deployments every year, definitely out to 2035 and continuing on to 2050. Therefore we need to make sure that we can create the environment for that investment confidence. Yes, offshore wind as the backbone, and complementing that, the other renewable technologies and a set of flexible dispatchable technologies that will complement it and make the system work as a whole.

Q61 **Chair:** What sort of other renewable technologies? Are you talking about tidal barriers or what?

Duncan Clark: Onshore solar power as well as onshore wind playing its part. There will also be some of those other currently more minor contributions, but we need to also create the environment for those to be developed and matured and for technologies to be brought forward. That includes, as we heard in the previous session, the more minor renewable technologies today, but it also includes hydrogen. We can produce hydrogen from surplus renewable electricity and that can then be a medium for helping us decarbonise industry. It can help us as a medium for decarbonising some of the heavy transport like shipping and aviation and also, in due course, be part of our solution for long-duration energy storage. That is another part of it and it is another one of these areas where we need to create the right environment where we can develop and trial and mature those technologies and their business models and the demand for them and also the investment appetite for them. If we can create that environment, we will have a healthy mix of different solutions for different parts of the energy system.

Q62 **Chair:** Where is the prudent and astute money going in other technologies in the next 12 years, apart from wind and solar?

Jonathan Selwyn: We only invest at the moment in solar and battery storage technology and we also have some operational wind farms, smaller ones. It is interesting that we are talking about what will happen in 12 years’ time or where we will be in 12 years’ time, because if we turn the clock back and look about 13 years ago, I was standing in a field thinking how we were going to construct the first 5 MW solar farm. It



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seemed a bit of a pipe dream that we could even do a single solar farm of that size. However, now when you look at where we are, we sometimes have solar producing 25% of the UK's energy during the daytime. The other day, 75% of the south-west's electricity was coming from solar. That is something that we probably could not have predicted.

Therefore we are optimistic that we can deliver increasing levels of solar deployment, as we heard from Chris earlier, and the battery energy storage that is essential to that. Although we are not investing in it at the moment ourselves, EVs have to play quite a role in that in the future in terms of at least balancing the grid and providing surplus power at times when we most need it, as the EV fleet grows.

Q63 Chair: At the moment solar is producing about 5.5% of GB demand. Does solar ever get turned off and constraint payments are made to solar farms?

Jonathan Selwyn: Like all energy technologies, sometimes we are curtailed. Sometimes the curtailment could be due to grid problems rather than we have excess energy on the system. It is quite unusual at the moment, even in the peak summer days, where we get any sense of curtailment because there is too much power on the grid. When people talk to me about wind turbines, "They don't work, they're not turning" I always say to them, "When was the last time you saw a gas turbine or a nuclear plant curtailed?" We do not see it. Wind turbines are very visible. With solar you do not see it either, so we would not necessarily see it visibly. We are not seeing a major problem with that at the moment. However, as more solar comes on to the system, inevitably there will be times when there needs to be some curtailment because of too much power in the system. That is where we hope storage and other longer-term storage can take up some of the slack.

Q64 Chair: How important do you see hydrogen in that mix?

Jonathan Selwyn: We are not investing in hydrogen at the moment, but we are very interested to watch—

Chair: Is that because you do not see money in hydrogen?

Jonathan Selwyn: At the moment there is not an obvious business case for it for our particular fund, but we are very interested in how it will develop in the longer term. We hope that it is really net zero and not something that is just displacing something else and having the same impact.

Duncan Clark: We are investing in developing green hydrogen, hydrogen made by splitting water, using renewable electricity. We see that that has an important role to play in replacing the fossil hydrogen that is used today across industry but also in developing new solutions for some other difficult to decarbonise sectors to make that journey, things like shipping and aviation. We are investing in what we call e-methanol. It is a traditional fuel in its composition but it is made through a



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renewable route. That is one of the pathways that we see for shipping to decarbonise.

We are at the stage now where we need to develop and prove and show and grow those technologies, to mature them. To do that we need a supportive framework in the early years or a technology maturing. That is what we saw with such success in the UK with offshore wind. When something is young and new and it needs that maturation journey, that is the phase when it needs consistent support, a regulatory framework and encouragement. That means that when we need to deploy at scale, we will have those options ready to deploy.

