



Select Committee on the European Union

Environment Sub-Committee

Oral evidence: North Sea energy co-operation and net zero

Wednesday 14 October 2020

10 am

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Members present: Lord Teverson (The Chair); Baroness Bryan of Partick; Lord Carter of Coles; Lord Cameron of Dillington; Lord Cormack; Lord Giddens; Baroness Jolly; Baroness McIntosh of Pickering; The Duke of Montrose; The Earl of Stair; Lord Young of Norwood Green.

Evidence Session No. 1

Virtual Proceeding

Questions 1 - 12

Witnesses

I: Barnaby Wharton, Director of Future Electricity Systems, RenewableUK; Martin Cook, Head of Business Development, National Grid Ventures; Dr René Peters, Business Director Gas Technology, TNO (Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek/Netherlands Organisation for Applied Scientific Research), and the North Sea Energy programme.

Examination of witnesses

Barnaby Wharton, Martin Cook and Dr Peters.

Q1 **The Chair:** Good morning and welcome to the EU Environment Sub-Committee. This morning we have an evidence session on North Sea energy co-operation, particularly in relation to our net-zero targets on both sides of the North Sea.

I welcome our witnesses, whom I will ask to introduce themselves in a little while.

I remind everybody that this is a live webcast and that a transcript will be made available to our witnesses. If there is any error in it, you are very welcome to point it out and we will make amendments.

I ask members of the Committee to ensure that they declare any interests when they first speak in the session. I am a trustee of Regen SW and of the Green Purposes Company, which has the green share in the Green Investment Bank. I also chair the Cornwall and Isles of Scilly Local Nature Partnership.

I ask the witnesses to introduce themselves briefly, perhaps starting with Barnaby Wharton.

Barnaby Wharton: Good morning. Thank you very much for having me at the session today.

I am director of future electricity systems at RenewableUK. We are a trade association for companies building a green electricity system. We have lots of members particularly in the wind sector and offshore wind, hydrogen, energy systems, services, cables, interconnectors and investors. In my role as director of future electricity systems, I am thinking about how the system as a whole can accommodate increasing volumes of renewable electricity.

The Chair: Thank you and welcome. Secondly, perhaps I may ask Dr René Peters to introduce himself.

Dr René Peters: Good morning. I am representing TNO, which is an applied research organisation in the Netherlands. I thank you for the invitation. It is an honour to be one of the witnesses before this Committee.

My organisation is looking at the Dutch sector and the North Sea sector and how energy transition can be facilitated on the road towards net zero. I am responsible for gas technology and hydrogen developments in the Netherlands, which in future will potentially be connected to offshore wind and has a lot of potential for energy transition.

The Chair: Thank you, René. Thirdly, and lastly, I ask Martin to introduce himself.

Martin Cook: Good morning and thank you. I very much look forward to participating in the debate today. I am the business development director

for National Grid Ventures. I have been in the energy industry for about 25 years, of which 20 have been with National Grid both here in the UK and in the US. In the past few years, I have been responsible for developing energy infrastructure projects in offshore wind, onshore wind, carbon capture and interconnector space both here and in the US.

Q2 The Chair: Thank you very much. We look forward to exploring a number of those things during our session this morning.

When all of us, or certainly those of my age, think of the North Sea we think not of renewables but of gas and traditional fossil fuels, which have certainly powered the UK economy and, I am sure, part of the European economy for some considerable time.

My first question is: how can energy projects in the North Sea, rather than add to our emissions, help the UK and neighbouring countries to reach net zero? What is that resource, and how will it help us to get going to meet that objective?

Barnaby Wharton: The most obvious way in which the North Sea can support net zero is through the deployment of offshore wind. Currently, we have around 10 gigawatts of offshore wind in the UK, of which about 7 gigawatts are in the North Sea. Similarly, around 8 or 10 gigawatts of Europe's 13 gigawatts of offshore wind are in the North Sea.

There are plans to expand that hugely. The Prime Minister spoke last week about how the UK could become the Saudi Arabia of offshore wind. Lots of that deployment will be in the North Sea. WindEurope estimates that we could have over 200 gigawatts of wind in the North Sea by 2050, so there is massive potential. The intention is that offshore wind, certainly for the UK, could be the backbone, as we say, of our power generation, with everything feeding through from that.

The other important aspect is the role of interconnectors between countries in the North Sea so that we can share that generation. When one country is generating huge volumes of power from wind, we can send that through the interconnectors to other countries that also need it.

Dr René Peters: It is clear that offshore wind is a main contributor to decarbonising energy, particularly the electricity part of the energy system, but we also have molecules to decarbonise, especially for industrial use but also for heating.

The North Sea can also play a role in the "molecule" part in two ways. One is to capture and store the CO₂ in the subsurface—in depleted gas fields or aquifers—to get rid of the existing CO₂ production from industry and the harbour regions. There are huge plans in the UK and in the Netherlands, and projects in Norway are ongoing.

The other relevant one is the future potential for hydrogen in the energy system. That could be very beneficial in decarbonising difficult parts of the energy system—high energy-intensive processes, high-temperature processes and the chemical industry where it needs clean feedstock for decarbonised production.

Hydrogen can be produced in two ways. It can be produced from natural gas with steam reforming, and then you have CO₂ capture as a way to decarbonise hydrogen production. It is called blue hydrogen. There are a number of projects planned in the UK and in the Netherlands.

Green hydrogen is a very attractive way to link offshore wind production with hydrogen production, because then hydrogen is being produced by splitting water into hydrogen and oxygen, and that uses green power from wind or solar to produce it. That can extend offshore wind beyond just decarbonising the power system and the molecules, and even export energy not via power cables but via pipelines to continental Europe.

I would like to add those options to the role of the North Sea in the energy transition.

Martin Cook: I wholly endorse the comments that have been made about offshore wind. It will probably be the largest source of clean energy that we will be able to provide to the UK and trade with Europe if we build connected systems.

