HOUSE OF COMMONS

Energy and Climate Change Committee

Oral evidence: Future of carbon capture and storage in the UK, HC 692

Wednesday 20 January 2016

Ordered by the House of Commons to be published on 20 January 2016

Watch the meeting

Members present: **Mr Angus Brendan MacNeil** (Chair); **Tom Blenkinsop**; **Mr Alistair Carmichael**; **Glyn Davies**; **James Heappey**; **Matthew Pennycook**; **Mr Jamie Reed**; **Antoinette Sandbach**; **Julian Sturdy**

Questions 1-67

Witnesses: ***Richard Simon-Lewis***, Financing Director, Capture Power Ltd, ***Professor Jon Gibbins***, Director, UK CCCS Research centre, ***Luke Warren***, Chief Executive, Carbon Capture and Storage Association, ***Chris Littlecott***, Programme Leader, E3G, and ***Neil Kenley***, Director of Business Investment, Tees Valley Unlimited, gave evidence.

Q1 Chair: Welcome to this session of the inquiry into carbon capture and storage by the Energy and Climate Change Committee. May I ask the witnesses to introduce themselves? We have a large panel this morning, so as they are giving evidence, I ask witnesses perhaps not to repeat evidence that someone else has given. We have a number of questions that we plan to get through, and we would be grateful for brevity from the Committee and from the witnesses, while still hitting the points that we need to hit. I ask the witnesses to introduce themselves, starting on my left.

Professor Gibbins: I am Jon Gibbins, director of the UK CCS Research Centre and a professor at the University of Sheffield.

Chris Littlecott: I am Chris Littlecott, programme leader for fossil fuel transition and CCS with the climate change think-tank, E3G. I am also a policy research associate with the Scottish CCS academic network and a member of the advisory council of the European technology platform on CCS.

Richard Simon-Lewis: I am Richard Simon-Lewis, financing director and head of finance for Capture Power.

Luke Warren: I am Luke Warren, chief executive of the Carbon Capture and Storage Association, which represents the CCS industry.

Neil Kenley: I am Neil Kenley from the Tees Valley local enterprise partnership, representing the Teesside Collective.

Q2 Chair: Panel, the decision to cut the competition seems to have been made very suddenly. At what point did you first become aware that it was going to happen, and were you expecting it?

Richard Simon-Lewis: The first indication of something coming down the track was probably on the evening of the 24th. The *Financial Times* had trailed an article that indicated that something might happen in relation to the level of grant funding. The article seemed to indicate that there was a view within Government that CCS was expensive and, as such, the grant might be exposed to reduction. That is the first time that we got a sense that something was coming down the track.

On the following day, the 25th, after I had spent three days engaging with our funding group—so I had spent three days in the office of a UK law firm engaging with our banks and bringing them up to speed—we were called across by DECC at 3 o'clock and our chief executive was informed by a DECC representative of the decision.

It is fair to say it was very unexpected from our standpoint. It was not something that we were given a huge amount of visibility around. Essentially, the day the stock exchange announcement came through was the first time that we were formally aware of it, though on the evening of the 24th there had been a sense from the *FT* article that something was coming down the track. I listened to the Chancellor's statement in its entirety and clearly did not get wind of what was coming later that afternoon.

Luke Warren: I very much agree with Richard. The week before, we had had the energy policy reset speech by the Secretary of State and CCS had been referenced there as an important industry going forward for the UK. It seemed to be fairly well positioned in terms of the UK energy landscape.

It was really around the Monday, Tuesday of the spending review—the 23rd, the 24th—that we suddenly started getting a bit nervous. That was partly due to our interpretation of how officials in DECC were reacting. It was very hard to get in contact with people, so we sensed that something might have been going on at that point. The key message is that it seemed to happen very late in the process.

Q3 Chair: I was told anecdotally that Peterhead had about five minutes' notice and someone at White Rose had heard via Twitter. Can anybody verify that?

Richard Simon-Lewis: No. The events as I outlined them cover the sequence of our process. In terms of formal communication, that was the 3 o'clock meeting with DECC that our chief executive attended, followed by the stock exchange announcement, which from memory I think came through just before 4 o'clock.

Q4 Mr Carmichael: To be quite clear, the press were briefed before you were given any indication of what was coming.

Richard Simon-Lewis: As I said, there was an article in the *Financial Times* indicating that something might happen to the level of grant funding. So we were alive to the fact that in the CSR speech from the Chancellor, the grant might be subject to a recalibration.

When we got through the speech and nothing had been mentioned about CCS, we unfortunately—or rather naively—thought that CCS was in reasonable shape.

Q5 Mr Carmichael: When the death sentence was finally pronounced, it was by an official not a Minister. Is that what I also understand?

Richard Simon-Lewis: I believe it was a DECC representative, yes.

Mr Carmichael: Not a Minister.

Richard Simon-Lewis: Correct.

Q6 Mr Carmichael: How do you feel about the whole experience?

Richard Simon-Lewis: Clearly, it is disappointing, because we had worked jointly with DECC on this commercialisation programme for a number of years. In relation to what I have done, developing consensus with the commercial funding community and educating that market about CCS, the indications from our banks were pretty positive, so we were on track.

Both for ourselves and DECC, it is a huge disappointment in the decision that was made. It was clearly a very difficult spending round. Difficult decisions have to be made by Government; we understand that. In terms of the efforts expended by the sponsor group, our management team, the employees within our company, it was a huge heavy lift over the past couple of years to take this first-of-a-kind technology to the point of market acceptance.

Chris Littlecott: I should make it clear that I am speaking as a public interest analyst and advocate for CCS. I am not connected with any of the projects; so perhaps that makes it a little bit easier for me to be forthright about the situation.

I think Richard is being very polite. The treatment of the projects was shabby. It reflects very badly on the UK Government's relationship with business and their ability to drive long-term investment. Overall this was a fundamental change in Government policy, masquerading as a spending decision. So the gravity of the situation here is that the Government now appears to not believe in its own energy policy. CCS has been part of the UK framework, not just under the Climate Change Act 2008 but also under electricity market reforms. CCS was central to justifying the technology-neutral approach of Government—getting state aid clearance for that; and the Government very clearly positioned the commercialisation programme as the entrance point to the future application of CCS to the UK. It was asking the commercialisation projects to do a very specific job.

They weren't supposed to be cost-competitive at this point in time. They were supposed to be providing the initial infrastructure and business models and funding expertise for future projects to be cost-competitive; and that was very clearly set as the outcome with a timeframe of 2020 and beyond. So the Government has effectively changed the goalposts on this at the last possible moment, four weeks before bids were going to be submitted. That is hugely politically damaging in terms of the incoherence of the Government's position and the wider implications for its engagement in Europe and internationally.

Mr Carmichael: In fairness to the Government, I think it is probably the Treasury that doesn't accept the Government's energy policy. It is maybe a distinction without a difference.

Chair: I will leave that as a comment. Professor Gibbins and Neil Kenley, would you like to comment as well? You have the option before I take questions from Antoinette Sandbach.

Professor Gibbins: The only comment I will make is I think it was fairly obvious from a number of statements and, indeed, from the situation that we are in that there was pressure on the projects to show a reasonably competitive strike price. I think that was clear. I will also say that over the period of the commercialisation programme development quite a lot of things have changed, and one of the big things that changed was the gas price, and expectations going forward of the gas price. There was some difference in the situation when we started and when we finished.

Q7 Chair: The implications of the gas price being—?

Professor Gibbins: The implication of the gas price being that it was probably—well, it is clearer now—that if we are going to get a lot of new fossil capacity built it would be natural gas. That wasn't so clear, I think, when the process started.

Neil Kenley: With regard to the announcement, we were not directly involved in those competitions but we were watching what was going on, so, to be honest, the first we knew was the day of the announcement; and it was within hours that the phone started ringing from the private sector companies that we have on board, trying to understand what the implications were, going forward. So it was actually on the day of the event.

Q8 Antoinette Sandbach: I want to come back to Mr Littlecott. It is a new Government. It was six months into its assessments. The American and Canadian examples seemed to indicate a strike price of roughly £170 per megawatt-hour, with nuclear at £92. I mean, it is expensive, don't you think, for consumers?

Richard Simon-Lewis: In terms of some of the strike prices quoted, I think it is important that we are comparing like with like. I think when some of the strike prices were provided by Mr Cameron in that statement, when you look at some of the work that has been done by the CCS cost reduction taskforce, and the trajectory of where prices for CCS mobilisation could go to, it is fair to say, while we were still in the process of optimising our models, because we were four weeks away from submitting bids so we didn't provide a strike price—the cancellation of the competition process meant that we weren't able to provide a strike price. If you look at some of the work that we did relative to the trajectory of the CCS cost reduction taskforce, we were on track to provide a strike price in the direction indicated by the work that was done back in 2012. It is important that we compare like with like, and there are clearly assumptions underlying what Mr Cameron said in relation to the £170, the nuclear strike price and the length of the CfD. That is one key assumption. Clearly, we had assumptions around the length of our CfD, and it is fair to say that we probably weren't going to get the type of duration of CfD that would attach to nuclear.

The way of applying a levelised cost of electricity metric to CCS is frankly somewhat missing the point because, when you look at the value of CCS, you have to look at it from an energy system standpoint—you look at what our project was going to provide. Basically, a significant part of the cost of our strike price attached to the transportation and storage

network that was going to come as part of the full-chain project. Clearly, the Government had supported headroom within that transportation and storage system to allow 3 to 4 GW of CCS-enabled generation to come on to that network over time.

When you compare a nuclear plant or wind with CCS, the levelised cost of electricity metric only gets you so far. I know that because, unlike many of these gentlemen, I am not a dyed-in-the-wool CCS individual, okay? I acted as a financial adviser before I came across to undertake this role, and I spent a lot of my time financing gas-fired plants in the 1990s and renewables for the last 10 years—I headed up renewables for one of the big UK banks—so I was up close and personal with all the technologies outlined by Mr Cameron, and it is fair to say that CCS is a technology of its time. When we look at strike prices, we have to be very careful about how we use the argumentation for CCS against what it delivers in terms of upside benefits for decarbonisation.