- Q65 **Vicky Ford:** Are the Government doing enough to ensure that the UK hits its wind targets? Within that, how important is floating offshore and how important is onshore?

Duncan Clark: The UK has a strong framework for offshore wind. We have a great track record of installing offshore wind farms in the UK. That means we have proven our industry processes for everything from planning for grid to financing and funding and a stable view of revenues. We start from a strong place. The most important thing today is that the allocation rounds for contracts for differences—which are our mechanism and our instrument in the UK for signalling that long-term price signal—we need to make sure that next year's allocation round is sized at the right place and priced in the right place.

- Q66 **Vicky Ford:** We will come to the details of that in another question, I am sure. Other than the CfDs, should the Government be doing more on floating and onshore?

Duncan Clark: Both have a part to play. For floating, particularly as we step from 50 GW through to 100 GW or more, that means that we will need to access, in an affordable way, the deeper water sites. Yes, floating must be brought through that journey of scale-up and technology proving. We have the instruments to do that. Floating can and does enjoy a separate pot, we call it, in the allocation mechanisms so that it can receive that support that it needs. We need to make sure that those smaller projects, starting with the smaller projects, get constructed, that the lessons are learnt, the supply chain gets put in place and grows and then we will be ready to deploy that at scale as we go through into the next decade.

- Q67 **Vicky Ford:** What about onshore, for the third time of asking? Given that it is cheaper, given that the Government—under pressure from some of us here—have said that onshore should be enabled where it has local support, how important is it and what should the Government do to facilitate that?

Duncan Clark: I do agree that it has a part to play. You can see it in the energy scenarios that were talked about. There is an important role for onshore to play. It is affordable, it is deliverable quite easily and there is the investment appetite for it. For all those reasons it is a good thing to



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make happen. However, of course, as you go from 2035 through to 2050, it is with offshore wind that we will be able to add the large amounts of extra capacity that the system will need.

Vicky Ford: To get the onshore between now and 2035, what more should the Government be doing?

Duncan Clark: We talked a little bit about planning in the previous session. There is streamlining and delivering the certainty so that the planning system can be predictable. That is what gives the confidence to investment and the confidence to the supply chain. If you can create that certainty, that is what enables the investment funds to be attracted and the supply chain to scale up, which is another point that was touched on. We need the supply chain to have that line of sight and the confidence so that it can make its own investments.

Q68 **Vicky Ford:** The Marine Energy Council told us that where you put wave energy converters co-located with offshore wind, that could reduce the levelised cost of energy for both projects by 12%. Is that happening? If not, why not?

Duncan Clark: It is a very interesting idea, but again we need to be cognisant of the maturity level of that kind of concept. It is an early-stage desktop concept. It would be interesting to take it to the next stage and explore it more. However, what we are talking about with onshore wind, solar and offshore wind is technologies that are ready for large-scale deployment today. We know that they are affordable and we know that they deliver secure energy.

Q69 **Mark Pawsey:** Can I ask a question on floating offshore? I know it is pretty nascent, but do you expect that when developed at scale the cost will be higher than a fixed offshore site or will floating be equivalent in price, the cost of the power generated?

Duncan Clark: Even within that whole basket of fixed offshore, we see a range of different sites: different depths of water, different distances from shore and different grid environments that you have to connect into. There are a range of costs. I can definitely see the most competitive offshore wind becoming around the same cost as some of the fixed. It will take time to do that. Let's be clear, the technology will need to mature and the supply chains will need to mature and the costs—

Q70 **Mark Pawsey:** But there is no reason why it should be more expensive if developed at scale?

Duncan Clark: Within the ranges. Different characteristics of different sites and different grids mean that there is a range of costs. We are talking about an overlapping range of costs.

Mark Pawsey: On average there should not be any significant additional costs?



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Duncan Clark: An overlapping range of costs, I would say, for the two different families.

Q71 **Chair:** On offshore, we have heard that the Government's 2035 offshore wind target is unachievable because the grid cannot be upgraded in time to connect it all. Is this true? If it is, can we solve the problem?

Duncan Clark: There is a lot of work going on with the transmission operators, the National Grid ESO and the industry more widely. Recently we have seen the Winsor report with some clear and actionable recommendations. From where I sit today, what we are aiming for in 2030 I can definitely see, without substantial change, it is totally deliverable to deliver more than 40 GW of offshore wind by 2030.

