



## Energy and Climate Change Committee

### Oral evidence: [Oral evidence: Low Carbon Network Infrastructure, HC 613](#)

Tuesday 12 April 2016

Ordered by the House of Commons to be published on 12 April 2016.

[Watch the meeting](#)

Members present: Mr Angus Brendan MacNeil (Chair), Rushanara Ali, Tom Blenkinsop, Glyn Davies, James Heappey, Matthew Pennycook, Antoinette Sandbach, Julian Sturdy

Questions 194-289

Witnesses: *Witnesses:* **Tony Glover**, Director of Policy, Energy Networks Association, **Phil Sheppard**, Director of SO Operation, National Grid, and **Charlotte Ramsay**, Head of Strategy, Markets and Regulation, European Business Development, National Grid, gave evidence.

**Q194 Chair:** Thank you, panel, for coming this morning to give evidence. Before we begin, will you please state your names and organisations for the record?

**Tony Glover:** Tony Glover, Director of Policy at Energy Networks Association.

**Charlotte Ramsay:** Charlotte Ramsay, Head of Strategy, Markets and Regulation for National Grid's European Business Development division.

**Phil Sheppard:** Phil Sheppard, Director of SO Operations for National Grid.

**Q195 Chair:** Thank you very much, panel. We are here this morning to consider how to develop low-carbon network infrastructure, and with the rapid growth in distributed and remote renewables, timely connections for new generation are, of course, key. Can you begin by walking us through the process for generators to connect to the grid? Who wants to start?

**Tony Glover:** Perhaps I can start from a distribution perspective, although I hasten to add that National Grid is also a member of ENA. From a distribution perspective—obviously we are particularly looking at distributed generation—we have prepared as an industry, through ENA, two main engineering recommendations that are designed to help with the facilitation of connection of distributed generation. We have something called G83 for smaller generation capacities and for some specific generation technologies, and G59 for

all other projects. We also have four guides that are available for distributed generators to use as part of that connection process and to help with that.

**Chair:** Anybody else wish to add anything to Mr Glover's point?

**Phil Sheppard:** From a transmission perspective, on an annual basis we publish a 10-year statement that indicates all the projects that are in train to connect to the transmission system, and the opportunities on the grid where people connect more readily than others. Then there is a three-month application process. A generator can apply to connect to the transmission system. National Grid has three months to work with the transmission operator to establish what the terms of that connection are, and then the generator typically has three months to make their mind up whether they want to sign a connection agreement with National Grid. Often that is extended because of the complexity of the process. We often waive that three-month deadline for generators to connect.

Through that process generators understand where they connect, what the costs are going to be and what the timing is going to be, and then they have the option to sign a contract and become part of the contracted background that is then published on our TEC register—the transmission entry capacity—and then covered in future 10-year statements.

**Q196 Chair:** If they take the connection, how are they charged, then, and how do they pay for that?

**Phil Sheppard:** Once they are connected they pay a transmission charge, and the transmission charge depends on the location in the country. Our charges are agreed by the industry and approved by Ofgem, and it is effectively a locational charge. Where there is more generation than there is demand, it tends to cost more, because there is infrastructure required to transmit that to a location where the demand is. From a demand perspective if there is a surplus of generation your demand charges are cheaper, and then the reverse holds true. For example, in Cornwall it is very beneficial to connect generation, because there is more demand than there is generation.

**Q197 Chair:** Is there a formula? I understand that the charging regime changed over the last year. Is there a formula or anything obvious that we can look into?

**Phil Sheppard:** Yes. There is a charging statement that is produced every year that explains in detail all the individual charges, where all those zonal charges are, what the different connection points are, and produces a map, and then if there is any special particular conditions. In Scotland, for example, there are locations that are part of the distribution network but for charging reasons are treated slightly differently.

**Q198 Chair:** When you say there are zones, behind the making or banding of zones is there a formula you can go to that will then underpin the reasoning of making X place a certain charge zone?

**Phil Sheppard:** Yes. The overall pot is fixed. That is the recovery of the revenue that it takes to operate the transmission system. Inside that charging document there is a calculation that is done for how that is proportioned.