Luke Warren: We can think about these as being generation projects, but actually they are infrastructure projects. They were designed to be infrastructure projects, so they had eight times the pipeline capacity required for the early volumes of CO_2 that were going to be produced by the power station. That opened up two regions that could then start to develop CCS projects. The very next project that tapped into that infrastructure would see a very dramatic reduction in its strike price, so the expectation was that your phase 2 projects that came on line in the early 2020s would be competitive, or very closely competitive, with the other low-carbon technologies that are available at a significant scale. The other point of differentiation between CCS and some of the other low-carbon technologies is that CCS is much more than just about power; it is also about energy-intensive industries and finding a way in which those industries can reduce their CO_2 emissions. CCS is the only technology that can enable you to do that, so it is not just about clean megawatt-hours; it is about these other applications, which is what adds a lot of value to the energy system.

Q9 ***Chair:*** What are the options for the Peterhead and White Rose projects going forward? Has all the money that was invested been lost?

Richard Simon-Lewis: In terms of the options, clearly the premature cancellation of the process has meant that we no longer have access to the grant funding or to the customised CfD so, regrettably, our sponsors have had to make the decision to wind down the business. That is a regrettable decision that has had to be made.

Q10 Chair: How much money is not being invested or not being taken in from Europe, or whatever? What has been lost, outside the Government money?

Richard Simon-Lewis: In terms of the European funding, clearly the NER 300 funding that had been awarded by the European Commission through work done by the EIB is now probably going to go back.

Q11 Chair: For the record, that was how much?

Richard Simon-Lewis: It was €300 million. That will not be deployed. In terms of the funding for the project, I am not party to the detail of where we have gravitated to, and where DECC gravitated to, in terms of the cost. The point I want to make is that, clearly, over the last couple of years we have learned a huge amount about how you get CCS off the ground and commercially funded, and we have walked around the commercial risk structures. So a

big part of what we are doing now—in fact, what we have been doing over the last couple of weeks post the cancellation of the process—is working on key knowledge deliverables and the lessons learnt suite of documents. There is an enormous amount of information that both ourselves and Peterhead will be providing to DECC in the form of, in our case 45 key knowledge deliverables, together with a suite of lessons learnt across consenting, permitting, financing, and derisking in terms of technology. That documentation has enormous value for Government in terms of the way we look again at the CCS roadmap and how we reflect on the new narrative for CCS in the UK.

The value of what we have done is not lost in its entirety, even though I think the team will be disbanded and people will go either back to their companies or into the market. Effectively, the lessons learnt documentation is something that will be with Government later this month.

Q12 Mr Reed: I want to return briefly to the point made before the previous question about the process of the cancellation. Were you provided with any official rationale when you were appealing the decisions? If so, do you know if that is publicly available? Was it accompanied by any market modelling for future energy policy in this country? And was any official study or analysis provided with regard to what this means for our CO_2 emissions strategy?

Chris Littlecott: The answer to that is no. The closest we have had to it is the Secretary of State's letter to the Committee, which said that CCS had been judged in respect of its economic benefits compared with other parts of the Government's infrastructure pipeline.

Mr Reed: That's it?

Chris Littlecott: That's it.

Q13 Tom Blenkinsop: Is it at all possible—this is a hypothetical question—that NER funding, which could potentially be returned to the EU, could be recycled or reused on existing projects that are still going ahead, like the Teesside project?

Richard Simon-Lewis: It's a great question. In terms of the relations that we developed with the European Commission, clearly the European Commission, through the European Investment Bank, did the original analysis on the project to basically award the project the NER 300 funding. It is fair to say that the most literate CCS institution in Europe is the European Investment Bank. They are one of our relationship banks, or they were one of our relationship banks in this process. One of the pools of liquidity that they now have access to through the work done with the European Commission is the Juncker plan funding. That funding is €26 billion of unlevied European Commission funding. It is absolutely designed for projects like White Rose and CCS projects generally.

The cessation of this process was unfortunate because we were on track to engage with the EIB in looking to attach to Juncker plan funding. Setting the NER 300 money to one side, which is a discrete process, I think the whole administrative burden of reorientating that NER 300 money towards another project would be challenging because it was based on an analysis of our project. But on the point about whether there is other funding that other CCS projects could benefit from from Europe, absolutely there is. The Juncker plan is one pool of liquidity that could be attached to it.

Q14 Chair: Of the money coming in, there was foreign investment lined up. What can be done to keep that money, or is it gone?

Richard Simon-Lewis: When we were running our process, we had engaged with the funding community, so we had 22 institutions within our funding group: 15 commercial banks, four export credit agencies, the multilaterals, the European Investment Bank, the Green Investment Bank, and Infrastructure UK. We brought the great and the good of the funding market with us. We have had to stand them down off the back of the cancellation of the process.

Q15 Chair: Will that have implications for future funding in the UK? Have they been seared? What has this experience meant for them?

Richard Simon-Lewis: Interestingly, the narrative that we developed with DECC for the funding community is analogous to offshore wind in many respects. I was fortunate in being involved in the big offshore wind projects in 2008 through 2010, and the narrative that we would walk the banks through was similar to offshore wind: if you direct your resource towards getting comfortable with CCS, you are at stage one of developing an industry in the UK as a platform to a global roll-out of a very important technology. The banks absolutely bought into that. The consensus that we developed with the banks—we actually had a presentation alongside DECC with our funding group, and it was oversubscribed. It was standing room only in a Government conference centre. So the commercial funding community was absolutely onside with rolling CCS out across the UK.

I think the fact that the competition has been cancelled now just means that the funding community is looking slightly quizzically at what is being done, thinking, "Where next for CCS?" Clearly, CCS has the potential to be the offshore wind of decarbonisation, with all the benefits that Luke has outlined. Our funding group, with the work that we have done with Government, were absolutely on track to support this technology.

Q16 Chair: The Secretary of State said that now is not the right time for the UK to invest in CCS. To what extent do you agree or disagree with that? If not now, when should the UK invest, if ever?

Richard Simon-Lewis: I think there is recognition that the spending review has been incredibly challenging, but all I can do is to repeat what I said previously. CCS is of its time. We had spent a lot of our time engaging with the local economic partnerships in Yorkshire and Humber, and clearly we have seen over the last couple of months the difficulties and the challenges that energy-intensive industry has had in Yorkshire and Humber. I think it is fair to say that the engagement that we had with the green economy panel at the four local enterprise partnerships—the four LEPs had written to the Energy Secretary giving their support for our project, and they absolutely bought into the benefit that developing a full-chain CCS cluster would bring to Yorkshire and Humber in terms of inward investment and inward access.

If now is not the right time, I think a conversation needs to be had around how we look at the narrative for the CCS roadmap and prepare the ground for CCS coming again, because what we learned from the structuring work that we did is that the technology works. Everything

that we have done on this project in terms of de-risking, independently assessed by technical advisers, shows that the technology works. But you need to develop commercial risk structures for CCS, certainly around transportation and storage. So if there is one lesson and one piece of work that needs to be done by Government when they reflect on where they go with the CCS roadmap, it is commercial structures for the transportation and storage side of CCS. If Government wants CCS-enabled CCGT, that is where they need to go.

Q17 Chair: Are we just avoiding costs today that will be greater in the future?

Chris Littlecott: A number of elements here are really important. You have just asked about costs, and there is also the timing question. We should bear in mind that the Government had said that they would receive bids in December 2015, and they would then evaluate those bids and decide whether to fund two, one or zero projects. The Government had not committed to spending the remainder of the £1 billion, which was around £900 million. They could have spent all of it, they could have spent perhaps £450 million on one project—in my view, that was probably the most likely outcome—or they could have decided to spend zero. My understanding is that the Government may be on the hook for additional capital spending now, because of having cancelled the competition early, but I think the National Audit Office ought to be considering whether that is the case. You have the information from the Energy Technologies Institute, which I think was a very clear letter talking about cost reduction but also the benefits across the economy for both power and industry of deploying CCS.

That brings us to the timing question, which is that we have to recognise that CCS is infrastructure, and there seems to be a view going around within parts of Government at the moment that we can afford to wait, and we can afford to buy CCS in the future when other people have made it cheaper. However, when we look at all the work that has been done through the CCS cost reduction taskforce, through work for the Crown Estate, the Committee on Climate Change and the Energy Technologies Institute, we see that all the significant pieces of cost reduction in the UK are around the access to transport and storage. Having cheaper and better CO_2 capture technologies would be great—that would depend on driving a wider market beyond the UK—but we can't afford to wait until the 2030s and then start to think about CO_2 infrastructure. We have to start now.

We have invested multimillions of public money in proving up the Goldeneye store for the Peterhead project through two competition processes and the 542 store for White Rose. Those are public investments that are now at risk of abandonment and sterilisation. From a public interest perspective, we need to ask the Government what their strategy is for maintaining those strategically important pieces of UK-critical infrastructure and UK value added. And at the moment, they are at risk of being lost very quickly.

Professor Gibbins: The question of investing in CCS—what does that mean? As my co-panellists have pointed out, it's not just a single project. To get the value out of CCS, you need to build significant infrastructure at an economic scale and you need to use that infrastructure in a timely manner, and then you can realise the costs. I know the Committee has got a letter from the Energy Technologies Institute predicting costs if you actually go along that process. Backing up also some of what has been said, if you just build multiple units at a reasonable scale, then the costs for the capture will come down just through normal commercial arrangements.

Where we've had a mismatch between market realities and Government policy is this: what does it mean to invest in CCS? With nuclear, we don't invest in one plant; we are looking at a series and getting costs down. The same with renewables. If you just said, "Oh, we'll do a token demonstration. That's solved it, hasn't it?" No, it doesn't. You've got to have a market.

One of the lessons that we should take away from this is that if you are not able or prepared to see CCS through and to use your infrastructure, then you have a problem. So you really have to be clear what CCS can offer, but equally what you have to do to get the advantages that the characteristics of CCS can give you.