Chair: And get it connected?

Duncan Clark: And get it connected. When you look to that period between 2030 and 2035, when you get to 50 GW and up to 80 GW and then to 2050 with more than 100 GW, that is when you need to see these actions delivered. We will need to see that same delivery of certainty so that supply chains and the companies that will be procuring the equipment, installing and commissioning that equipment, have a long run in. That is what will be needed to deliver that in an affordable way.

Q72 **Chair:** For the sake of argument, let's say that you built it with some financial backing and the thing is not connected but you are potentially generating. Who takes the hit? Do you turn around and say, "We can generate, so pay us the money" but you cannot get it anywhere, or do you then take the hit because you have a standing asset or an isolated asset or an asset at sea?

Duncan Clark: I like to think that when we consider these major multimillion pound investment decisions, it is very unlikely that a decision like that would go ahead if there was not very high confidence that—

Q73 **Chair:** Say it goes ahead, whoever is the developer or the financier or whatever, and you are saying, "We've built it". Whose responsibility is it to get the cable into the grid? You could turn around and say, "Constraint payment bonanza, please".

Duncan Clark: The way that it works today in the UK is that as an offshore wind developer we will design, procure, construct and commission also the transmission connection into the grid. We rely on National Grid to deliver onshore upgrades that allow that connection. Typically up until now it has been a much smaller part of the investment, but we look carefully at its capability to deliver it. As I say, we would only deploy the billions into the new offshore wind farm and its transmission system if we have very high confidence that the supporting infrastructure would follow in the right time.

Q74 **Chair:** We should never see a scenario of a developer reaching the shore and saying, "Well, the grid hasn't developed" because you are telling me



that you will work in tandem together?

Duncan Clark: Correct.

Q75 **Chair:** Fair enough. An opportunity for a moan for either of you. Are there any major policy gaps affecting wind in the UK? You must have a perspective from other countries as well. Or indeed solar.

Duncan Clark: The most important thing right now is that we can attract all of that investment. It is multibillion pounds every year and we need to make sure that the investment appetite is there and that the supply chain capacity to deliver it is there. The allocation round scheduled for next year, it is important that that round sets the price at the right level and sets the appetite and the volume at the right ambitious level as well. If we get those things right we will attract that investment, we will attract that supply chain and then we will also harvest all the other benefits that things like major investment in offshore wind delivers.

It is energy security and the reduction in cost of the energy that we are going to be using for a very long time. It is also the economic benefits in the coastal communities, where we usually make our connections and we base our operations and our construction activities. They are huge beneficiaries of the economic activity that comes with constructing and operating these new assets.

Q76 **Chair:** Are energy security and net zero in tension with one another? What you have said there is that they complement one another and they help one another.

Duncan Clark: Absolutely right. Every new renewable capacity that we build, every new renewable megawatt hour that we produce is replacing a fossil one, where currently we are exposed to uncontrollable market forces and prices, whereas with renewables you get a very long line of sight of what it will cost you. It is far more secure financially and physically.

Chair: I did ask for solar, but I will put it on hold because I have jumped ahead of myself and I did not mean to do that.

Q77 **Dr Poulter:** Mr Selwyn, do you feel that the Government are doing enough to ensure that the UK hits its solar targets?

Jonathan Selwyn: The first thing to say is that we very much support, as Chris said earlier, the targets for solar by 2035. We think that it is ambitious but achievable. However, there are some areas where there could be improved signals, particularly from Government, in terms of policy certainty. We have heard a bit about the rollback on net zero in the media. At the same time as we heard that, we also heard about the investment in the grid to make sure that solar and other renewables connect quicker, so there are a few mixed signals there by the Government. That does affect investor confidence.



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You then have the electricity generator levy, which sends a signal to renewables investors that we will be faced with a tax. It has had a material impact on us. The rumour of the energy generator levy came up when we were raising funds. We raised tens of millions less in funds because of the rumour of the electricity generator levy.

There was a big success for solar on CfDs, but the message was that it was not a success for offshore wind. However, 2 GW of solar won CfDs in allocation round 5, and for solar that was a huge success. We would like to see some changes to the CfD process, which we think could help solar even further in the future.