**Q199 Chair:** If I was to give you a point on the map of the UK—is it the UK or is it just GB? If I were to give you a point on the map, would you be able to tell me the cost from your formula, or would you have to go to the banding that was set?

*Phil Sheppard:* Whichever location you are in, you can see from the charging statement what those charges would be in the current year.

**Q200 Chair:** What I am trying to get at is how you arrive at that. There must be underpinning work. Is there a formula?

*Phil Sheppard:* Yes. A process approved by Ofgem runs that formula. I am sure you can get to the point.

**Q201 Chair:** Is the formula widely available to the industry to see and to challenge?

*Phil Sheppard:* Yes. It is one of the things that were consulted on through what was called the remit review of charging.

**Q202 Chair:** Okay. Thank you.

Mr Sheppard, RenewableUK has warned about the supply chain bottleneck for transmission connections for renewables in remote areas. What are you doing to address this, and in particular, are you looking into the new HVDC technology?

*Phil Sheppard:* They are slightly separate questions. On HVDC technology, we are always looking at the use of that. For example, we are just about to commission—next year—an HVDC link between Scotland and England that uses DC technology. That is a large link that bypasses a lot of the existing AC transmission system in Scotland, so it provides a large step change in capacity. In remote areas such as the north of Scotland, when it comes to building transmission we always look at the various options with the transmission operators around what is most cost-effective for the consumer. Is it going to be an HVDC link, or is it going to be various sorts of AC connections?

In terms of trying to accelerate the connections of renewables, we do a whole piece of work around what we have called “connect and manage”. We work with Ofgem and the industry to produce a methodology that allows generators to connect earlier than they would if we waited for the main infrastructure to be built.

**Q203 Chair:** Will an HVDC line lower connection costs for generators in areas that are considered remote by Ofgem—not because they are considered remote by many people, of course, but because they are considered remote by Ofgem?

*Phil Sheppard:* It will not necessarily lower the charges, but it is the cheapest solution rather than building an onshore equivalent-capacity connection. There are places, for example, in the Scottish islands, where once there is a portfolio of projects that have a contract or a strike price, the cheapest solution may well be HVDC cables rather than AC cables and onshore reinforcements.

**Q204 Chair:** If you had a HVDC cable from the Scottish islands, would you see that going to the Scottish mainland or directly south?

**Phil Sheppard:** We would always work with the two transmission operators in Scotland to work out what is the best connection point that minimises the overall cost to consumers. Sometimes it might be worth extending the cable so that it connects further down in Scotland rather than at the closest point onshore, because you still may have a bottleneck that you need to get from that onshore piece back to where the demand is.

**Q205 Antoinette Sandbach:** Is that link that you referred to from Scotland the one running into Deeside?

**Phil Sheppard:** That is right.

**Q206 Antoinette Sandbach:** That has caused problems, hasn't it? There is going to be a new nuclear power station built on Anglesey, and effectively you are displacing the environmental impact from Scotland into Wales, aren't you? What would have been an HVDC link, potentially from Anglesey into Deeside, cannot happen.

**Phil Sheppard:** There are always different options. I do not think it precludes reinforcing the transmission system from Anglesey to Deeside.

**Q207 Antoinette Sandbach:** It does. Grid has ruled that out, saying that the DC link has been reserved at Deeside for Scotland.

**Phil Sheppard:** The Deeside connection is going to be commissioned next year.

**Q208 Antoinette Sandbach:** Yes. Exactly. So my concern is around the planning, and in effect what you are doing is that Snowdonia national park, which has more grid lines running across it than any other national park in the UK, is going to have that displaced impact, because the potential HVDC link at Deeside is being used for a Scottish connection instead of for the Welsh connection.

**Phil Sheppard:** Okay. I am sure we will be happy to provide an expert in that area. As the system operator, I am not an expert in planning and the rules around national parks and the like.

**Q209 Antoinette Sandbach:** Also, north Wales pays higher generation costs, even though it is a net exporter of electricity, because the transmission lines run east-west. You are not looking at the national borders of Wales to determine whether they are paying fair charges, because you do not have a link between your northern transmission line and your southern transmission line. You are not looking nationally at the country. Despite the fact that north Wales is a net exporter of electricity, it is paying substantially higher transmission costs and suffering the environmental impact of huge amounts of onshore transmission lines. What is National Grid doing to address that process? Do you think that is fair?