Richard Simon-Lewis: One very short point is the point I made previously around CCS being analogous to what's being done in offshore wind. When you look at DECC material that was published back in 2011 for the levelised cost of electricity for offshore wind projects being closed at that time, the range is between £140 and £190 per megawatt-hour. So, when Government decided to support the roll-out of offshore wind, they were willing to provide subsidies via the ROCs to induce and bring offshore wind forward. No different to the costs of CCS. It's a nascent technology, and it's a decision that Government had the vision to make for offshore wind back in 2010.

Q18 James Heappey: I will make two very quick points, if I may. First, do we need to be overly sentimental about the investors? I'm not sure that they're lost for good; provided there is a return available to them in the future, they'll be back. They tend not to be overly sentimental about these things, provided they can see a return as and when the project is likely to proceed.

Secondly, do you accept that the UK has no obligation to be in the vanguard on this, and that the Government need to make decisions about the overall cost of generating energy and achieving our climate change aims, and therefore the Government have made their decisions on what they judge their priorities to be at this point? They might not suit you and your interests, but that is ultimately in the Government's gift when they have a difficult job to do with the public finances.

Luke Warren: On the point about investors, the pool of companies that were looking to invest in the CCS industry in the UK had already shrunk quite considerably, because all the main parties going into the 2010 election had said that they were committed to four projects. That then reduced to two, so the pool got smaller. I would not necessarily assume that those projects or companies will rapidly come back to the table. It may take a lot more convincing for them to come back to the table. I think it is quite a high-risk strategy to say that we will just let everyone scatter to the four corners and then come back at a time of our choosing. They may not choose to do so.

On the point on the UK being in a vanguard on CCS, I would question whether that is the case. The UK wanted to be in a vanguard. Actually, while we have been talking a lot about CCS and developing a lot of good CCS policy, other regions have got on and developed large-scale projects. Just in the last decade, we have seen a 50% increase in large-scale projects around the world. We have seen applications of CCS in all the main CO_2-emitting sectors and in most of the key regions, whether that is North America, the Middle East, Latin America, Australia or China. Other countries are getting on and developing CCS, and I think there is probably a strategic risk for the UK in not developing capability in this area, because

it is likely to push up our energy costs and it calls into significant question whether we can retain our energy-intensive industries in this country going forward.

Professor Gibbins: It is possible that new investors and also new developers will come to the market if the market is sufficiently attractive, but in terms of the duties of the Government, it is clear that if you are aiming for deep decarbonisation and you do not have CCS available, costs will be higher. The timely verification of whether or not you can have CCS is required. There may be some debate about what is timely. You have to allow a few years each way, but equally you cannot take the present situation as being one that will apply even in five years' time. The Government have to be responsible. They can take decisions, but they cannot assume that that is the end of it. The underlying reason to develop CCS is being clearly expounded by the Committee on Climate Change and the Energy Technologies Institute, and that needs to be taken into account. There is some solid evidence there.

Q19 Matthew Pennycook: I have a final question on cost, before we move on to the next section. We have talked about short-term costs and the value over the long term. Can I get your opinions on the implications for the levy control framework of the decision to pull funding from the competition project? We often hear about the need to cut back because of overspend and the headroom there. What implications does the decision on CCS have for the levy control framework?

Luke Warren: We looked into that. Those projects were due to come in right at the end of the current levy control framework period, which runs until 2020-21. The net draw on the levy control framework was going to be relatively small. We calculated it as being around 1% of the total levy control framework that had been allocated for the period from 2013-14 to 2020-21.

Chris Littlecott: There is an important question here for the Government to clarify. They have finally come out and said that CfDs for CCS are still available in principle, but that is clearly in anticipation of a future levy control framework round. The feedback that we and others had in the immediate aftermath of the decision, when a number of us were scratching our heads and saying, "Could a rescue package be launched for one or more projects?" was that the Government clearly did not want to be asked to commit to a CfD if a solution could be found for the capital. This is not just about the capital; this is about the Government not wanting to spend on CfDs and CCS. The majority of the justifications have been around the CfD cost, rather than the capital cost. There is a level of incoherence in the Government's justification.

Given what the Government have said about their perceived affordability of CCS and acceptable cost, and in the absence of anything specific to deliver on the transport and storage—that is a major element of cost and of the financial risks and the cost profile of the projects—they will not be able to get future projects out of a CfD-driven approach. At the moment, their offer of future CfDs is purely theoretical. There is no budget attached to it. They will be looking at the LCF framework for 2021 and onwards later this year. The Government will have to confirm whether they intend to fund CCS via CfDs, if they believe that it is too expensive to put CCS within the LCF going forward. That raises questions about state aid clearance, if all that is left is nuclear and offshore wind, and they will have to find an alternative way to fund it.

There is a deep fundamental question around the policy framework in which Government had intended CCS to be delivered. They are, in effect, forcing themselves to come up with a new architecture for delivering CCS. We cannot just assume that they will be able to pick up where they left off, using CfDs.

Richard Simon-Lewis: To build on that point, it is one thing looking at the draw on the levy control framework, but you have also got to look down the other end of the lens at the benefits. Clearly, if you are able to move CO_2 and safely store it in the North sea as a CO_2 hub, then that is a platform to enhanced oil recovery. In terms of some of the analysis that has been done, you could potentially secure an additional billion barrels of incremental oil off the back of enhanced oil recovery, and £5 billion of tax receipts for the Treasury. The stepping-stone that an anchor project and a full-chain project gives you towards enhanced oil recovery is significant, which you do not get with nuclear or offshore wind.

The other points made by the panel—

Q20 Matthew Pennycook: May I ask you something briefly on that point, going slightly off on a tangent? What are your views on expanding the OGA's remit with regard to the MER UK strategy, to give CCS development as well as licences of premises allocation a role in that body? Do you think that is taking it too far? Do you think there is a role in the North sea for CCS as part of its long-term future?

Chris Littlecott: From our perspective, recognising that CCS is infrastructure, the OGA absolutely needs to be looking at this. We should remember that the Wood review in the process excluded climate change from its considerations.

The Wood review's recommendations and way of operating in the North sea around oil and gas are directly applicable to CCS, in terms of hands-on, proactive focus on infrastructure. It would not be asking the OGA to act in a different way; it would be asking it to act in a way that combines our energy security objectives with our climate change objectives. At the moment there is a real lacuna there in respect of climate change being excluded.

When we look at the short-term pressures the North sea is under because of the oil price, the OGA is inevitably going to have to look more at decommissioning and the availability of assets. That is a key piece of the puzzle in terms of CCS. We would certainly welcome expanding the remit of the OGA, while also ensuring that the onshore piece is being covered in respect of the National Infrastructure Commission. Both of those have to take a much more strategic role. The Government had tried to leave this to the market, in having individual projects deciding CCS infrastructure. That is not going to be tenable going forward.

Luke Warren: The Government tabled some quite helpful amendments in the House of Lords in discussion on the Energy Bill, in particular ensuring that the OGA was free to use its skills to support the development of CCS, and we very much welcome that. In terms of the discussion that is happening at the moment, there is a particular amendment that has been tabled that we think is very germane to the discussion we are having today. That is a call for the Government to come forward with a CCS strategy in 2016. That will be critical if we are to keep remaining projects and investors interested in the UK as a potential market for CCS.

Q21 Matthew Pennycook: I have a couple of quick questions about the contribution of CCS towards the UK and global emissions. The Chair is glaring at me to hurry me on, so I will be as brief as possible. Richard Simon-Lewis, you have said that the technology works. I want to get a quick yes or no from the others on whether they believe that is the case. I remember the PM saying just a few weeks ago that, while he completely believes in the idea, "the technology does not work". Is the technology working, other members of the panel?

Neil Kenley: The answer is yes. We are already capturing carbon from a number of plants across the Teesside area. Some of that CO_2 is now being transported into greenhouses for growing tomatoes. A lot of it goes into the bottling industry. All we were looking at was capturing more of that through the technology that already exists, so the answer is yes.

Luke Warren: In Norway, just over the North sea, there is a CCS project that is entering its 20th year of operation. It stores around 1 million tonnes of CO_2 a year, and it began in 1996.

Richard Simon-Lewis: Just to bookend the point, we hosted our entire funding group—the credit committee people and technical engineers from our banks—at the Vattenfall site in Schwarze Pumpe in Germany, and we spent two days at the Schwarze Pumpe 30 MW demonstration facility, which has been capturing CO_2 for the last seven years, 2008 to 2015. Unfortunately, in terms of that element, the briefing from Mr Cameron was plain wrong. It does work, and what we have learned through the competition process and de-risking is that the technology absolutely works. Where we need support is in relation to integration and transportation and storage, but the technology works.

Professor Gibbins: What isn't working is a public-private partnership arrangement that will actually deliver CCS at the scale that is needed, thereby getting the costs. That is where we are going, and it is clearly not an issue with the technical feasibility, the industry's readiness or even the investors' readiness. The issue is having a national plan that will do that. The problem is that if you look at small projects in isolation, they will not look attractive. You need to look at the industry and ensure that the transport and storage infrastructure is used properly.

Q22 Matthew Pennycook: May I push you all a bit further on what the pros and cons would be if the UK buys CCS technology that is developed and commercialised in other countries? When you look at this in other countries—you have given some examples, but I am thinking of the Boundary Dam project in Canada, and there are projects in Mississippi and Texas—it looks like other countries are running away with this. What are the potential downsides of our being forced to buy finished products from overseas?

Professor Gibbins: If I can carry on, to some extent we were buying technology developed elsewhere. We were taking advantage of that through both White Rose and Peterhead—the technology was developed in the USA and Canada, respectively—but you cannot buy in technology to develop infrastructure. That has to be applied in the UK. You may have the ideas, but actually putting them into practice at scale, and with as much UK supply chain as possible, can only be done in the UK.