On planning, we generally have a supportive planning framework but it is applied very inconsistently at the local authority level. We also have a real challenge when it comes to local authority resources. For example, we have a very small solar project that has been in planning for 13 months now. It should have been 13 weeks. It has no objections from anybody, statutory or members of the public, but it has taken 13 months so far and there is no sign of it coming out of planning.

Therefore there are quite a few challenges. The overall message from Government about strong solar targets is very welcome but we would like to see more consistency in the rest of the message about net security and energy security.

Q78 Dr Poulter: What you are suggesting or stating is that local authorities and their desire or otherwise to support solar projects in terms of the view taken by their planning department—and indeed, local councillors—is a key factor in whether planning consent is given for many new solar developments.

Jonathan Selwyn: That is right. As we heard earlier, solar is very popular, solar farms as well, even in the areas where they are located. If a site is chosen carefully, you very rarely get many objections. To give you an example, we had four projects recently go through planning, each of them 150 acres or so, on agricultural land, but generally low grade. Out of those four projects, a total of 600 acres, we have had a total of 10 objections from members of the public. Where you choose a project carefully, you do not run into opposition. Where those projects do not run into opposition, you would expect support from the local authority planning committee, but you still get local authority planning members who do not like solar at all and therefore will find reasons to reject it.

The other point that I was making is that it is very variable in terms of how quickly a local authority planning determination happens. It can take months and months and months. Increasingly we see that we need to do a lot more work on surveys prior to determination. Archaeology is a particular bugbear at the moment. There is a project where we have to do about £300,000 worth of archaeological examinations before it even gets to the committee, so we do not know whether it will get planning. That can slow things down.



Q79 Dr Poulter: When a local authority decides that it will reject an application for a solar farm or solar park, in your experience—individual applications are different, of course—when you go to appeal on those, what is your success rate in having those decisions overturned?

Jonathan Selwyn: Personally I have had a 100% success rate in planning. Way back in 2012 we had one that went to appeal. However, if you look at the industry as a whole, you see that a lot of appeals are successful at the moment, even recently on grade 1 land, which we would never choose to develop a solar farm on. The appeal was successful on wholly grade 1 land because of the balance between the need for renewable energy and the loss of agricultural land in that case.

Q80 Dr Poulter: Is that determined by local planning policies to some extent?

Jonathan Selwyn: A mixture of local planning policies and national planning guidance.

Q81 Dr Poulter: One further question. How important do you feel the construction of small-scale solar installations will be to the future solar capacity, for example, rooftop solar compared to the large-scale solar parks and farms that you have outlined?

Jonathan Selwyn: I don't currently get involved in rooftop solar but I used to. As an industry, we see rooftop solar as every bit as important as utility-scale solar but it will not be on the scale. To deliver the targets that the Government have set we need absolutely every type of solar to be delivered at pace, but inevitably utility-scale solar will do the heavy lifting in terms of value.

The other thing to mention is that sometimes people say that we must do more on rooftops to get to these targets, but rooftops are quite complicated in terms of the structure of who owns them, particularly commercial rooftops. It is not always easy to get a project away. I remember spending just as long trying to get a 100 kW rooftop project away on a commercial building as it took to do a 50 MW solar farm project. You do need both but it is not always easy.

The other thing is that we would obviously like to use brownfield land where possible, but it is very difficult to find appropriate brownfield land. In particular, most of it has hope value for commercial or residential development, which prices it out of the market for solar developers. Inevitably therefore agricultural land tends to be the target. However, there is a huge amount of agricultural land that is not growing food for human consumption, so it does not necessarily affect food security in the slightest.

Q82 Chair: You call that hope value for brownfield land, okay. A question on agriculture: can you graze animals around the solar panels in a solar farm?



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Jonathan Selwyn: Absolutely. At Bluefield over 40% of our solar farms have sheep grazing on them over the course of the year. You do it generally on rotation. The sheep like solar farms. We like the sheep because they keep the grass down without using any artificial means. However, there is sometimes a conflict between grazing sheep and biodiversity net gain. For example, if we want to have wildflower meadows and we want to have more in the way of biodiversity on the site, then you cannot do sheep grazing year round because they tend to eat the wildflowers. However, if you do it on rotation in the times where the wildflowers are not growing, it is a very effective way to maintain the land so that you can have dual use.