To give scale to some of the technologies that have been mentioned, we are involved in a carbon capture project in Humber and Teesside that is designed to take carbon emissions from industry and store them in undersea reservoirs just up the coast. That in itself will cater for 50% of the UK's industrial carbon emissions. It is critically important not just on the electricity side but on the molecule side, as René says, that we exploit the North Sea to our advantage in meeting our climate change goals.

The Chair: That is all good news. Clearly, the North Sea will be a really important resource in all sorts of ways in meeting net zero, but what is the main barrier or problem that might get in the way of that? Would each of you be able to give me an example of something that we have to make sure we fix, or will there be a difficulty in achieving that?

Martin Cook: There are a number of very topical issues at the moment. The Energy Minister has just launched something called the offshore transmission network review to help us work out how on earth we get from where we are today with 10 gigawatts of wind installed to maybe 40 gigawatts by 2030, and beyond that to 80 gigawatts.

To date, we have almost exclusively been connecting wind farms in the sea to the shore in the UK on a point-to-point basis. Down the east coast of the UK, new connection points are coming in frequently. It will be impossible to carry on doing this when so many new connection points are required. There is no other way of doing it at the moment in regulatory and commercial regimes, and we have to get our heads around how we better co-ordinate the collection of power in infrastructure cables from all the many new wind farms that will be built over the next 10, 20, 30 years and bring it onshore in a much more efficient way. That is a big challenge for us.

The Chair: We hope to explore that later. René, what do you see as the barriers to achieving this?

Dr René Peters: In continental Europe, bringing all the offshore wind power into the electricity grid will create limitations on balancing, storage and even the capacity of the grid. We are looking at converting the electricity to molecules—hydrogen—and then it is much easier to transport it and bring it into the energy system.

We need more interconnection capacity to bring the wind power not only with a point-to-point connection back to shore but to transport it between different EU countries, thereby balancing and stabilising the system to a greater extent.

There are hurdles not only for wind. CCS is clearly a technology that can be realised only if there is policy support, because financially there is not yet a business case and regulations are not in place to enable hydrogen transportation or production in existing pipelines to shore or to interconnect to continental Europe. The infrastructure is not yet in place and the regulatory and policy scheme is not yet clear for hydrogen in the energy system.

Barnaby Wharton: I would endorse everything that has just been said. The UK offshore wind sector has lots of these sorts of barriers. We have groups working on the transmission issue, which has turned into the offshore transmission network review. We are also looking at environmental barriers and how we can deploy the volume that we need in the most environmentally sensitive and appropriate way. There is also ongoing work on aviation issues and how wind turbines and aviation interact. As we build more offshore wind, we need to keep all that in mind to make sure we develop in co-ordination with other sectors.

The other important thing is interconnector markets. If we want to build more interconnectors, we need to understand fully how those markets are going to interact. As these projects get more complex with multipurpose interconnectors and offshore wind farms connected to the same cables that are bringing power from different markets, the way in which those markets work and the energy flows will be really complicated. We need to understand clearly how that will operate, and that will be a real challenge.

The Chair: That is a good introduction.

Q3 **The Earl of Stair:** Wind utilisation in the North Sea is perhaps the best known of the green energy uses in the North Sea. Developing the potential of both hydrogen production and carbon capture is perhaps less well known. How far down the road are we to realising the low-carbon energy potential of the North Sea through both current and future planned projects?

Martin Cook: We are quite far developed in carbon capture and storage. We have not built any of it in the UK yet, but the Government are running a process for which, for all the industrial regions in the UK, plans

were submitted only last week to put projects on the table to capture carbon from each of those industrial zones. I think that at least two of those will be heading towards the North Sea in terms of where the carbon will be stored.

If things went well, we would hope that those carbon capture systems could be built and operational maybe in the 2026-27 period. At that point in time we start to store carbon in undersea reservoirs off the coast in the North Sea, enabling our industries to be decarbonising, which is massively important for the UK's economy, protecting jobs and making the UK industrial areas attractive for further industries to come to.

We have started the journey. There are some important steps for government to take over the next six months in supporting developers such as ourselves who are proposing these projects, but certainly some progress is being made.

Dr René Peters: If I may add a broader perspective across North Sea countries, carbon capture and storage has been applied in the Sleipner field in Norway. It is storing about 1 megaton per year of CO₂ in an aquifer, but many North Sea countries have plans like that in the UK mentioned by Martin.

In the Netherlands there are two projects, called Porthos and Athos, under development in Rotterdam and Amsterdam. Porthos will store about 2.5 megatons per year. It should start in about 2025, so it is in line with plans in the UK.

Denmark is also planning for CCS. It is still in the early phase because the only project running in the North Sea is Norway's, so we are still at the start.

On hydrogen, I think we are even further away. The first studies or initiatives have been announced in relation to Ireland, the Netherlands and Denmark. In the Netherlands, for example, we are planning the first pilot facility—the PosHYdon project—to test hydrogen production on an offshore platform with power from offshore wind. It is still only a 1-megawatt pilot, and for significant economic production of hydrogen from offshore wind we will have to move to about 1 gigawatt, which is 1,000 times as big.

We are at an early stage. I do not think it is a big problem, because for the next 10 years we will use all the offshore wind power to decarbonise electricity, as was mentioned earlier. The UK needs 70 gigawatts and the Netherlands about 10 gigawatts. We will not reach those levels before 2030, but beyond that we will definitely need power to gas and power to hydrogen to bring all the energy into the system. We are currently running pilots and have some plans for hydrogen, but we will definitely need it beyond 2030. That is the plan.

Barnaby Wharton: On the offshore wind side, we currently have about 20¹ gigawatts deployed in the North Sea. It is a lot, and the UK has half

of that. We are a global leader in offshore wind, but we are looking to get to 200 gigawatts by 2050 in the North Sea, so there is a long way to go.

On the floating wind side, we have only a couple of small pilot projects, and in the north North Sea that will be a huge opportunity. The Prime Minister announced a gigawatt target for 2030, but we need to reach much further than that.

On offshore wind, a lot has been done, but there is much further to go.