Chris Littlecott: This is the really important point, because the theme of CCS as a widget that we can wait for others to produce for us seems to have gained some traction

within Government, which misses the point about CCS's infrastructure completely. I so wonder about the kinds of advice going in at senior levels of Government. This decision has obviously not been driven by DECC, so it appears to have come from the Treasury and elsewhere. The Prime Minister's position on CCS has changed within the course of a year and he has said some rather strange things, so he seems to be getting some rather different advice, and not from—recognising the DECC background.

We have to remember that CCS is a category, and there are many different kinds of capture technologies—many different applications. It is already used at large scale across the gas sector. Shell's note to you points out their involvement in multiple projects of different kinds. When we look at the strategic position of gas in the UK and the continued push for gas from the Treasury and across Government, we have to recognise that the gas sector is actually very well positioned to deliver on CCS. That is a real strategic problem that the Government has now created for itself.

Richard Simon-Lewis: The key thing that needs to be developed alongside—

Chair: Briefly, if you can.

Richard Simon-Lewis: The key thing that needs to be developed alongside is the commercial risk structures. When you deploy CCS, you absolutely need commercial risk structures to seed CCS—to enable it to happen. Buying off the shelf and just putting it down on a modular basis doesn't work unless you have addressed what we have learned around transportation and storage—that you have to look at the regulation of transportation and storage to enable CCS to come into a market efficiently. In the same way that we saw the OFTO regime being introduced for offshore wind to make the financing of transmission more efficient, you need to do the same work around the regulation for transportation and storage to get CCS into a market.

Q23 Matthew Pennycook: One final quick question, as brief as we can if possible: I take it from what you have all said before that the UK can meet its emissions targets without this, or without quicker progress it will just cost us more in other areas. Specifically in terms of gas, there is a clear indication from the Government—from the reset speech and other things—that the dash for gas is a big part of this Government's energy strategy. What could the Government do now in terms of unabated gas plants to ensure that we can retrofit CCS technology further down the line?

Chris Littlecott: Again, this is part of the strangeness of the decision and the timing of the decision. In parallel, DECC was consulting on amendments that would have clarified the availability of retrofit CCS CfDs. That is not about old coal plants; it is about future gas plants. So part of the Government's intent was to enable new gas plants to come forward and for them to be retrofitted with CCS in the 2020s and 2030s. The infrastructure that was going to be put in place for both projects would have been a door opener to a sensible conversation about the staggered deployment of gas each year during the 2020s and 2030s. Not a huge capital expense up front and not a huge burden on CfDs, but a progressive roll-out.

There was a fundamental problem for the Government. It is not possible to be pro gas and have an absence of a CCS policy while meeting their climate change objectives. The Committee on Climate Change has already said, "No role for gas plant at anything above

peaking from the early 2030s without CCS," so the Government need to make sure that those plants are not just capture-ready but in the right locations, and that the transport and storage infrastructure will be provided. Then that might be a credible way forward. Otherwise, this is an attack on the efforts to combat climate change.

Professor Gibbins: It is possibly a matter of money in meeting the 2050 target, but 2050 is at the end of the process. If you look at moving on beyond 2050, it is highly unlikely that it will be feasible at any price without some carbon capture and storage. With regard to what to do about the current power plants, the most important thing is to come up with a CCS strategy that includes credible transport and storage infrastructure for CO_2, and then make sure that at least some of the gas-fired power plants that are built are in those regions, and also make it clear that developers who take making those plants capture-ready seriously are not disadvantaged.

Q24 Julian Sturdy: Matthew has asked the main points that I wanted to raise. You talked about the technology. We know the technology works on a small scale, but will it work on the scale we need to deliver this? The Boundary Dam project in Canada has had its problems. It is not capturing as much CO_2 as was thought, and as a consequence is paying severe penalties at the moment on that, and it is predicted to pay penalties further down the line. So we know the technology works, but my question is about the scale that we need to get it to.

Luke Warren: May I come in on this point, because I referenced some of the projects happening overseas? They are occurring at an industrial scale. These are not small pilot or demonstration-scale projects.

Q25 Julian Sturdy: No, but the Boundary Dam project is not a huge success.

Luke Warren: It is in its first year of operation. Most engineers will tell you that they would not expect a process industry to reach a steady state and its design specifications for perhaps a period of three years. It is inevitable that these new projects that are innovative will have some teething problems but, speaking to Boundary Dam, they are in the process of rectifying those problems and they do not see any long-term challenges there. I would also point to other projects that have been operating for decades with no significant problems. So I think there is no question around the technology.

Professor Gibbins: I would back up what Luke has said. In fact, the latest bulletin on Boundary Dam, which I can send you if you like, details the modifications they have put in in the light of experience to get the operation up to the normal level, and they are expecting to get their design performance now. That is normal practice. With regard to the physical scale, we have scaled up a lot of similar apparatus, or equipment, and it is well within capability.

The other issue you might be talking about at scale is actually building large numbers of these plants, at the scale of the industry, and clearly that is something that can be done and something that will be a significant advantage when we do it. The question is more: can you do it economically at very small scale? And the answer is, "Well, actually, probably not. It's small-scale."

Richard Simon-Lewis: Clearly, we were in a discussion with the commercial funding community—and clearly project finance, limited recourse finance—so we had mandated independent technical advisers to run the rule over the technology and undertake significant

due diligence. The European Investment Bank was very interested in the technology; they applied their engineers to look at the work that we'd done.

In its early days, offshore wind had teething issues—they had foundation issues and turbine issues—and the UK is now a global leader in offshore wind. CCS will never come out of the box and do everything it says on the tin; it will have teething issues and there are interface issues. But I think in terms of what it brings and the value that it brings—platform to enhanced oil recovery, decarbonisation—frankly, it ticks all the boxes.

Q26 Antoinette Sandbach: I want to move back into the investment arena. We spoke about the Juncker funding. What is stopping you applying to the Juncker fund anyway without the £1 billion from UK Government, and saying, "We have a project. It's a viable project. We have got €300 million already allocated"? What is stopping you taking the project forward in that way?

Richard Simon-Lewis: It's the effect of taking the wind out of our sails. I think the cancellation by UK Government of the competition signals to the market that there is a question mark in the UK Government's mind over CCS. So, if you're an investor—whether that's a third-party equity investor or a debt provider—you look at what the UK Government is signalling to the market.

Clearly, the Juncker plan had White Rose within its list of important projects; White Rose was listed in the Juncker plan as a nationally significant project. But I think in terms of the work that we'd undertaken around capital formation, a big part of our capital formation was the grant funding—notionally, £450 million. The customised CfD was incredibly important to make the economics of CCS work. So, if Government is signalling that the grant is no longer there—there is a big question mark over the provision of a customised CfD for CCS—then frankly, the investors are going to look at you slightly quizzically and go, "Really? Do we really want to proceed with this, when the Government is saying, 'Actually, we want different technology. We want CCGT'?"

So, to go back to the Juncker plan with the confidence that's been lost by the signal that the Government's provided is incredibly difficult, but the point you make is a good one—

Q27 Antoinette Sandbach: Have you actually had the conversation with DECC about that? And have you gone to the National Infrastructure Commission, because it seems to me that the evidence we are hearing today is really that the issue is transport and storage, and that that is an infrastructure project, not an energy project? Given the establishment of the National Infrastructure Commission, what steps have you taken to try and put that on its agenda?

Chris Littlecott: Obviously the National Infrastructure Commission has had its first consultation, including on energy. Our response as E3G has been recommending to the commission that it must look explicitly at CCS and CO_2 infrastructure.

Antoinette Sandbach: Can I hear from the industry representative?

Luke Warren: Similarly, we have provided a response to the National Infrastructure Commission. We are yet to meet the commission, and we are keen to understand the potential role it might play for CCS, but the CfD will also be absolutely critical here. If the CfD is off the table—although I don't think the Government have been explicit about the CfD being off

the table, I don't think they have said that it is on the table for the competition projects—then it's going to be very, very hard to see how those projects could proceed.

Q28 Chair: So, even if £1 billion comes from somewhere else, without the CfDs you are saying—

Luke Warren: Absolutely, yes. And my understanding is that the projects were never asked whether or not they could proceed just with a CfD. They were told that the project—the competition—could not proceed as it was designed because £1 billion has been removed.

Richard Simon-Lewis: You are making a great point there. At one level, if we had been given more notice of what was coming down the track in relation to the cancellation of the process, one could envision us having, alongside DECC, a discussion with the European Commission and the EIB about availability in the Juncker plan to get this off the ground.

Q29 Antoinette Sandbach: Is it too late to do that?

Richard Simon-Lewis: On the basis that we are dismantling the structure that constitutes the special purpose company, giving notice to our staff, and writing lessons, reports and key knowledge deliverables for DECC, it is fair to say that the horse has bolted. Frankly, we are now in transition to closure mode. For the industry, it is a discussion worth having. The reality is that, at one level, one can question whether the burden of making CCS happen in the UK was the responsibility of one sovereign state alone.

I spoke at a DG Energy and Euracoal event a couple of months ago. If you look at the European Commission and the issues that Europe has regarding energy importation, it is fair to say that there are countries in Europe that are reliant on fossil fuels, which have almost gained pariah status. CCS is a huge opportunity for Europe. If I were in DECC's shoes, I would be engaging with the European Commission and the EIB to see what could be done around liquidity and the Juncker plan. If the UK is saying that it cannot afford to bring CCS forward, frankly it is a collective burden that needs to be carried by Europe, if Europe wants CCS.

Q30 Antoinette Sandbach: So there is still an investor opportunity available, provided that there is CfD support.

Richard Simon-Lewis: Potentially.

Neil Kenley: From an industry point of view, we maintain that dialogue with DECC. There is a project that we were looking to piggyback on the back of the other two projects so we maintained the dialogue with DECC to try to do that. Our real push at the moment is to maintain the dialogue with the existing two stores. Without the infrastructure in place, it puts our whole project back two, three, maybe even five years, and increases costs. To answer your question, yes, we are opening those dialogues with both storage operators and DECC.