Chair: As someone who keeps sheep—I do not want to digress too much—in the north-west of Scotland in the Hebrides, I notice that on sunny days they love the shade, so solar farm grazing must be perfect for them because they can tuck in behind the panels.

Jonathan Selwyn: Yes, and there is anecdotal evidence, if you talk to the sheep farmers, that the sheep seem to grow better and be more productive having that shade. However, it is important to stress that the grass grows under—

Chair: Do you want to put a solar farm on a croft in the Hebrides at all?

Jonathan Selwyn: It may be a bit tricky in terms of topography and the soil. Sheep like it. Some people say that grass does not grow under solar panels. Grass grows rigorously under solar panels so the sheep eat the grass under the panels as well as between the panels.

Chair: They get grass in the shade or grass in the sun, depending on the weather. I have gone too far on this.

Q83 **Mark Pawsey:** I will ask a question I asked witnesses in the previous panel on the opportunities for UK manufacturing. Duncan, you spoke about the billions of pounds being spent and that Ørsted design and procure. Are the signals about wind strong enough now for there to be UK manufacturers to benefit from this investment that is taking place?

Duncan Clark: Right now on Teesside there is a new factory under construction for world-leading steel fabrication to make the foundations that we use for offshore wind farms. We can attract that. They can be world leading for the next generation of supersized turbines.

Q84 **Mark Pawsey:** We have missed out on the first generation, haven't we, because the signals about investment and the climate were not strong enough?

Duncan Clark: Even in the last five years we have used more than 250 UK companies as part of delivering our offshore wind farms. About 50 of those we also take with us when we build offshore wind farms in other countries. There is a set of thriving businesses providing products and services into offshore wind. What we want is to be able to scale that up.



It is a global supply chain but that has to be scaled up multiple times to meet global demand.

In the UK there are particular areas where we have strengths. We have a number of blade factories. In Hull, Siemens is currently upgrading its blade factory so that it can make the next generation of bigger blades. We also have an upgrade and relocation of an existing cable factory. We have these examples where we can be world leading, where we can set ourselves up to be efficient and modern in the way we produce. The important thing now, as you say, is to make sure that those signals are long term enough so that those businesses can grow and thrive and we can attract more of them.

Mark Pawsey: Often the objection I hear to investment in renewables is that we do not make them in the UK and we are importing them. However, you are telling us something other than that.

Duncan Clark: There are 30,000 people in the UK currently employed in offshore wind.

Q85 **Mark Pawsey:** Jonathan, on solar, the panels are all coming in from China. Chris pointed out that the panels are only a small part and there is a whole load of extra components that go into solar farms, not just the panels, but the panels are the most visible. That is where my constituents who wish to oppose an application would say, "They're all imported from China and they're made in conditions that we might not wholly approve of". Is that right or wrong? Are we ever going to be making panels here and how much of the value of a wind farm investment does find its way into UK manufacturing?

Jonathan Selwyn: We used to have a manufacturing presence in the UK in solar panels in the early days. Sharp had a big factory in Wales but it could not compete on world markets. We are heavily reliant on Chinese panels. They are not all made in China; there is south-east Asia. Increasingly, because of the Inflation Reduction Act, America is ramping up production in solar panels in the US. However, at the moment we are heavily dependent, like many sectors, on Chinese manufacturing for the solar panels. However, that is a one-off investment. We are investing in solar panels at the construction stage. Once we have done that, these plants are wholly UK-operated and dependent on UK skills.

In terms of other components, we should look, as Chris said, at where we can add value, where we can deliver manufacturing at pace and that is competitive. One of the areas that we should be looking at that we have some capability in is an area like switch gears and transformers. There is a worldwide shortage of transformers, which is holding up projects. Some of our projects we cannot build for two years because we cannot get hold of transformers. We are competing on world markets and there are not enough of them. We have the opportunity maybe to look at investing in transformer and switch gear, but also in the grid upgrades that we need.



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We need a huge amount of investment in grid and we should be doing that with local supply chains.

Q86 Mark Pawsey: On a standard solar installation, by cost and value, what proportion is UK-manufactured and what proportion is imported materials?