**Phil Sheppard:** Ofgem have carried out a review of transmission charges, which was remit, and I am sure you can touch on that in the next session, but that process was widely consulted upon.

**Q210 Antoinette Sandbach:** I do not care whether it was widely consulted on or not. The reality is that you said that where there are net exporters of electricity, they pay lower transmission costs. That is not correct in Wales. How do you justify that as a transmission operator?

**Phil Sheppard:** We apply the rules that have been agreed. There is a process that has been gone through. The consultation ended up deciding that was in the best interests of consumers overall, and that is the outcome that we apply.

**Q211 Antoinette Sandbach:** Is that something you would be willing to look at again?

**Phil Sheppard:** The transmission charges are always under review—certainly looking at some of the changes in technology in things like storage, absolutely.

**Q212 Antoinette Sandbach:** In terms of district network operators, did you have a chance to look at the Green Electrician Group's evidence—TGE Group's evidence—to this inquiry?

**Tony Glover:** Not in detail.

**Q213 Antoinette Sandbach:** They were saying that low-voltage applications can take up to 45 days to process, while high-voltage applications take up to 65 days. "Our fastest approval came in five hours, while others have arrived at the last hour on the last day. This uncertain process in time makes scheduling work impossible and it is not commercially viable to do the full design work until DNO approval has been received."

What is your evaluation of Ofgem's quicker and more efficient distribution connections project so far?

**Tony Glover:** This is not a new problem, and it is certainly a problem that I have discussed at this Committee before, and indeed others. It is the issue of the level of penetration of DG, particularly in some areas of the UK, and the impact that is having. It is not just the DG that is taking place, it is the applications. Overall, we think about 70% of applications to connect are in fact speculative, and not all of those are going to take place, but of course we have a queue system. How do we deal with that? That is the issue.

ENA collectively, through its members, is looking at a queue management plan. That is one aspect of what we are looking at, identifying how we can deal with that particular issue, and that can be for either existing customers not utilising their existing capacity or for those that are contracted but not connected yet.

In addition to that we issued a consultation on milestones at the beginning of this month. What we are looking at here is being far stricter with the applicants before planning permission and then allowing the process to be smoother afterwards. I have to say, this is working with the DG community, because they are as concerned about this as we are.

**Q214 Antoinette Sandbach:** Are you saying the new rules for milestones in connection offer the best solution?

**Tony Glover:** We are saying that the big problem we have is queue management. We can talk about all the other issues around reinforcement. We can talk about flexible connections—the option to agree a connection without the need for enforcement and, with agreement, strain off when needed—and we can talk about smart tap solutions, and there is a lot I am sure we will discuss about that. In terms of the queue, this is quite a critical issue because—

**Q215 Antoinette Sandbach:** Is it the best solution?

**Tony Glover:** It is the solution that the DG community are happy to go forward with after a lot of consultation with them. We, as ENA, operate a forum that brings together the DG community and the distribution network operators, and this has come out of that.

**Q216 Antoinette Sandbach:** Okay. Mr Sheppard, do you think National Grid has enough information from the DNOs on the impact that distributed generation will have on the network?

**Phil Sheppard:** We continue to work with the ENA and others. Over the last 18 months or so as the penetration of solar has increased, the terms and conditions of the contracts that we have with the DNOs has changed over time to capture more and more of that information. We understand both the queue, but also the information that is inside the queue around which they actually connect.

**Q217 Antoinette Sandbach:** When we went to your headquarters—

**Phil Sheppard:** Wokingham, yes.

**Antoinette Sandbach:** Yes, Wokingham. You could not see solar on the network. Do you have enough information, bearing in mind your system limitations at present?

**Phil Sheppard:** We do not see it in real time, because almost all of the solar is embedded in the distribution networks. We are working with each of the distribution companies to gain both information about what is connected, but then also how much of that we can meter. We have several projects looking at how we forecast it better. Understanding where it is makes a big difference, because things like cloud cover moving across parts of the country have quite a significant impact on the amount of embedded generation that is there. I would say we are not there yet, but there is definitely progress to be made. People are being very co-operative in delivering some of that.