I reiterate the points about green hydrogen. The Gigastack project by Ørsted, Phillips 66 Limited and ITM Power is in development. That will be the first offshore wind hydrogen project, but we need to move much quicker and take advantage of that opportunity, too.

The Earl of Stair: We have heard about plans for the undersea storage of carbon in reservoirs. How practical is it to reuse existing infrastructure in the North Sea for hydrogen and carbon capture, or will it need a whole new infrastructure to support it when it is developed?

Dr René Peters: We are looking at it in the Dutch sector, because there is quite an extensive network as in the UK with existing pipelines for oil and gas production, which has come to an end, not technically but economically. Gas production is going down, so there is excess transport capacity for the existing pipelines.

There is a technical question about whether the pipeline material can allow for CO₂ or hydrogen. It seems to be the case for both CO₂ and hydrogen, although for CO₂ it must be extremely dry so you do not have corrosion problems. For hydrogen, embrittlement is an issue, but it looks like the material of the pipelines in the North Sea, at least in the Dutch sector, is capable of handling hydrogen.

The second question is: are these pipelines in the right location to connect to offshore wind parks, and are they available at the right time when the offshore wind parks will start to produce hydrogen? For CO₂, are they connected to the right gas fields that are available for storing it? In the Dutch sector it looks like there are good opportunities for the combination. I expect that it is similar on the UK side, but I leave that to the other witnesses to discuss.

Martin Cook: On the offshore facilities, the answer is that we can reuse previous facilities, or at least there is a plan to do that for the Humber and Teesside project, where we would take the carbon out into the sea. Some new infrastructure will be required to build platforms to inject the carbon down into the reservoirs, but the reservoirs are there from previous use and can be reused. They may need expanding at certain points in time, but we have a lot of natural existing assets that we can utilise efficiently in order to do this.

The Earl of Stair: Mr Wharton, do you have anything to add?

¹ Mr Wharton subsequently clarified that this figure is 17 gigawatts.

Barnaby Wharton: Not on the gas transmission side; it is not my area of expertise.

The Duke of Montrose: If we are talking about future projects, where does marine energy fit in?

Barnaby Wharton: Marine energy is an important part of the mix. The best places for marine energy are where tides are strongest, and that tends not to be in the North Sea. Orkney is a great location for marine energy. It is just on the edge of the North Sea, and we have seen some world-leading projects there. For the UK, for marine energy we are looking down the west coast—Wales, the Severn channel and those sorts of areas—rather than the North Sea itself.

Q4 **Lord Cameron of Dillington:** My question is about international co-operation. I have two questions, one based on international co-operation generally and the other related strictly to energy.

I was on this Committee about five years ago when we did a survey of the North Sea and discovered that it was one of the most highly used bits of ocean in the world. At that time, almost 600,000 people were involved in the oil and gas sector; 100,000 people were involved in fishing; the cargo trade accounted for 650 million tonnes per annum and employed about 60,000; and the ferry and cruise industry, which has probably all gone now, employed 10,000 people. There was also aquaculture and prospects for mining and gravel extraction, as well as all the energy stuff in which you are involved: wind farms, cables, CCS, hydrogen plants, converter stations and grid connections. You also need an enormous amount of space for the environment, in particular sea birds. It is important always to remember that.

Not all these activities are necessarily compatible. For instance, beam trawling for fish and bottom-dredging and cables clearly do not go very well together.

What overall planning is being done in the North Sea? I see that the North Seas Energy Cooperation initiative has a support group that is looking at maritime spatial planning. How is that going?

My second question goes back to energy in particular and the advantages that we can get from international co-operation within the energy field. I do not know whether Dr René Peters could answer the first question.

The Chair: Before we go into that, may I remind everybody that Baroness McIntosh will be coming in on the North Seas Energy Cooperation initiative specifically in the next question, so we will do the rest of it?

Dr René Peters: Let me focus on the multiple uses of the North Sea for different functions, because that is part of the question. The North Sea is the most intensively used area of sea in the world, and that holds true specifically for the Netherlands near Rotterdam harbour, as you can imagine. We want to have a very good balance between the economic

function, energy production, fisheries and the role of the North Sea in our food production, but also the role of nature that you mentioned.

In the past, the North Sea was planned in different sections and each section had its own function. There was an area reserved for shipping, for fishing, for nature functions and for energy production, oil and gas or wind. That does not fit any more with all the future plans that we have for the North Sea with the growth of the energy function, but also with the increase in shipping. I am thinking about new routes going through the Arctic that require new space for shipping.

The current development, at least in the Dutch sector, is that we look at multiple uses of the North Sea. We look at combining functions in North Sea areas for multiple use. For example, if you develop wind parks, that excludes shipping or fishing from the area, but it could be combined with nature preservation. It could even strengthen nature functions. Something like seaweed production could be allowed in those areas, or even floating solar, which has been studied as an alternative use. That could be combined with the wind parks, and even oil and gas and wind production could be combined in certain circumstances.

We are trying to look more towards combined functions in the marine space to optimise the use and leave sufficient space for nature and ecological functions. That is our view.

Lord Cameron of Dillington: Would anyone like to have a go at the general question, or should we revert to the advantages of co-operation on energy?

Barnaby Wharton: I will say just a couple of things on the planning side.

The Crown Estate, which is responsible for managing the seabed, runs a pretty rigorous planning and seabed management process. We are currently going through the fourth leasing round for offshore wind. In that process, the Crown Estate has looked at the entirety of the UK's seabed and has excluded certain areas and whittled it down to the areas that it thinks are appropriate for wind, leaving the other areas for other uses. We have a pretty good process. If you look at the North Sea as a whole, even if we do build out to 200 gigawatts, that is still a very small proportion of the whole area under use. It needs to be managed carefully, but all these things are compatible if we do it properly.

Lord Cameron of Dillington: What about the advantages of international co-operation, Martin?

Martin Cook: I am happy to.

Baroness McIntosh of Pickering: I will turn to that in a moment.

The Chair: We are coming to that particular initiative, but I think there is a broader question to be answered here which Lord Cameron has asked.