Jonathan Selwyn: For solar panels, that makes up traditionally about 50% of the CAPEX spend, but it is going down because solar panels have halved in price in the last year for various reasons. Therefore the proportion of total spend is going down.

Mark Pawsey: Would more than 50% be domestic?

Jonathan Selwyn: Not necessarily domestic. We don't have all the capability we need to build solar farms in the UK. We would like the long-term certainty and investment to be able to train the people we need to have that skillset.

Q87 Mark Pawsey: I will come on to the skillset. We heard that people in other areas of energy provision can retrain or can transfer their skills. Are there enough transferring and are we training enough people in our colleges?

Jonathan Selwyn: There is a national shortage of engineers. In the solar world we compete with our peers for engineers and it is a tough market finding new recruits and new graduates to come into our industry. It is an attractive industry but there are not enough of them. Equally, at the technology skills level in apprenticeships, we need to ramp up the number who are coming into our industry and particularly also coming into the grid industry, the distribution network and the supply network.

Q88 Mark Pawsey: You also spoke about the challenges of getting things through planning and often the resistance coming from planning committee members. Of the rejections that you have had, how many of those councils have declared a climate emergency?

Jonathan Selwyn: We have not had any rejections, I am pleased to report. Yes, most of the councils where we are siting our projects do have a climate emergency declared. Sometimes the committees think that that is an internal declaration and is all about how the council uses energy rather than how they will promote renewable energy schemes in their area. However, generally we have had a very good success rate in planning so we have not faced that contradiction yet.

Q89 Chair: You said that the panels are only 40% or 50%. You were asked was the rest UK and you said no. Where is the rest coming from?

Jonathan Selwyn: A mixture. Some is coming from the UK, as Chris said. For example, our steel structures usually come from the UK, which is quite a large proportion. Some of the electronic components come from the UK. Sometimes transformers do, but not always. Inverters, for example, tend to come from mainland Europe and China. We see



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ourselves as being an important market but not a leading market for solar and therefore we are competing with worldwide markets. We see European markets as a way of sourcing our kit, which reduces our dependency on China.

Q90 **Chair:** What is the lifespan of a solar panel?

Jonathan Selwyn: The guarantees for solar panels are 25 to 30 years. Although we are paying the 40% to 50% of CAPEX at the beginning on solar panels, they have a very long lifetime and we are getting back the investment on that. When we started doing solar back in 2010 or 2011, I think we all crossed our fingers that that would be the case. We have projects that have been in place now for 10 years and the evidence shows that panels really do last a long time. If they work when they first go in, they tend to work for a long time.

Q91 **Chair:** If they reach their 25-year end, are they recyclable? What happens to the panels?

Jonathan Selwyn: The panels in this country generally are polysilicon and mono silicon panels and about 98% is recyclable. It is silicon, glass aluminium. There are no rare earth metals in them. There is another technology called thin film that does have a rare earth metal but we do not use that.

Q92 **Mark Pawsey:** Are they as efficient at the end of their life as they are at the beginning of their life?

Jonathan Selwyn: They have declining efficiency, so the warranties take account of a decline in efficiency of about 0.5% per annum. We see less than that, but that is what the warranty is.

Q93 **Chair:** I want to ask the same question about blades, because I have seen on television blades in Germany lying in a sort of blade graveyard and not being recycled. The blades that we talked about there, the manufacture of those—

Duncan Clark: We have committed to recyclable blades. Throughout our whole material cycle of an offshore wind farm, it is predominantly steel, copper and the blades. That is the bulk of the materials that we use.

Q94 **Chair:** How long will the blades last for?

Duncan Clark: A blade will typically last the full lifecycle of the offshore wind farm, which these days for a new offshore wind farm will be 30 to 35 years or more. When we first put offshore wind in the water, which was 1991, design lives were 20 years. We took those turbines out about 25 years later, so we are typically seeing the assets last a bit longer than their original design life. For new wind farms today almost all of the developers and investors are assuming 30 to 35 years or more in terms of their operating life.

Chair: Recyclable materials are being used in blades and everything



else?

Duncan Clark: Certainly Ørsted is committed to that journey and we have that dialogue with all of our supply chains all the time. We make it crystal clear what we are expecting so that we can put what is necessary in place.