**Q218 Antoinette Sandbach:** Mr Glover, do you think networks need to be encouraged to invest ahead of need to meet their connection demands in the future?

**Tony Glover:** That is an interesting question, because we are constrained from doing that, obviously. Certainly investment ahead of need, where appropriate, where it can be justified. Obviously what we do not want is to end up with stranded assets that are not being utilised. Our primary objective is to minimise the cost to the customer, but clearly there does need to be a way of dealing with the issues we face in terms of the amount of penetration of DG in parts of our network.

We are dealing with it at the moment through things like flexible connections; we are dealing with it in queue management; we are dealing with it by directing them to connecting in places where there are not hotspots. Of course, if we are going to get to the kind of levels of target that we are talking about, we are going to have to think about this in a more creative way. Distribution network operators are having to start operating the system locally.

This ties in very well with the work we are doing with National Grid. We have set up a number of workshops and seminars bringing together National Grid and distribution network operators, and a number of workstreams have come out of that, particularly one

on high volts. There is a lot of sharing going on to see how we can better work to identify where these hotspots are that impact on the transmission network.

**Q219 Antoinette Sandbach:** We had evidence from Sarah Bell in an earlier context that said that there was a reluctance; that basically investors who hold DNO assets are reluctant to invest ahead of need and reluctant to innovate, because effectively they are looking at their returns, which are a higher return for their investors, and that is not encouraging the innovation. If you do need to build ahead of need, how should the costs of investment be recovered?

**Tony Glover:** This is the issue. This will have to be within the regulatory framework. It will have to be within the price control process. The principle has been established at transmission level. Given where distribution networks are going in this whole process, we are going to have to think about it at distribution level. As we will all know, distribution networks, whenever built, were fit-and-forget passive networks. We did not need to think about managing the system locally in the way that we now have to do.

**Q220 Antoinette Sandbach:** Anyone looking forward, and particularly in light of how the EMR was set, and so on, would have realised that those issues would arise.

**Tony Glover:** Which is why we have been arguing for it.

**Q221 Antoinette Sandbach:** Do you think a single common application portal for all grid connection requests is feasible, and would it be useful?

**Tony Glover:** Yes. I think this idea came from Tempus Energy as well. I would say two things about that.

What we are trying to achieve, and this is through the joint working we are doing with the DG community and as Energy Networks Association, is looking at how we can standardise, where appropriate and where practicable. Of course, we have to see this in the context of the fact that you are looking at different distribution network operators operating in different types of locations—some of them, in fact, with differently configured networks, technically speaking.

Also, as a backdrop to this, we have a regulatory framework that is designed to deliver the best and to have a level of competition within a framework where no competition exists. Outperformance is central to that. You have to be careful that you strike that balance. I am not entirely clear how this would work in that context.

I guess I would say that the final word of warning on this is: okay, let us look at this at some point later on, but with the tsunami of applications we currently have to deal with, if we suddenly had to create this whole new portal, that could well be quite a distraction at this time. Okay, fine, let's look at it in the future, but I do not necessarily think at this moment. Much as that might be ideal for some of the generation community, I think it might be a bit of a challenge at the moment.

**Q222 James Heappey:** Mr Glover, if we can stay with the distribution system operators, with DNOs becoming DSOs, first of all, can you be clear with the Committee what you would understand from that term? What would a DSO be and do?

**Tony Glover:** I think that was already touched upon a little bit. There are two aspects to it. It is about moving away from the network that exists—at distribution level it is very much fit-and-forget, based on centralised generation, with no active management and a very passive network. We are now clearly moving towards having to become like a mini system, if you like. It is already happening, particularly in parts of our network, as we deal with the penetration of DG. System operation is starting to become part of what DNOs have to do, particularly to deal with the kind of non-synchronous generation, such as solar, that we are having to deal with.

Moving from a passive to an active network, a very good example of this, if you like, as a forerunner that has come out of some of the network innovation funding that we have benefited from, is what has been going on in the Orkneys, with the Orkneys smart grid. I do not know if the Committee is aware of that, but the outcome of that is about managing a distribution network as a system in a way that would not have been done in the past. One of the benefits that has come out of that—I still think this is an astounding figure—is the requirement not to reinforce to connect new renewables. About £300 million-worth<sup>1</sup> of network reinforcement ended up only costing half a million.