Martin Cook: If we take the much-held vision on where we are heading to exploit the North Sea for clean energy, we are heading in the electrical space to a North Sea grid. We are really at the beginnings of that today. That involves optimising and making the most of it at the lowest or best cost and designing it efficiently. If in that mix there is, as there will be, a lot of interconnection between ourselves and our European neighbours, there has to be a lot of co-operation from a spatial perspective. Which parts of the sea are we using to do this? From a regulatory and technical perspective, because bits of equipment need to talk to each other, and from a commercial perspective how do we design sensible economic models to make sure that power flows to the right place at the right time? It is absolutely essential that we have a means of co-operating on all those fronts to achieve what we want to achieve in the most efficient way.

Lord Cameron of Dillington: Does anyone want to add anything to that; otherwise, I will surrender the podium?

Barnaby Wharton: On the point Martin made about dealing with it in the most efficient way, I absolutely agree with everything he said. If we want to build the cheapest and most efficient system where power flows in the best way, we need co-operation to minimise costs. There are some really interesting numbers out there about how much money you can save if you have interconnected multipurpose projects rather than just the point-to-point projects we have talked about. It saves billions of pounds and that will only be a benefit to consumers.

Dr René Peters: You may be aware that the European Commission has initiated a plan to develop a European Hydrogen Backbone that connects most of the industrial customers and the main demand centres for hydrogen for the future with large-scale hydrogen gas transport to grid. I think that grid would also extend in the plans to the UK and Norway across the North Sea, and strong collaboration is also needed to make development of this Backbone grid possible.

Q5 **Baroness McIntosh of Pickering:** I am president of National Energy Action, which is trying to achieve warmer homes and to tackle fuel poverty. I am also half Danish, so I take a close interest in anything to do with the North Sea.

René, will you tell us a little about the co-operation under the North Seas Energy Co-operation initiative and what you think the impact is of the UK being excluded? Could you give a little of the background to why we were excluded, even though you have given a good number of reasons in responding to Lord Cameron's question about why intergovernmental co-operation is so important?

Dr René Peters: I think that the collaboration on the North Seas initiative was undertaken in 2016 or 2017. I looked at it yesterday. It states that it has the ambition to facilitate future interconnections and market integration for energy from the North Sea. That is already happening. Just a few weeks ago I saw the announcement that TenneT,

which is a Dutch TSO, wants to set up an interconnection with National Grid in the UK. That interconnects a future wind park far offshore via interconnectors to both the UK and the Netherlands. That is what will be needed in the future to make the system most cost-efficient and create a stable energy system in north-west Europe. This collaboration actually facilitates that. It is to set up common standards and align regulations, policies and markets to make it happen.

That collaboration is really valuable if we want to accelerate the low-carbon energy options for the North Sea and create better interconnectivity. That is not just for power or electricity from offshore wind; it is also for CO₂ storage. These will initially be point to point from the mainland, but the Northern Lights project in Norway, for example, wants to collect CO₂ from North Sea countries and needs cross-border transport of CO₂.

As I mentioned earlier, we need cross-border transport of hydrogen. If the UK wants to become a hydrogen producer for north-west Europe, we need to put in pipeline interconnections. I think that the North Seas Energy Cooperation helps to get the regulations and harmonisation in place and the learning from different countries with similar ambitions. It was really helpful to maintain the UK on board for that collaboration.

Baroness McIntosh of Pickering: Martin and Barnaby, are there downsides to the UK no longer being part of that Cooperation?

Martin Cook: I think there are. We were directly involved in the North Seas Energy Cooperation earlier this year, but clearly we are not now. As René points out, we have very strong business-to-business relationships with our European partners. We have joint ventures with Norway, Denmark, Holland, Belgium and France, because we own and operate interconnectors between the countries. Therefore, we have been able to get on and carry on developing projects such as the one René referred to, which is a multipoint interconnector between Holland and the UK.

However, there is a lot of regulation about large infrastructure projects, so a lot of common regulation is required to make an end-to-end system work together. Businesses can do so much, but we do need the support on both sides of the North Sea in making sure that there is a harmonised connection on a trading and regulatory basis, so it is very important.

We are hoping that once we get through Brexit and whatever happens we will return to that picture, but it is still very important no matter how well we work together on a business-to-business basis.

Barnaby Wharton: I absolutely agree. We want to build a more interconnected system. It is the most efficient and effective way of managing power. If we are generating lots of wind, being able to send that to Europe, or to bring Norwegian hydro to the UK when the wind power is lower, is really important for a cheap low-carbon system. Not being part of these conversations just slows down the regulatory process

and adds unnecessary complexity into the mechanics, I guess. Therefore, not being part of the co-operation risks making it a little bit less efficient. As Martin says, hopefully when the dust has settled on the current situation, we can get involved again and make it much more effective again.

Baroness McIntosh of Pickering: Carbon capture and storage has been a political priority since 2010, and clearly it must be the lack of funding that is hampering it. To what extent has the collapse of energy prices pushed back the actual investment?

Barnaby Wharton: CCS is not my area of expertise. I used to work at the CBI when I had to cover some of these issues. We have seen variation in the political priority of CCS. There was funding and I think it was cut in 2014 or 2015 for a specific project, but I will hand over to Martin, who knows much more about this than I do.

Martin Cook: This is probably the third time around on CCS in the UK. I think that the main change is that the climate change targets are staring us in the face. Funding has been put aside this time round, which we believe is sufficient to incentivise developers like us to start to build carbon capture and storage systems.

The main difference this time round is that if we are serious about decarbonising some really hard areas to decarbonise, such as industry, CCS has to be built in the next decade.

The Chair: You mentioned the agreement in principle between National Grid and its Dutch equivalent in joining up fields. When I read it, it was not likely to happen or to be implemented until 2029. Why does it take nine years just to tie two bits of cable together under the sea? I do not get it.