Q95 **Dr Poulter:** Very quickly, Mr Selwyn, are there any changes that we could make to how we design and build solar to improve efficiency or to lessen the impact on grid stability and the environment? You have talked a little bit already about your approach of not pushing what will be controversial applications, but just addressing that question more generally to the industry.

Jonathan Selwyn: The efficiency of solar has increased significantly since we started large-scale solar in the UK. For example, if you want 1 MW of solar these days, it takes up around two and a half acres on the utility scale, whereas back in 2010 it would have been five acres, so you have seen a doubling of efficiency. That will continue, so we will take up less area for more output.

In terms of the other technologies that we deploy, we are becoming much more experienced and therefore better at designing our solar plants for maximum efficiency and you will see that continue. The deployment of batteries will help greatly with grid stability. Therefore it is not only about storing surplus energy, it is also about stabilising the grid. You will see the combination of solar and batteries becoming more and more common where the grid connections allow for that to happen. I think as an industry we have matured very quickly and we are getting much better at operating efficiently and finding ways to improve that efficiency over time, and long may it continue.

Q96 **Dr Poulter:** One issue you may be able to address for me is the issue—perhaps topically on a day like today—of flooding and the concerns that large-scale solar farms and parks could potentially add to the risk of flash flooding and the impact on communities of flooding at times of heavy rainfall. How do you answer that and are there any mitigation measures that could be put in place as part of the design of solar parks?

Jonathan Selwyn: Yes. It is a subject close to my heart because we are building two solar farms where we are putting in significant mitigation, not because the solar farm will add to the flooding but because the local community asked us to help with flooding from the fields that was there before we built the solar farm. The key thing is that there is an assumption that you see these panels and they are one solid mass, but there are gaps between all the panels so the water continues to filter between the panels. It is not directed from a mass of panels into one particular area. It continues, which is why the grass grows under panels because the water continues to go through the panels.



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We work very closely with the local flood authority to make sure our schemes have no additional impact, but when we are building them we are certainly aware of some of the fields having a propensity to have standing water. We obviously want to design that out because water and renewable energy does not particularly mix.

Q97 **Dr Poulter:** Just very quickly, that is how your company approaches the issue. Is that an industry standard or is there some variability in how these issues are addressed?

Jonathan Selwyn: I think ultimately the local planning authority will impose conditions on the solar developer to make sure that there isn't a problem, because the local flood authority will be a statutory consultee. If it is not happy with the design then it will make sure that there are conditions that will deal with any of those potential problems.

Q98 **Dr Poulter:** Again, we come back to the centrality of the local planning authority to the grant of an application for a new solar farm and what conditions it may put around that?

Jonathan Selwyn: Yes, absolutely. If the local flood authority is not happy it will put an objection in and that is then part of the planning balance decision as to whether that is acceptable or not.

Q99 **Chair:** Where have you found the best business environment internationally for investing in solar and wind, and what can we learn from that place?

Duncan Clark: The UK has been a great business environment for our investment. It has grown to be our largest market for offshore wind. We are also—

Q100 **Chair:** Is that because of the seas available?

Duncan Clark: It is partly the natural benefits that the UK enjoys. It is also that consistent support in terms of regulation and the frameworks that allow it. That is everything from planning consent through to contracts for the offtake, so it is a strong overall combination of regulatory framework that we can offer. What is important is to make sure that that then converts into a fair price for the investment and that the scale of the demand comes through clearly. We have the basic ingredients: the contract toolkit, the industry processes and the institutions. What is on us now is to make sure we use those in the right way, and I cannot overemphasise how important it is that next year's allocation round comes through and delivers at the right scale and at a fair price.

Jonathan Selwyn: I would echo that from a solar perspective, but without mixing metaphors, we have seen tailwinds over the last 12 months. For example, the mini Budget is still affecting us in terms of being able to raise capital for our projects because of the long-term effects on the bond markets. The inflation and interest rates are affecting



the ability to raise capital. The energy generator levy has affected us, as I mentioned earlier, and also the mixed messages about net zero.

Generally it has been a great environment to invest in in the UK, and that is indicated by the amount of solar that has been deployed and indicated by the solar and batteries in the pipeline. However, some of these things have affected us in the short term in terms of the ability to raise capital, and then we are competing on international capital markets with things like the Inflation Reduction Act, which to a degree are obviously distorting the ability to raise capital in the UK.