Q31 Chair: At the point of cancellation did anybody within DECC go anywhere near what Antoinette Sandbach is suggesting? Was it raised with you that you went direct to Europe for the money?

Luke Warren: No.

Neil Kenley: No.

Luke Warren: There has pretty much been radio silence from DECC and from the Government in general about the next steps. That is probably a response to the fact that this happened quite late in the process. I do not think that there had been a process in Government to think about the next steps.

Q32 Antoinette Sandbach: Isn't there a responsibility on the industry to engage with the Department, rather than waiting for the Department to come out to you?

Luke Warren: We are trying very hard to engage with the Department. The industry requested an emergency meeting of the development forum with the Energy Minister. We are very pleased that she attended that, and we are in engagement with officials and Ministers. That said, at the moment the industry will be reliant on Government policy. If there is not the will to try to progress CCS, the technology will not progress within the UK; it will progress elsewhere.

Q33 Antoinette Sandbach: May I pick you up on that? We have heard that the technology was largely being brought in from North America and Canada, and that the opportunities for the UK were really around storage and transport rather than the CCS technology itself. Who else is working in that arena of opportunities for capture and storage? Is that argument still out there for investors? How many jobs could that generate?

Luke Warren: In the UK?

Antoinette Sandbach: Yes.

Luke Warren: Absolutely. As Richard said, we have to assume that both front-runner projects in the competition are now gone. But there were a set of projects that were at an earlier stage of development and wanted to come through as part of what was known as phase 2. They are going to tie into the infrastructure. These were the products that would have seen the big reductions in costs and would have been cost-competitive.

Teesside is one of those projects, which is a set of industrial emitters. We have a set of emitters or potential projects in the Yorkshire and Humber region that want to come forward, and projects up in Scotland, particularly around the Grangemouth refinery. There is a set of investors looking to take the technology forward, but at the moment they are waiting to see what the appetite from Government is. We are keen for the Government to come forward with a strategy so that we can try to retain what is left from the CCS industry and do not, hopefully, have too significant a delay from when our first projects are operating. The big risk is that we have drift on policy and don't have any real progress until the early 2020s, so we don't have our first projects until post 2030.

Neil Kenley: Let me partly answer that question and partly answer the previous question about scalability. As I have said before, the technology exists, and it is already happening as we speak. About 400,000 tonnes per annum are being captured by some of our companies. The work we have done has proven that it is scalable and cost-competitive. To answer the previous question, we were looking at somewhere in the region of 2.8 million tonnes per annum being captured in just four of the plants that we know of. A further 7.5

million or 8 million tonnes of CO_2 could be captured to increase the scale of the projects we are working on. It is already there, but without those stores we are on the back foot.

Richard Simon-Lewis: You make a great point about jobs. CCS projects provide a catalyst. Our project will have employed 3,000 at peak construction. The local enterprise partnerships were looking at our project in the Yorkshire and Humber area basically as a catalyst for inward investment. Some work is being done on the benefits of a CCS cluster—£11 billion of inward investment and 100,000 jobs out to 2030. When we engaged with the four LEPs that co-signed the letter to the Energy Secretary, it was all about keeping energy-intensive and highly skilled jobs in the heritage industries of steel and manufacturing in the Yorkshire and Humber area. The LEPs absolutely saw the industrial logic of a CCS full-chain network and the benefits that accrue, in terms of keeping highly skilled jobs in the UK, and the Treasury is very keen to do that.

Q34 Antoinette Sandbach: What would you say the estimate is for the global market in CCS, and have we missed the boat?

Richard Simon-Lewis: From the experience that we gained over the last few years in developing our project—we made enormous strides in learning how to get one of these projects off the ground—I think the markets are still enormous, in relation to the deployment of CCS. We know that North America and China are making great strides. Europe, frankly, has always been a bit of a laggard in relation to CCS, but the opportunity is still there. To go back to the point I made previously, from what we learned about how to structure a full-chain CCS project, which will be embedded in the documents we provide to DECC over the coming weeks, engaging with the European Commission to decide whether we want full-chain CCS and the learnings from it in Europe, and to get the funding from Europe, in combination with the UK, to make that happen, would be an incredibly important staging point for CCS.

Professor Gibbins: A couple of things. Where the technology design comes from and the UK content in the plants that are built, and the UK expertise that can be sold overseas are different things. If you have experience of an actual supply, you will have a market overseas. We will lose the chance if we don't develop CCS in the UK to decarbonise various activities in a timely fashion. We will have to do something else, and the opportunity will have been lost. That is the really timely factor.

Q35 Antoinette Sandbach: Very briefly, what timeframe are you saying that that move has to be made in so we don't miss that opportunity?

Professor Gibbins: We have to be demonstrating CCS at scale in the 2020s. By demonstration, I mean that it can be done in a cost-effective way.

Luke Warren: A very quick point to cover what others have already raised. The Paris agreement was more ambitious than many people expected. It limits temperature rises to well below 2° C—potentially to 1.5° C—and work by the Intergovernmental Panel on Climate Change suggests that CCS is going to be absolutely essential for that. When you look at the scalability, the implications are that you are looking at an industry that is going to be equivalent in size to today's oil and gas industry, in terms of the amount of fluids it moves around the world. That gives you a sense of the size of the future industry we are talking

about here. It is going to have to be massive if the world is going to address climate change at the least cost.

Chris Littlecott: May I pick up on Luke's point? This comes back to the question of the timing of the decision. It was very strange to have it the day before the fifth carbon budget announcement, the week before Paris and the week before White Rose was due to sign an agreement with Chinese partners. A whole set of things were coming down the line that, internationally, were going to be positioning more action on CCS. Even if the UK Government had continued to have cost concerns about the burden it was going to face in terms of the two projects, in my view it would have been ideally positioned to have brought in further funding to help to offset the UK domestic costs.

With all the work that Richard and colleagues have done with the EIB and others, in quarters one and two this year the UK could have said, "Okay, we are in a post-Paris world. CCS is going to be more important. We have two internationally significant projects here. Who else is going to come with us?" We already knew about the Chinese investment slated to come forward, so it didn't have to be that the UK was going to do this on its own. The UK was going to be able to provide a platform for that international technology development and for international investment, and it could have had the first mover advantages for its industrial sectors and for that inward investment. Yorkshire, Teesside and Grangemouth were already having active conversations, and I know that colleagues at Scottish Enterprise were working on attracting investment into and alongside the Grangemouth refinery location based on the future availability of CO_2 infrastructure. By cutting everything off we have lost the opportunity to have a proactive conversation about how we do this better and cheaper.

Antoinette Sandbach: I understand, but that's where we are, and just stating where we are doesn't actually help us to move forward. We are in the situation that we're in and this inquiry is about where we go from here.

Q36 Chair: A point that you raised, Mr Littlecott, was about whether the UK Government had taken a different strategic view before the abrupt cancellation. Are you saying that they could have gone to other sources of funding and grafted that on and continued on this other route while still withdrawing the Government role in CCS?

Chris Littlecott: We were already seeing that the Government was evolving its role, and a greater recognition that there would need to be more effort on transport and storage.

Q37 Chair: Had they signalled it in a more gentle manner and used a shallower glide, if you like, would others in the investment community have come on board?

Chris Littlecott: Yes, I think that would be the case.

Q38 Antoinette Sandbach: Mr Simon-Lewis, you were the investor group. Had there been further delay, how would that have impacted?

Richard Simon-Lewis: In the grand scheme of things, we could have managed our process in such a way that we could have introduced a deeper dialogue with the European Commission. Clearly, the stakeholder position that the European Commission had, if you set

NER 300 to one side, was all around state aid, so I think the Government was conscious of ensuring that the state aid process was followed with the European Commission.

However, had the UK Government come to us and said, "Because of budget reasons and restrictions, we need to bring in the European Commission in a slightly different narrative to access liquidity and lesson the burden on the levy control framework," which, to a certain extent, the NER 300 money would do, that is something we could have accommodated in our process, because in the discussions that we were having with our banks, we were—in a very structured, very disciplined way—bringing the banks with us. The banks absolutely understood the technology a lot better than they did when we first engaged with them two and a half years ago. They understood what we needed to do with Government to support some of the risks in transportation and storage. I think that, what with the banks, the funding community and the institutional investment, along with the Chinese interest in the project, we could have managed that process in a glide path to bring in additional funding.

We have a fantastic relationship with DECC, and that remains the same. If Government had come to us earlier in the process, we could have spoken to the sponsors and the key stakeholders, and spoken to our funding group and said, "Look guys, we need three months or six months to work this through with the European Commission, to see whether there are any channels or pools of liquidity that we can attach to." We could have circled the wagons and moved forward again. Undeniably, we could have done that.

Q39 Mr Reed: I will come in on the infrastructure issues later, but is it fair to say that at the very point a global marketplace was about to be created post-Paris, we had an initiative that would have enabled the northern powerhouse to take wings and everything else, and we decided to pull out?

Richard Simon-Lewis: Yes.

Q40 Tom Blenkinsop: Neil, in relation to Teesside, you have gone into the point about the two projects that the Teesside Collective wanted to piggyback off and the necessity of stores. I know, for example, that SSI was a key partner within the Teesside Collective. Post the Government's announcement, what are the repercussions for the Teesside Collective project?

Neil Kenley: It has put us back a bit. Since the announcement, we have had other organisations approach us to join the collective, which is a positive step. We still strongly believe that it is the only way we can maintain and keep the businesses we have in the long term, because the two issues around the whole CCS question are maintaining what you have while being able to attract new companies. It is still a live project, and we continue to push it with DECC and our partners. The private sector at this moment in time is still 100% behind us and wants to see this happen.

Q41 Tom Blenkinsop: What is the combination within the Teesside Collective? What is the ratio in relation to energy production and the surrounding energy-intensive process industries?

Neil Kenley: At the moment, the balance is chemical process. SSI was one of the biggest contributors to that through its power plant, but it came from gases from the blast

furnace. We are still in dialogue with other companies that are looking to bring potential power plants there. Whether that is CCGT or gas, they could still be the anchor, if that is the right word. They could be the anchor projects to get the infrastructure in place to allow the chemical process guys to add into that network system.