Martin Cook: We ask ourselves that question time and again. Essentially, eight years is about the timescale, and seven years if you are lucky, to start to build and finish an interconnector. On both sides, in the UK and in Europe, there is a lot of planning and consenting to do. There are lots of things to do. Planning and consenting are quite a driver of the time it takes to permit the large cables crossing between the UK and Europe.

Sometimes the landing areas in some of our European partner countries are not on the beach; they are quite a long way inland. Our project in Denmark is a good example. It goes quite a long way inland across protected areas of land in Denmark to get to its transmission system.

That is probably one of the major factors that mean that these things take time. It is also a very topical point, because that will be a key feature of how quickly we are able even to connect offshore wind, because satisfying residents of the UK and European countries that we are building these in an efficient way so as not to cause too much disruption is an important thing.

Interconnectors are very, very big projects. It probably takes two winters to drop the cables into the sea, so they are very long projects with some very serious electrical equipment required to build them. We build them as fast as we can.

The Chair: That is really interesting. I find it depressing that these things take quite as long as they do.

Q6 Baroness Bryan of Partick: The EU has said that energy matters, including offshore wind, will be addressed as part of the negotiations on the future relationship, but stakeholders have said that, regardless of the outcome, energy co-operation in some form with other North Sea countries will be vital for us to meet our net-zero targets. What working relationships are needed to support co-operation between the UK and other North Sea countries?

Barnaby Wharton: As has just been said, there are good bilateral relationships between transmission operators, and the TenneT-National Grid project is a great example of that. Those will continue. Most of the companies involved in offshore wind or interconnections are part of global companies and have projects all over the place.

Within that, on the governmental side there are various forums that can operate. There is ACER, which is the Agency for the Cooperation of Energy Regulators, and ENTSO-E and ENTSG, which are the transmission operators on the electricity and gas side. There are various forums around that facilitate the discussions we need.

There also needs to be intergovernmental co-operation, because the regulatory and market frameworks in which all these projects will be operating are absolutely essential to the most efficient functioning of the system. There are groups around; they do exist. This will be very important because, when the dust settles on the current negotiations, we can engage with those fully again.

Martin Cook: I would echo that. I think Barnaby has covered most of what I was going to say. We have very strong business-to-business relationships and some very strong industry forums that have a common goal in mind, mainly populated by businesses and interested parties, but in order to get the co-ordinated, integrated system that we have been talking about today as part of the vision of a North Sea grid, regulators and Governments need to be talking to each other.

To give some practical examples, we need to be co-ordinated on timing, investments, regulated models and trading platforms. Those things need to be co-ordinated to optimise the system that we are going to build. That is essential, because billions of euros and pounds will be invested in this. It is very important not just for the businesses to work together but for the regulators and Governments behind those businesses to be synchronised in what they are trying to do.

Dr René Peters: On top of that, one aspect to mention is that it is very valuable to harmonise and align standards and regulations for the

operation of offshore installations related to safety and certification of equipment, which is sometimes different between the UK side and Dutch side. It means that equipment is allowed to be installed in offshore areas on the Dutch side but not on the UK side, or people are allowed to work with the right training and certificates on one side but not the other, or they are allowed in oil and gas but not in the wind sector. There would be a real benefit if there was harmonisation and alignment across countries.

Q7 The Duke of Montrose: We are supposed to declare interests: mine are pretty minor compared with what we have been talking about. I own a large blanket bog, which is part of this regeneration exercise, and a small farm-based hydro-electric scheme.

We have been discussing very much the question of co-operation through industry forums. I do not know whether there is any more to be said about that.

I have a query about green energy. Orkney will need a massive interconnector down the east coast of the UK. Should that not be integrated into the system of interconnectors that you are talking about?

Barnaby Wharton: Absolutely. The Government have launched the offshore transmission network review, and part of that will look at how we can integrate wind farms with bootstraps carrying power down the east coast, and interconnectors with other countries. The way we are doing it at the moment on a project-by-project basis is clearly not going to work, as Martin said earlier, so they absolutely need to think about all that. We will continue to press the Government to ensure that they do, as we work through it.

The Duke of Montrose: I do not know whether it will have any effect in the Holland situation, but it will all be part of the network.

Martin Cook: I see this developing not in two phases but certainly in the first phase of the next 10 years. We have some ambitious climate change targets, and we have some existing regulatory mechanisms under which we can make some progress toward integrating what we do offshore.

As Barnaby says, the Energy Minister's offshore transmission network review can stand back a little and ensure that in the longer term we look at how we design a system that is truly integrated and can integrate assets such as the ones that you mentioned.

There is a need to get on and use some of the mechanisms that we have today—to start to make progress—and a need to stand back and look at what a long-term, fully integrated system might look like. If we need to change the way we do things more fundamentally, we have time to do that to ensure that it is ready for future years.

The Duke of Montrose: Is there any idea on offer about when we will see the government review?

Barnaby Wharton: The timelines are tight. The aim is for the review to conclude by the end of next year so that it will be able to feed into

projects that are happening now. There is a lot of work to be done and I think we will have a very busy 2021 looking at this. There is a lot to look at.

It is important to stress that while the review is ongoing, and hopefully will produce a new regime for protects in future, we have a huge number of projects that are being thought about and developed now that we need to crack on with. There is a risk that if we pause everything while we wait for the review to conclude, given the timelines of the projects that we have talked about already, we could push back projects into the 2030s and miss some of those very important targets. We need to crack on with the review and get that concluded, but we also need to crack on with the projects we have in progress already.

The Chair: May I ask one of you to answer this? Obviously, we have issues with governmental co-operation at the moment, partly because of the Brexit process, but working across the North Sea with business forums, does that still work, and is that effective? May I ask one of you to answer that very briefly?

Martin Cook: I would say yes, it does. I do not think the lack of formal co-operation has slowed us down yet, but because we are facing a need to change the way we do things in the near term, at some point that dislocation will slow things down. It has not yet. Many of the new ideas in multipurpose interconnectors, and in bringing offshore wind and interconnectors together, are in the design and development phase. If we were saying the same thing and we did not have a replacement for co-operating in 12 to 18 months' time, that would start to be a problem.