Finally, the grid situation is one that is significantly affecting us, at least for the next five to seven years, in terms of being able to deploy projects, some of which are all ready to build but we cannot build them because we cannot connect them. We have quite a few challenges at the moment but generally the UK has been a good environment to invest in.

Q101 **Chair:** I know the Americans call it the Inflation Reduction Act, but do you agree that it is a reduction Act or an increasing Act?

Jonathan Selwyn: I think it was titled the Inflation Reduction Act to get it through Congress, but I am not sure it could be described as that now.

Chair: Do you think it is inflation increasing?

Jonathan Selwyn: That seems to be an indication in the markets.

Q102 **Chair:** Yes, it is quite fascinating. On the grid situation—and maybe turning to Duncan Clark—I notice for the offshore wind that is built, it is sort of in the wash area in the Thames Estuary, but the vast majority of the planning area is the east of Scotland, going to the north of Scotland around to the north of my constituency in Lewis. There is very little on the west coast of Scotland, incidentally, which I know is very windy. There is quite a bit in the Severn Estuary extension, the area between Wales and Cornwall. Looking at the north of Scotland, I know the grid constraints that are there. There is so much planned in the north of Scotland, but maybe not more further south because it is heavily dotted in that area.

Duncan Clark: I think one thing I would add to your list is the Irish Sea. We have a large cluster of assets that are already operating and more is planned in the Irish Sea, so there is—

Chair: Off Blackpool, the north of Wales area.

Duncan Clark: Off Barrow and off Liverpool, yes, so we have clusters of assets there and there is more coming through other developers as well in the area. Part of the picture is using all of the areas that are favourable and connecting in where we can. I think there are high levels of ambition for Scottish waters and—

Q103 **Chair:** When can they be delivered? What I am looking at is—



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Duncan Clark: Some of that is already being delivered.

Chair: Some of it is, yes, to the east of Edinburgh. I see a bit of Shetland. There is something in the Moray Firth, but there is an awful lot of planned areas; probably about 20 to 30 planned areas.

Duncan Clark: We talked earlier a little bit about floating wind and I think one of the challenges for some of those areas in Scotland is deep water. Excellent wind conditions, but more challenging sea and seafloor conditions. It is another one of those examples where we need to learn the lessons, improve the technology, get the solutions matured and get the supply chains ready to deliver those solutions and then we can exploit as much as possible of that brilliant resource that is there.

Q104 **Chair:** Just before we finish up, on the contracts for difference, is that the right way for the Government to incentivise large-scale wind and solar, do you think?

Duncan Clark: As a contract instrument, it has proven itself as a great instrument for raising funding and that is part of the big challenge we have here.

Q105 **Chair:** When you go to the market, if you have CfDs that is a way for getting the cash?

Duncan Clark: As an instrument, yes. Where we need to look is exactly how we continue to evolve that instrument to reflect changes but also the allocation mechanism. We absolutely need to make sure that those work for us: fair prices, the right volumes and the right line of sight to those things. It is that long line of sight to it that enables the early investment by things like supply chain. That will give us all the wider benefits of these investments.

Chair: Briefly, Mr Selwyn.

Jonathan Selwyn: Yes, we would certainly echo that. We think it is a very effective mechanism. It does bring down the cost of capital. It was successful for solar, as I mentioned earlier, in the latest allocation round.

Q106 **Chair:** A useful crutch for you in terms of security?

Jonathan Selwyn: Absolutely. It brings down the cost of capital because there is certainty. What we would like to see is the CfD term lengthened to reflect the lifetime of the projects, because at the moment there is a cliff edge after 15 years, which makes it difficult to price the projects and that leads to an increase in the cost of capital. If you increase the cost of capital, you increase people's bills. What we want to do is reduce people's bills, and by increasing from 15 years to say 20 to 25 years, it will not increase the burden on the Treasury because the long-term energy prices that we see will be higher than the prices that we are bidding for solar. Therefore it is just a mechanism to provide greater certainty and bring down the cost of capital.



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Chair: Excellent. Thank you both very much for this morning, very useful indeed, and doubtless we will probably see you at some point in the future. This is the way in energy.