Q42 Tom Blenkinsop: How key do you think CCS is to the Government's desire to roll out, for example, shale exploration and to utilise that exploration? It is not just shale, but things like coal gasification and syngas. How key is CCS to the development of the non-conventional gas market within the UK?

Neil Kenley: For the opportunity to get CO_2 to market, you need to have that infrastructure in place, whether it is shale gas or underground coal gasification. In the process of refining that syngas, you can capture the carbon. Whoever has the network system to distribute to market, they could tap into that. That could lead, as we have already discussed, to enhanced oil recovery. We have talked about waiting for other countries to develop these schemes and the technology, but we could be at the forefront of this. Yes, the frontrunners tend to have the biggest cost, but the scalability and the ability to bring in new technologies, new projects and new companies down the line are huge.

Q43 Tom Blenkinsop: In relation to that decision by the Government, how far up the table do you think Teesside is in being the area where a CCS project could still get off the ground?

Neil Kenley: I believe that we are still the perfect location to do that. Companies will not do this on their own. They have not got the pockets to do it. Because they have not got the CfDs to charge back, there is no mechanism in place to incentivise those companies to do that. We are still the right place to do that. If you think about the two existing stores, we are only 130 km from White Rose and 300 km from Peterhead. We are ideally placed. We are already landing somewhere in the region of 85% of the UK's gas anyway, so gas processing is something that is there. The infrastructure already exists, so we're ideally placed to be the centre of a cluster that can then link to Grangemouth in Scotland or Runcorn in the north-west through pipeline corridors that already exist.

Q44 James Heappey: So we are going to talk a little bit about the cost of CCS, but a lot of that has come up in passing in our conversation so far. We have heard that CCS costs are separated into capture, transport and storage. Can I invite you to give a little more detail on how savings might be achieved in each of those three phases in order to make each of them cheaper?

Professor Gibbins: In all of those areas, the principal way through is scale and getting quantity. On capture, we are talking about building individual plants at full scale—typically 800 MW—and also building multiple units. If you just go through building multiple units, costs will come down. That is clear in the letter that the ETI sent to you. On transport, you need a pipeline that is carrying in excess of 10 million tonnes a year, and you have to fill that up reasonably quickly and not leave it standing idle. On storage, you are again looking for scale to cover the exploration and proving cost over a significant number of tonnes of CO_2. Also, if you're getting a real industry going, you can start to have redundant stores and plan the development in a cost-effective way. If you're taking all the risk on one project, that

comes at a very high price. Once you get to scale, the other thing is that financing costs come down.

Q45 James Heappey: And on the projections that the industry had, assuming that November had never happened and you were all still going, what was the curve like for the deployment in order to achieve scale and therefore reduce the cost?

Luke Warren: We did some collaborative work that was actually led by the ETI, looking at a deployment scenario for the UK. We understand the cost structure of the first projects, and we understand what is likely to happen as you start to build projects off common infrastructure. We looked at what happened under different deployment scenarios, and if you want to drive costs down very quickly, you concentrate CCS in one or two regions. What we saw is that with a very low install base—this particular scenario was about 2.5 GW—you were around or below £100 per megawatt-hour. That could have occurred by 2025.

By way of comparison, offshore wind has said that they will probably need 12 GW to 15 GW of install capacity to reach that £100 mark, but we are saying that we start a bit higher, because of the infrastructure, but we come down very rapidly through economies of scale, production costs and capital, to get sub-£100. That is also for firm dispatchable power that has none of the costs of intermittency, so it is actually more valuable to the system than some other forms of low-carbon power generation.

Richard Simon-Lewis: Exactly. The point I wanted to make, picking up on Jon's point, is that in terms of the economic efficiency of the system and introducing real benefits from the financing community, the way that you design the system is key.

When I talked about needing to focus on transportation and storage, if you could apply some of the learnings from regulated asset base structures—partially regulated structures involving Government—such as Thames Tideway, to transportation and storage, that basically opens up the market to institutional investors and pension funds. The Government have clearly seen the huge efficiency that you get in tapping into institutional investors and capital markets. If you overlay the learning from big infrastructure projects using RAB-type models to CCS and take the benefit of long maturities and very efficient funding, then, frankly, your costs keep coming down.

The other point is that those in the funding community with whom we were dealing are creatures of precedent. They like doing deals that they've done before, as we have seen in offshore wind and in CCGT. They have to go through an education process and a learning curve to do the first deal, but once they get there and that knowledge is institutionalised, they want to do the next one and the next one and the next one. We maintain competitive tension in our process. We can make funding of these projects very efficient over time by folding the learning from other Government infrastructure projects, so that we have the lessons learned driving capital efficiency. That is a key point. CCS is expensive at the start, in the same way that offshore wind was expensive at the start, but over time, with the knowledge we now have, you can make this very efficient from a funding standpoint.

Q46 James Heappey: Yesterday evening, I attended a dinner where there was a representative of the Swansea Bay tidal lagoon. He was talking about a very interesting

funding model that potentially sees the first 30 years of the project's life funded through a strike price, but thereafter, the capital is effectively paid for. The project has another 90 years in its life and therefore can repay some of that. I wonder if that sort of model might be pursued with CCS, given that once the infrastructure is in place—once the plant is in place—the life will presumably extend a lot further.

Richard Simon-Lewis: It is a great point. If you look at the transportation and storage network that National Grid were developing for the White Rose cluster, those assets have a useful life of north of 45 years. Clearly, in relation to the CfD that we were hoping to attach to for our project, notionally, that could have been up to 20 years. You are right; you have a tail of 20 years, or maybe longer, in relation to the network. In terms of bringing other projects on to the system, bringing the cost down and driving the efficiencies you were talking about, that is absolutely something that could be replicated.

Luke Warren: A point I would make as well is that we focus a lot on transport and storage and the importance of that. Under the previous competition, we were expecting just a CfD to drive that type of investment. It is exactly that type of creative solution that we need to identify when we think about how we are going to take CCS forward from here, so that is a very useful contribution to the discussion.

Q47 James Heappey: The challenge with this, of course, is that if you do it as a strike price, you are front-ending the cost on to the consumer. How you reimburse the consumer in their bills once you start to repay—once you reach year 21 to year 40 in your timeline—is a challenge. It might need to be a more conventional subsidy from the Exchequer, rather than through bills, in order to make the model work.

Richard Simon-Lewis: But I think the benefit that flows to the consumer is the system benefits that CCS provides. At one level, in a market where you do not have CCS, the ETI work has proven that it will cost up to 1% of GDP per annum—between £30 billion and £40 billion. Ultimately, the consumer will end up picking up that cost if CCS is not deployed. If, in five years' time, God forbid, we have not made progress on CCS in the UK, the consumer will be asking, "Why haven't we gone with this decarbonisation pathway, when we're left to foot the bill anyway?"

It is about giving the consumer a sense of what CCS is all about. When we were going through our permitting and consenting process in the Yorkshire and Humber region, for both the power plant and the transportation system, the overwhelming consensus coming through the consultations we ran with the public was, "Why has it taken so long to develop one of these full-chain systems in the UK? This is absolutely what we need."

The consumer understands the drivers of climate change and emissions reduction and absolutely bought into our project. Our project, if cancellation had not happened, would be full-chain consented in May 2016. That is a full-chain CCS project, fully consented in May this year. If you look at what the public were saying about the project, they just wanted to see it happen, so the consumer has learnt a lot about CCS in the process.

Q48 James Heappey: I have two final questions on cost. First, is it effectively unviable for as long as there is not a high enough carbon price?

Richard Simon-Lewis: Well, no, because basically the combination of the grant funding and the customised CfD meant—they were the pillars that made the economics of this project work. In relation to a proper carbon price coming through, clearly, that is more of a stick than a carrot for CCS projects. Ultimately, what the carbon price will do, to the extent energy-intensive industry is not insulated from that carbon price, is basically leave the UK.

There is an element of footrace in all of this. We talk about global competitiveness and what CCS does. There is a footrace for when carbon pricing comes through, how can Governments keep energy-intensive industry in the UK and Europe? Ultimately, if there is no compensation for the additional burden that they have in addressing carbon, they have to make a choice about where they take their manufacturing.

What CCS does is give them a competitive route, a channel, for their CO_2 for them to stay in the UK, to the extent that it is still an attractive market, with all the competitiveness issues that we see for industry in the UK.

Chair: Professor Gibbins you want to come in.

Professor Gibbins: I have a quick comment. You could argue that all forms of low-carbon generation should be funded through the carbon price, but they are not, for a very good reason. The carbon price starts low and rises and the cost of developing these technologies starts high and falls. So there is naturally a period at the start of the introduction of any technology where the carbon price is not a suitable mechanism. In the long run, it may well be the mechanism that funds all of the low-carbon technologies.

Q49 James Heappey: I do not expect much enthusiasm for this question, given that the panel is fairly united its view. Are there any other major cost barriers that stand in the way of employing CCS, other than those we have discussed so far? No? I didn't think so. The Clerks have done a very good job in providing us with an entirely standardised Committee with no opposing views.

Professor Gibbins: From what we have said about what is required, there is clearly a cost barrier in that to get cost-effective carbon capture and storage, you are talking about investing effectively in a large pipeline and a series of projects. That is different from other technologies where you can break it up into small bits and pieces. That is a characteristic of CCS. You can try to work your way round it but essentially that is the characteristic.

The other side of that is that CCS gives you things that other technologies cannot. It gives you the ability to decarbonise industry and the ability to operate at part load much more effectively than some of the other technologies. You just have to realise that. That maybe gives more of a role for Government in understanding that that is required and that Government have to do something to guarantee that that scale can be delivered to get the benefits.

Q50 Chair: I want to take the panel to the letter from the Energy Technologies Institute. Outside Government, we are struggling to find people with contrary views to use. In its fantastic piece of evidence, it said, "The key to reducing the cost of CCS is delivering a small number of large plants sequentially (at least 3), ie; industrial scale deployment - not innovation from technology focused R&D activity."