The Chair: Thank you.

Q8 **Baroness Jolly:** Clearly, you have to establish working relationships, but how best can the UK's regulatory regimes facilitate joint energy projects connecting the UK and other North Sea countries? That is the first part of the question. The second part is: what other conditions are needed to facilitate these projects?

Martin Cook: The UK regulatory regime so far, if you think about offshore wind and interconnectors, has been very effective. We have enjoyed what is called cap and floor for interconnectors, and we have used contracts for difference for offshore wind farms, with a subsequent process for the transmission cables. They have been very effective.

The way we tend to join up with European regulation for interconnectors is that we create a regulatory regime with Ofgem and our partners in Europe so that when power flows there we do not have any dislocation of trading. That has worked very effectively.

If we suffer from a lack of co-operation between regulators going forward, that will be a problem, but to date we have had very sensible conversations in aligning regulatory models between ourselves and our European partners. They do not always have to be exactly the same, but we need to talk about how they work together.

Going forward, those two instruments could be good for a little while in starting to make progress in integrating energy offshore, but probably through the offshore transmission network energy review we will have broader, bigger vision of how a different European-wide regulatory system might work, which will need co-operation from regulators around Europe. That is where we are at the moment.

Barnaby Wharton: Martin has covered most of it off. As we said previously, if we are going to make this as effective as possible, co-operation between regulators to align the regulatory regimes and markets, to ensure the markets work, will be really important. Again, it all comes back to whether we can make this as efficient and cheap as possible to consumers, and co-operation will be essential to that.

Baroness Jolly: The main question was all about regulatory regimes, but what other conditions are needed to facilitate joint projects?

Barnaby Wharton: One thing we need to think about is the wider benefit to the whole of Europe. It is very tempting to look at the bilateral conversations between, say, the UK and Norway, or the UK and France, to build interconnectors and multipurpose interconnectors, but there is a wider European benefit as well, by having a more integrated Europe-wide system.

We need to look at who pays for and supports some of these projects as well. The way in which we finance European projects of common interest and whether there is funding from elsewhere that can be used is an interesting area to look at.

Dr René Peters: That is probably a perspective that is relevant, because we are talking about cross-border infrastructure—grids or pipelines. The other thing is whether the electrons or molecules are allowed to cross the border when they are still subsidised by additional funding. At the moment, that is still a limitation. All countries across Europe require the subsidised green power or energy to be imported back to the country itself and cross-border transport is not yet allowed. That is another aspect. It is not just the hardware. Permission to transport the energy, either in electricity or molecules, across borders if it is produced in one country and moves to another is still something to change.

Martin Cook: The good news on the conditions necessary is that we have pretty much aligned climate change targets, and that drives us to do things in step. That is one of the conditions where we are pretty much aligned with Europe.

Another working-level condition means that through our European relationships we have been able to have common environmental impact assessments. For us to take a cable from the UK to Denmark, we have to go through four territorial waters. We have to do significant environmental impact assessments, and we co-ordinate and collaborate on those as well. Those are the sorts of things that make projects more or less efficient.

The Chair: Thank you. We will move on to environmental assessments with Lord Giddens.

Q9

Lord Giddens: Good morning and thank you for your illuminating answers so far. I think that Lord Cameron mentioned sea birds. All forms of energy production in marine environments, including wind farms as they proliferate, can have negative effects on flora and fauna. How can the UK work best with other North Sea countries to manage and sustain a proper ecological balance? Would you like to comment on the possibility of having close relationships with Norway, which is in a very interesting position because it has been hugely dependent on oil but has very profound environmental aspirations at the same time.

Barnaby Wharton: The UK has stringent environmental legislation, and the process that wind farms go through is pretty strict. There is one thing we should think about. If you look at the leasing process for offshore wind, as well as doing project-by-project environmental assessments, the Crown Estate, once it has all the bids in, looks at a plan-wide assessment of the projects. We can look at that on a European basis. We know broadly where we are going to go and what we want to do with the development of the North Sea and the energy infrastructure there. Having a process to look at that overall plan as it develops over time will be really critical. That will require co-operation and discussion between different regimes.

Lord Giddens: How would you see that progressing more concretely? We would not want to undermine certain environmental objectives while pursuing others. I would see this as a pretty huge issue of ecology that all the North Sea countries will face because they are simultaneously trying to do two things: transform their energy system, but not undermine the wider natural system.

Barnaby Wharton: I absolutely agree, and that is why we have pretty strong regulatory requirements in the UK and across the rest of Europe. The EU has pretty impressive goals on both fronts. Norway is not part of the EU but is very serious about this. Everybody is aligned in their desire to balance the development of a clean energy system with protecting the wider environment. It is worth bearing in mind that we are doing this to address climate change and to protect the bigger picture, too.

It is an incredibly complex picture, but we are all aligned on our goals, and already we have pretty rigorous assessments. You can see that through the consent and leasing process. As has been mentioned, it takes so long because these things are looked at in detail and get heavily challenged as well.

We have a pretty robust system in the UK, and it is a question of ensuring that we align and think about the bigger picture with our European partners. That will require a lot of conversation and discussion.

Martin Cook: We have aligned with Europe on some of the major instruments that ensure that we take account of the environment. There

are EU-wide regulations on ensuring that we do environmental impact assessments.

The example I gave about us building interconnectors between the UK and Denmark was subject to all those things, so it is common and quite strict, as Barnaby says—regulations that we have to adhere to.

The EU Habitats Directive is another instrument that we follow. They have worked well, and I cannot see why we would not carry on using something like that in the future when we are not part of the EU going forward. They are very strong.

It is a crowded space in the North Sea, as was mentioned earlier, and I guess that through the Crown Estate and the planning process we have to make the most efficient use of the space that we are taking up to minimise the disruption.

Dr René Peters: Perhaps I can extend it a little bit.

Lord Giddens: Perhaps you could also talk from a wider European point of view. It all overlaps with the Green Deal, because you have to sustain the whole body of environmental objectives; you cannot separate them out.