Does anybody disagree with that? No. Thank you. It also said, when comparing scenarios of a delay to CCS deployment, "Delay adds an estimated £1-2 bn per year throughout the 2020s." That is, cost in meeting our carbon reduction targets. Is it right in that?

Luke Warren: It has a very comprehensive model. Some work was undertaken by Cambridge Econometrics that looked at some of the ETI work and the impact on electricity prices. It found quite significant differentials, even by 2030, on electricity prices, where you try to reach decarbonisation targets without CCS and when you have CCS. I think by 2030, electricity costs would be about 15% higher if CCS were not part of that mix. There does seem to be some evidence around that.

One other point I would make is that it is absolutely right about the importance of sequential deployment. We cannot just wait 10 or 15 years and then suddenly expect to build an industry in a five-year period. The supply chain just will not be able to cope with that. So if you want to build out a sequential programme by 2030—the Committee on Climate Change has said we might want 4 to 7 gigawatts—you really need to be moving with projects now, because you are looking at an 11 to 14-year timeframe to build out that range of projects.

Q51 Chair: The further costs that the energy technology industry gets for the end of the 2030s is about €4 to €5 billion; it might start to make the billion that was not left in the competition chickenfeed by the end of it.

James was at a dinner last night; I was as well. A Member of the House of Lords who was at the dinner pointed out that there is a window of opportunity with the North sea as it is at the moment, and not just in relation to the work that Professor Haszeldine has done on enhanced oil recovery. Where do you see this in the future if the North sea is not there as somewhere for storage? Carbon capture is one leg of this; storage is the other leg. How important is the North sea to this happening?

Richard Simon-Lewis: That was key. When we were walking the funding community through the benefits of CCS, one element of the narrative that they absolutely bought into was the CCS roadmap and the use of the North sea as a CO_2 hub for the industrial heartlands of Europe. We are blessed—that is the word that is used in the Shell letter. We are blessed in the UK with storage in the North sea that is sufficient to take the industrial emissions of the UK and the European industrial heartlands for the next 100 years. Also, when you combine that with the fact that we have incredible knowledge and intellectual property within our oil and gas industry, to me the logic of combining the two and taking advantage of the storage capacity in the North sea and the oil and gas capability that we have with CCS as the enabling technology makes an enormous amount of sense.

Q52 Chair: Will all these storage facilities in the North sea—these holes in the ground—be as accessible for storage from onshore carbon capture plants in 20 years' time?

Richard Simon-Lewis: Unless investment is continued now, you mean?

Chair: Yes.

Richard Simon-Lewis: Clearly, National Grid, in relation to the Endurance store—the 542 store—has spent an enormous amount of time assessing that store and benefiting from EEPR funding to do that. They have publicly come out on the record and said that the Endurance store is one of a number of stores in that area. To the extent that the tap is turned off now in relation to what National Grid does with the Endurance store, and no more investment is going into storage in the North sea, the opportunity, frankly, is lost. People are not going to sit on these assets when they are not revenue-generating assets. They will basically lie fallow unless there are projects coming down the track that will want to access those stores. The two go hand in hand.

In a full-chain project, the power, the transportation and the store are umbilically connected. You cannot retain stores without the knowledge that you are going to get CO_2 anchor projects coming through, and without the knowledge that you will have a transportation system capable of taking that CO_2 to the stores. So the three elements go hand in hand. You need full-chain CCS to monetise the value of those stores and to get to enhanced store recovery.

Neil Kenley: We mentioned the OGA. There is a need to ensure that the OGA understand, because they will be the organisation issuing the abandonment licences, and there is a question of, could the store could be used for—?

Richard Simon-Lewis: I have three points. We don't have an enhanced oil recovery market of any real note in Europe. If you look at the Permian basin in Texas when the oil price was slightly higher, you were getting over $30 a tonne for the CO_2. White Rose—and Peterhead probably—were having to pay to have our CO_2 taken away, but if an enhanced oil recovery industry develops in the UK through the North sea, that is notionally $32, in euros or sterling equivalent, of value for every tonne of CO_2 that we produce, if that market matures and becomes real. When we talk in the US about having to pay to take our CO_2 away, the CCS developers like Summit and the other guys who developed Boundary Dam are looking at us and thinking, "Wow! You mean that CO_2, which has a value in the US, is something that we have to pay to get taken away under the economics of our project."

Q53 Julian Sturdy: The fifth carbon budget stated that the crucial part of reducing costs for CCS would be to do with developing the CO_2 infrastructure clusters. Will you outline what an infrastructure cluster would look like and involve?

Richard Simon-Lewis: It is a shame, because I don't have access to it now, but DECC has a fantastic policy scoping slide for CCS that illustrates a CCS cluster. Effectively, a CCS cluster starts as an anchor project—in our case, White Rose's case, a supercritical OPP plant—with a transportation system, the pipeline to take the CO_2, and a store. That slide shows that if you design the network in such a way as to have headroom for additional CO_2 to come on to the system, you see CCS-enabled projects joining the network, whether they are industrial CCS or BECCS, biomass in combination with CCS—we have a fantastic relationship with the US Department of Energy, which sees BECCS as an incredibly valuable extension of CCS technology, and BECCS is something that you could do with CCS in the UK, given that we are building our plant alongside the biggest biomass plant in Europe—and then you have a stepping-stone to enhanced oil recovery.

When you look at that slide—DECC has it, a CCS policy scoping slide—it is a fantastic illustration of cluster and of value that flows from a cluster. You do not get that with nuclear,

you do not get that with offshore wind, you do not get that with CCGT; that is unique to CCS. So I would say to every member of the Committee: check out that CCS cluster slide, because it is the most demonstrable example of what CCS delivers when you build it as a cluster.

Q54 Julian Sturdy: On linking biomass in—we have Drax in Yorkshire, which is obviously moving more to biomass—is the technology there yet for that?

Richard Simon-Lewis: In terms of design, our project was designed to capture 90% of the CO_2, so effectively we emitted 10% of the emissions. We have designed our plant to have the optionality to co-fire biomass, so we have an ongoing discussion with DECC around the benefits of co-firing that 10% with biomass. For our project, that would take us down to net zero emissions. So if we added a bit of biomass to our process—our boiler is technically capable of taking biomass—we can get down to net zero emissions.

With BECCS we are talking about a greater proportion of biomass. If you put a greater proportion of biomass into a CCS project—this is difficult to get your head around; I certainly struggled with it—you can go to negative emissions with a project, because effectively you are drawing emissions out of the process through the biomass. So absolutely we could take 90% of emissions; we could go down to net zero with a bit of biomass—we offered that option to DECC, but I think because there is no economic benefit to co-firing biomass in the UK it is something that DECC were ruminating about, but never reached a landing on it as a decision—and the more biomass we put in, we could go to negative emissions.

Professor Gibbins: Biomass project developers are looking at making plants capture-ready even when they are not at the size that would legally oblige them to be. We need the mechanisms there to reward it. It is also important—I have made this point before—for likely locations where transport and storage infrastructure will be available in the future to be signalled as early as possible, because that is a key part of incentivising people to invest in opening up these prospects.

Q55 Julian Sturdy: There has been a lot of talk around the transport and infrastructure already. We know that some of that is already there and operational. You mentioned that National Grid has been developing infrastructure. How much is there? How much would be needed? What is the impact on that infrastructure of moving away from carbon capture and storage?

Chris Littlecott: We should recognise that the starting point for the UK is, effectively, that zero infrastructure is in place and used, compared with 5,000 km-plus in the US. There is a catch-up piece there, whereas the US can have plug-and-play CCS projects.

Q56 Julian Sturdy: But they are talking about using some of the infrastructure that is already in place.

Chris Littlecott: The tremendously disappointing thing for Scotland in where we are at the moment is that Scotland already has the Feeder 10 pipeline going down the eastern side of the country, which would have connected the Peterhead project down to Grangemouth. That is already part of Scottish national planning policy. It is identified as a strategic piece of national infrastructure. There are existing pipelines that could also connect from Scotland

down towards Teesside. There are a few pieces that could be used but are not already being used, and the work that National Grid were doing was part of that strategic effort.

Richard Simon-Lewis: Exactly. In relation to the work that National Grid had done, National Grid have come out publicly and given an insight into the geological formation that they found—the 542 Endurance store, which frankly is astonishing. I have seen the initial presentation on Endurance, and it is stunning. It is huge. Basically, the Endurance store was capable of taking all the CO_2 from the White Rose project. We capture and export 2 million tonnes per annum of CO_2. The Endurance store, as I understand it, had the capacity to take multiples of what we produced, so effectively it had headroom to allow other projects to join our transportation network—for example, CCS-enabled CCGTs—for decades. The Endurance store is vast.

In terms of the exploration work and the analysis that Grid had done, they had found sister stores in close proximity to Endurance that they could have joined up into a network and then moved that CO_2 for EOR purposes up into the North sea. National Grid had undertaken appraisal work. I think they had taken an 150-metre borehole sample to prove up the modelling they had done, and what they found from the drilling work they had done just confirmed the integrity of what they had discovered.

Endurance is a significant national resource that will not be monetised from a value perspective unless the CCS industry is developed in the UK. Fact. If what we see over time is the decommissioning of North sea assets, and if we need to life-extend our oil and gas facilities in the North sea, CCS is a stepping-stone to providing enhanced oil recovery from stores like Endurance up into the North sea to keep oil flowing and money flowing to the Treasury. Endurance is a remarkable resource for the UK.

Professor Gibbins: There is evidence of infrastructure there, certainly in the central North sea and less in the southern North sea, although we have obviously explored some of the storage. What is lacking at the moment, because of the way the commercialisation programme was run, is any incentive for a transport and storage business. That really needs to be talked about—not just the assets but how someone puts those assets together and operates them. How do they get the large up-front investment to put extra infrastructure in, and in every case large up-front investment to make sure there is adequate storage available to justify that infrastructure? That is really missing, and we cannot talk about it too soon.

Q57 Julian Sturdy: Are there any technical barriers to that?

Professor Gibbins: I don't think there is anything insuperable in the way of a technical barrier to doing it, but there is no business model for that. It just does not exist, and it needs developing.

Q58 Antoinette Sandbach: What kind of costs are we talking about, on the scale that we need in order to get the benefits?

Luke Warren: The infrastructure for the—

Antoinette Sandbach: Yes.

Luke Warren: If I can give you an example, the first two projects in the competition were going to be developing pipeline capacity of about 24 million tonnes. That probably would have been sufficient for the UK in terms of backbone infrastructure to take you through to 2030—certainly late 2020. The first two projects give you that core infrastructure, and that was wrapped in the £170 per megawatt-hour, which the Prime Minister spoke about.

Richard Simon-Lewis: The point that Jon made is fantastic. We have learned lessons and gained knowledge over the past few years about what you need to do to make full-chain CCS work, and a lot of the fabric of that resides in the commercial restructures that you need for transportation and storage. If the Government looks again at CCS as a pathway, it should look at the lessons learned suite that we are currently providing to it, and at the architecture that is needed for transportation and storage to properly monetise the value of the storage in the North sea, which is critical to getting CCS off the ground in the UK.

We found that there are risks in the transportation and the store that commercial funders aren't willing to take. We need to look at regulated-type models to address those risks, because the ultimate beneficiaries are both the UK consumer, in terms of decarbonisation and the overall cost of meeting emissions, and the Treasury, which will benefit hugely from the formation of enhanced oil recovery as an industry in the UK over time. To put a bit of front-ended effort into looking at how you notionally regulate transportation and storage, and provide the architecture would be a good thing.

Q59 Mr Reed: My background is in the nuclear industry, which seems to have some incredible parallels with this issue. This does not appear to be a problem of technological innovation and capability; it is about policy and political decision making. What do we need to do to the current framework and structure to achieve—a fantastic phrase—full-chain CCS? We seem to be a long, long way away from it.

Chair: Can we get a brief answer to that big question?

Luke Warren: We have potentially got a lot of what we need. A lot of very good lessons came out of the two competition projects, which came very close to submitting bids. We need to make sure we learn those lessons and incorporate them into any future programme. We need a strategy so that the industry understands what the potential for CCS is here. As I said earlier, we still have the phase 2 projects, and if we keep CfDs on the table, they can potentially see a way to market. The missing piece is around transport and storage. Some inventive thinking about how to bring that forward would go a long way to supporting the industry.

Q60 Chair: Will the lessons document become publicly available?

Richard Simon-Lewis: I think the key knowledge deliverables, of which there are 45, will be publicly available, but I believe the lessons learned suite that we are providing to the Government is not publicly available.

Q61 Julian Sturdy: To return to something you said earlier about the storage market, is the UK on track to deliver a storage market, and will other countries pay the UK to store? Ultimately, if that is the case, it will have a financial benefit.

Richard Simon-Lewis: It is interesting. I mentioned the CCS policy scoping slide—the cluster slide—which I think is incredibly compelling, but there is another slide that DECC use in their narrative, which looks at the building of a CCS network in the North sea. That is a Government slide. When we talk to our banks, we have the cluster slide, which the banks totally get, and then we have the CCS network in the North sea slide, which is a DECC slide that shows the development of a CCS network in the North sea. Our understanding is that the Government was in conversation with other European states about using the North sea as a CCS hub, because other European states have the same challenges as we do in relation to balancing their energy systems. If you look at some of the lessons that Germany learned in relation to nuclear and renewables—they are burning more lignite than they have ever done—and some of the lessons being learned in Europe, frankly CCS has as much value for other European states—

Q62 Julian Sturdy: But they don't have the storage capacity.

Richard Simon-Lewis: They have access to it through the North sea. My understanding is that the UK Government—

Q63 Chair: So storing other people's carbon could be an income area for the UK; is that what you are saying?

Richard Simon-Lewis: Yes.

Q64 Chair: Two final questions, because time is pushing on. Sorry, I promised Professor Gibbins—

Professor Gibbins: What does the UK need to do? It is really important to get a fast response and develop a strategy, because we really will lose direction if there isn't rapid action. The importance of that can't be overemphasised. Even if it is not the final story, if it is just kicked into the long grass and left we will lose a lot of the information that is available now and a lot of the enthusiasm, so a quick response is needed.

In terms of what is required, I do not think we know how to get there yet necessarily, but we do know that physically, you have to get large clusters going. You have to get economies of scale. If you don't get the economy of scale, then you do not have an economy of scale and it is not economical. That is the lesson we have really learnt, but how to get there and the business models to do that perhaps need a bit of time.

Q65 Chair: Thank you. At last week's Liaison Committee with the Prime Minister, I had a bit of a tête-à-tête with him over the carbon levels of 450 grams per kilowatt-hour being emitted from gas. At the launch of the fifth carbon budget, Lord Deben said that without carbon capture and storage, we would have an issue if we went on with gas—because gas is 450 grams—to get to 100 grams. Given that CCS is there to help deal with the carbon from fossil fuels, is there not an argument that the £1 billion would be better spent on renewables and storage instead? For people who are well into carbon capture and storage, this might be an—

Richard Simon-Lewis: When people talk about renewables and carbon capture and storage, and also nuclear, it is almost as if they are all mutually exclusive, whereas the reality is that when you design an energy market—an energy system—you need all those

technologies. So if you went with lots of renewables, you have an issue with intermittency. If you go with nuclear, you have an issue around base load, you have no flexibility and you still have the issue of CO_2. When we talked about White Rose, we were actually invited to speak at renewables conferences.

Q66 Chair: But renewables combined with storage; chemical storage or—

Luke Warren: I still haven't seen any scenario where that can be substituted for fossil generation. Fossil generation is the jam, if you like, between base load nuclear and intermittent renewables, but you also are not providing a solution to the energy-intensive industries, who cannot use batteries and intermittent generation.

Q67 Chair: We come to the final question. We have done a lot of scrutinising of DECC, which is one of the Committee's roles, of course, but we also like to be constructive, which is also one of our roles. We see ourselves as being constructive and bringing things forward for the future. With that in mind, we have talked of the need for a carbon capture and storage strategy. What would you like to see in that strategy? I will give you a minute each, as they say at the end of every good panel programme.

Professor Gibbins: As I said, apart from what is in it, it is how quickly it comes. That cannot be overemphasised, again. There needs to be a clear statement of what is required to achieve economic CCS. We know what that is. I think there needs to be a very open-minded view of how to get there. You mentioned the problems with nuclear. Effectively, we have been offered the sort of support through FID that nuclear is getting. Well, CCS has some different characteristics. It gives you different benefits, so I think you need to be open-minded about that. I think there also needs to be a fairly tight timescale, because we do know that we need CCS to be ready by 2030, and if you work back from that, we have to start moving now. So there needs to be some urgency there; you cannot just forget about this if you are going to have projects coming on in the 2020s.

Chris Littlecott: I would agree with that. I would also say that as well as the speed, there has to be clarity on the intent. The way that this has been done so far has seemed to be intended to be removing CCS, so we need to be very clear that it is there, not just in worth but in action. There needs to be an immediate piece around the risk of losing access to storage through decommissioning. There needs to be, particularly for Endurance and Goldeneye-associated infrastructure, a focus on that. I think we are going to be looking at some kind of transport and storage authority. Lord Oxburgh has been asked to chair a strategy group by the Government. Interestingly, back in 2009, he wrote a strategy paper for the Conservative party that suggested having a national strategic CO_2 storage authority to take on these responsibilities. The Government did not go down that route, but they were very good ideas of the time, and I think their time has now come. The last piece, I think, is the gas deployment piece, so we are going to have to look very carefully at capture-readiness, at the location of those gas plants and at linking them to the strategic roll-out of the infrastructure. Otherwise, we are really going to face a problem about getting the investment in gas that the Government wants to have. There will be all kinds of issues both in terms of the business case for that new gas and also its social licence unless CCS is part of that mix.

Chair: Mr Simon-Lewis, your minute starts now.

Richard Simon-Lewis: I would first of all recommend that there is reflection over where we have got to and what we have done, and also scrutiny of the lessons learnt work that we will be providing to Government at the end of this month. That is incredibly important. If the UK is on a pathway towards another dash for gas—another roll-out of CCGT—then it is folding the lessons we have learnt from CCS into that new deployment of CCGT.

I think there is read-across for new nuclear in terms of what we have done in developing and taking the funding community with us on this pathway to educating them. So if we go down the path of nuclear and CCGT, I think the lessons learnt from the process that we have run on a first-of-a-kind project with the funding community should not be lost.

Luke Warren: It needs to be developed pretty quickly, so that we do not lose more of the industry. I would recommend that it is developed in partnership with industry so that it is seen as being credible by investors. Finally, I would recommend that it should seek cross-party consensus, because CCS is an infrastructure project and these projects will not go ahead unless there is cross-party consensus on the need for the technology.

Chair: Thank you—a very good point. Neil?

Neil Kenley: One minute?

Chair: One minute starting now—no repetition or deviation.

Neil Kenley: With regards to the energy-intensive industries, certainly up in Teesside 95% are owned by foreign parents. We need a consistent message from DECC and Government on the policies for the long-term future for those guys to even consider investing in those assets. That is the long-term ask.

Short term, I think we need to ensure the momentum, the message and the awareness that we have created over the last 18 months—certainly over the last 2 years—is not lost, and that all the information we have does not sit on a shelf and gather dust. It is key that we get and share the information that is out there.

Chair: Thank you very much. That was indeed done without hesitation, repetition or any deviation whatsoever. It should be pointed out the Government has told us that its view remains that CCS has a potential role in long-term decarbonisation of the UK, so there is that in the ether.

Gentlemen, may I thank you all for your time this morning? It has been two hours and I certainly felt it was worthwhile. I thank the audience in the Committee Room who have stayed with us. Thank you all. No doubt we will correspond on this issue in the months and years to come.