Dr René Peters: Yes. I would also like to stress that of course the North Sea is not only an area that we can use for our energy supply and decarbonisation objectives; it is also an ecologically sensitive area. It is not just about CO₂ emissions or greenhouse gases. It is also about the ecology below and above sea level that is affected by the energy transition.

There are still the CO₂ and methane emissions from the existing oil and gas infrastructure. In the Netherlands, we are especially concerned about bird migration routes from UNESCO-protected areas in the north. They go exactly along areas where we are planning offshore wind parks, and this might threaten these bird migration routes. Even below the sea, the installation of offshore wind parks produces noise during the installation that is affecting mammals and sea life.

We are taking precautionary actions to prevent strong impacts. We are looking at it from a broader perspective. You mentioned Norway, which is of course keen on continuing to produce its oil and gas reserves, and even developing new areas in the north, which are naturally environmentally sensitive. At the same time, it is very keen on expanding its CO₂ storage option to balance total emissions. To realise the Green Deal, we need these carbon emission reduction options, and the North Sea plays a key role.

I should also mention CCS, which was mentioned earlier. In previous decades, it was seen as an end-of-pipeline solution for industry. It is now also seen as a solution to introduce blue hydrogen into the energy system—not an end-of-pipe solution but a pre-combustion solution to start the hydrogen economy before green hydrogen enters the market as

an economic system. CCS is now also considered as an accelerator for starting the hydrogen economy, and it is important to realise it for the North Sea areas and to realise the Green Deal.

Lord Giddens: We are a bit pressed for time. I would like to pursue it, but I will defer to the Chair. Thank you very much.

The Chair: There is one thing I want to follow up from that with René, if you do not mind. You mentioned this conflict, particularly with migratory birds. Very briefly, is there a solution to it, or will it have to be one or the other?

Dr René Peters: Two solutions are pursued in the Netherlands. One is to take the bird migration routes as a selection criterion for new wind park areas and try to exclude areas where bird migration routes are known. That is one.

The other option is that, because bird migration takes place in limited periods in the year, there is technology under development to identify the start of bird migration so that we can stop the production of offshore wind for a short period to allow bird migration to happen and not to be affected by offshore wind turbines. Of course, that affects the production of offshore wind, but it could be a way to handle it. Those options are both being pursued.

The Chair: That is very interesting.

Lord Giddens: There are huge issues with bird migration. That is certainly the case, so thank you for the question.

Q10 **Lord Young of Norwood Green:** I will be brief, because I am pushed for time.

The UK's and the EU's draft texts for a UK-EU agreement both refer to co-operation in the development of offshore energy. The wider UK-EU arrangements for electricity trading will also significantly shape the possibilities for co-operation on electricity transmission infrastructure, which you talked about already. If the UK and EU agree to use a form of algorithm-based trading for electricity, a more efficient development of grid infrastructure would be possible. Will you comment on that?

How could the UK-EU future partnership agreement and other UK-EU treaties shape the possibilities for co-operation? What should the EU and UK be aiming for in the UK-EU agreement to enable the best use of the North Sea for net zero?

Martin Cook: We have enjoyed the harmonisation of trading across our interconnectors for a few years now. As a result of Brexit, we will be leaving the IEM, which is the market mechanism that is used now. There is a substitute for that and it is adequate for us to carry on doing it. We are hoping that, in future, we can work our way back to a more harmonised trading platform. That basically enables the efficient transmission of power between countries, so it creates the right incentives and signals. The power ends up in the right places at the right

times because we have a common platform for trading electricity. That is really important. It does not seem to be in anybody's interests to dislocate that, so we hope this is just a blip.

Lord Young of Norwood Green: To press you a little, will it be algorithm-based trading? Will that be the future? Will it enable us to meet a net-zero objective?

Martin Cook: I am not sure about your first question on whether it will be algorithm based. Basically, we are using the regular electricity trading mechanism that most traders use. The power trading between two countries obviously depends on power prices in the various countries. That is how that works.

We will achieve, I think, a better and lower carbon generation mix for consumers by installing and deploying and developing clean energy technologies in each one of the countries. Both the UK and Europe are on the same track to meet our climate change targets. We will benefit from lower carbon generation by installing more offshore wind, by building carbon capture and storage, by all our European partners doing exactly the same and us exploiting the North Sea. I do not anticipate, unless there were some real skewed incentives in a new trading mechanism, that that would hold us back.

Lord Young of Norwood Green: Is there any brief comment from Barnaby and René?

Barnaby Wharton: The only point I would add is that, in future, we want to be able to have trading in energy as close to real time as possible. The risk is that, if we go backwards, it is a day ahead trading, while power fluctuates by the instant. The desire to move back towards trading of energy in as close to real time, and as efficiently as possible, is a really important ambition that we should keep our mind on.

Dr René Peters: In general, a partnership that enables the cross-border transport of power—hydrogen, gas, CO₂—is of mutual interest to realise future ambitions in both the UK and the EU, so it will benefit all.

Q11 **Lord Carter of Coles:** What else can the Government do to ensure the best use of the North Sea in the journey to net zero? In the interests of time, perhaps you will focus on incentives. René raised the whole issue of the level playing field. Secondly, a question was touched on regarding planning and consenting.

Dr René Peters: I thought about this. I mentioned that the level playing field is extremely important for the future development of offshore wind and CCS and hydrogen. All the North Sea countries are developing national hydrogen strategies. The UK is working on that. It would be great to have it and to develop it. It would give a clear direction to industry on how to move forward.

We have discussed already the strong need to develop and stimulate strong interconnections, the potential for reuse of infrastructure, and

perhaps gas infrastructure to build new interconnections between the UK and the Netherlands. I would stress again the harmonisation of the rules and regulations in the offshore sector in the broader context. Those are the three items I would like to mention.

Lord Carter of Coles: Martin, in your comments perhaps you could address taxation and the incentives that you think are necessary to drive this more quickly.

Martin Cook: So far, the evidence on the regulatory commercial instruments that we have used for offshore wind is that they have been very successful in driving prices down, probably lower than we all anticipated. We use incentive mechanisms for procuring offshore wind—contracts for difference. They protect the offshore wind industry. Barnaby will have more to say about this. The evidence is that they are increasingly driving down prices to very competitive levels.

We have the right instruments in place to encourage that. There is more efficiency coming into the market. Turbine production and installations are becoming more efficient. We are on a good track. Certain European countries have got to the point where no subsidy is required. They have competitive market prices for renewable energy. That is true. We are in a strong trajectory there.

The challenge now is to bring even more of it on and build the infrastructure to bring it on to the shore in both the UK and Europe. There, we face issues. I talked about it earlier in the discussion. We are looking at many, many landing sites in the UK, unless we find a better way of doing it. There will be planning objections unless we do it more efficiently, so we probably need a new long-term model to support the build-out of the offshore grid to support all the offshore wind coming. That is one big issue that hopefully will be tackled by the offshore transmission network review. Those are probably the two things I would mention at this stage.

Barnaby Wharton: To draw on Martin's point, CFD has been an incredibly efficient way of bringing forward new wind farms in the North Sea. It is being looked at by other countries. We need to continue that and continue to drive the efficiency of wind farms in that way. We need to ensure that is aligned with our European partners and their market mechanisms, to ensure that everyone is competing, as you say, on a level playing field.

The transmission review will be very important in facilitating a more sophisticated offshore grid, which can integrate all these different projects in a way that reduces costs and reduces the impact on both the environment and on local communities where the landfalls happen.

It is important with all this that we bear in mind the fact that we are trying to build wind farms and that these are commercial bodies delivering them. We need to keep in mind the commercial risks as well as

the incentives to building out. Enabling more projects to come forward is really important. It is not just about building a grid for the grid's sake.

My final point is that government needs to lead on this. The TOs and wind farm developers are all doing it, but there needs to be a long-term strategy from government to identify where the projects are and how it operates across Europe. Government ownership and leadership will be critical over the next two or three decades.

Lord Carter of Coles: A very clear and well-made point. Thank you.

The Chair: Thank you, Lord Carter. There were some interesting points there. We are all waiting for the Energy White Paper and the hydrogen strategy in the UK.

Q12 **Lord Cormack:** I would like to direct my question in the first instance to Mr Cook, but I would welcome other comments.

The Prime Minister has recently reiterated a pledge issued in 2019 that by 2030 every home in the United Kingdom will receive its energy needs through offshore wind power. Is this a realistic aspiration or is it just starry-eyed idealism?

Secondly, is it affordable, because it has recently been said by an organisation called Aurora Energy Research that this would cost at least £50 billion? I would be grateful for brief comments, starting with Mr Cook, from all three of our witnesses.

Martin Cook: The target that the Prime Minister mentioned in that statement last week, or the week before, is our ambition. It is the ambition to build and to triple around 30 gigawatts of wind to the UK system in the next 10 years.

The challenge that we have to ensure technically that we could power every home is that the wind blows when the wind blows, and we would need storage facilities to store wind to ensure that it was available at other times of the day. Other technologies will probably need to develop in time with this to meet that ambition, but that ambition itself is absolutely what the industry is lined up to do.

Going back to the previous point, the evidence so far has been that offshore wind prices have been coming down and are very competitive against other generation technologies. I am not sure exactly which report that is from Aurora, but it is a very respected entity.

The billions required to build this are true, but essentially at the moment they are being delivered through private sector funding, albeit with some mechanisms to protect the offshore wind farms as regards the CFD. Our interconnectors are private-sector funded by ourselves with an allowed return. Those billions are being put in by the private sector, and, to date, the result of running those interconnectors between us and Europe has led to lower prices for the UK consumer.

There is a lot going on in that statement and that comment, but there is a lot of strong commercial protection in the way we have built our processes in the UK. The Government and the regulators have delivered some pretty strong competitive instruments to control prices, and the evidence to date is that they have been successful.

Lord Cormack: Thank you. Do the other witnesses wish to add to that?

Barnaby Wharton: Martin has been pretty clear. The first part, the ambition of 40 gigawatts by 2030, is deliverable. It requires a lot of work from industry and government to enable it to happen, particularly the transmission side that we have talked about, but industry is definitely up for it.

It is absolutely doable in system management. The role of interconnections and flexibility with other markets and storage—both short term through batteries as well as longer term potentially through hydrogen—will also be critical to that. A lot of my work is on that system flexibility and management. I think they are all eminently achievable.

Finally, as Martin said on the costs, these projects are funded by the private sector, and the costs are recouped over the lifetime of the project. Those costs are very low. We have seen the CFD delivering projects at potentially market prices, if not below. Although the whole number looks very big, when you look at it over the lifetime of the projects and the cost of the energy, it is very important.

Dr René Peters: I would add that the ambitions are aligned with Dutch ambitions that in 2030 all the wind power offshore should be able to decarbonise the electricity system feeding the power grid and decarbonising homes. The latest wind parks in the Netherlands were tendered without subsidy. I must say that that is excluding the grid. The grid is socialised and developed by a TSO, TenneT, in the Netherlands, but wind parks were tendered without subsidy.

There must be a tenfold capacity in 2030 compared to today, moving from 1 gigawatt to 10 gigawatts, so it is quite ambitious. The big challenges will be thereafter, where balancing the grid and the grid capacity as such will create challenges, probably similar to the UK. That is where the molecules and the hydrogen potentially will come in to balance the system and to get the energy in the grid not only in electrons but in molecules. We are very similarly aligned in our ambitions and our challenges between the Netherlands and the UK.

The Chair: Thank you very much. That ends this session on a high note. All I can say, following Lord Cameron's comment, is that we will have a very crowded North Sea in 2030, let alone in 2050. Barnaby Wharton, Martin Cook and Dr René Peters, may I thank you very much indeed for being witnesses this morning, and taking us through what is a very important area for decarbonisation for our futures, but not always one that gets the coverage that we would like? I am sure this session will start to put that right. Thank you very much indeed.