There are some really big benefits here; it is not just a word. We are looking at active management, system operation, and sharing information with National Grid in a way that we have not done before. That is what I think a DSO is.

**Q223 James Heappey:** What incentives or regulations are required to bring DSOs into being?

**Tony Glover:** Obviously as we go forward, being a DSO is going to have costs. I know there is some question around who should be the DSO, and I will be absolutely, explicitly clear to the Committee: from our perspective we cannot see any practicable and cost effective way for the DSO not to be the DNO.

**James Heappey:** You have pre-empted my next question.

**Tony Glover:** Sorry. Forgive me.

**James Heappey:** No, no, you have answered it. I will not ask it.

**Tony Glover:** That is our position. So yes, there are costs. I think it is happening anyway. It is not as if this is some sort of commercial thing, or we would like to get involved in this area. We are already having to do it.

**Q224 James Heappey:** Thank you. We will let National Grid have a say.

From National Grid's perspective, what benefits would DSOs bring? How do you envisage your relationship with them?

**Phil Sheppard:** I agree with the comments just made. We are already on that journey. For example, in the last 12 months, through using some of the things that people describe as a distribution system operator's role—actively managing voltage in the network, or at the connection point, or the interface between the transmission and distribution network, or

---

<sup>1</sup> Subsequently corrected to £30 million, see Q255 below.

automatic network management systems—we have managed to connect in the distribution network 7.7 GW of renewables, compared to what would have been 2 GW if we had followed the old, traditional way of doing things. Because the networks are changing through collaboration with distribution network operators and through their customers, we are already on that trajectory, particularly on congested bits of the distribution network.

**Q225 James Heappey:** You touched on this when Antoinette was asking questions a couple of minutes ago. With the intermittency—the variation within generation—it strikes me that the more and more wind and solar in particular come online, the greater granularity you need at the system operation, at the TSO level, and that can only be delivered by the DSOs knowing what they have and feeding that information in to you. You seemed very relaxed when the Committee came to Wokingham about what you did not know on a day-to-day basis. I understand the logic in that, but can you be clear with us what you are doing to make sure that as soon as possible you are able to have a real-time understanding of what is being generated and what is being used?

*Phil Sheppard:* If we take the two technologies slightly separately, we have a lot of experience now of wind in the transmission system and in the distribution networks. Most of that information is visible to us, and we are always working with people—with academia, with innovators—to model wind better and do the forecasting better, so we understand the variations and therefore can balance the system better.

The bit that has been missing with solar, as we touched on earlier, is visibility of the amount that has been there. I think everybody was taken aback by the growth, and therefore we were not far enough ahead in working out what were the consequences for us as a system operator. Because it is embedded, what we see is effectively a reduction in demand when the sun is shining. Working out how much of that is actually embedded generation, how much of that is demand change and how much of that is just general demand forecast has been important to us. As you say, the greater the granularity we have and the better we can model it, the better we can forecast it and the better our balancing actions are.

**Q226 James Heappey:** What is the current cost of that lack of granularity? You can see what the weather is likely to do, and that, I suppose, gives you the opportunity to power down various generation resources, but if you do not know exactly what is being generated and used by solar, there must be a danger that you are over-generating and, therefore, that the bill payer is paying more than they might need to.

*Phil Sheppard:* Yes. There is a variation both ways. Part of the issue with solar for us at the moment is that we still have a way to go in terms of forecasting. The timing of a front moving across the south-west in particular can make a big difference, both in terms of the angle of the sun and the cloud cover. We are putting in lots of effort trying to work out how we can forecast it better and get the timing of those fronts. Sometimes it can be too early or too late compared to our forecasts, so sometimes it means that we have a positive error or a negative error. Over time they will balance out, but our job is to reduce those, to minimise the costs of balancing.

**Q227 James Heappey:** The final area I want to look at in this section is storage. Looking specifically at that, what role do you see for large-scale storage like pumped hydro, and what role do you see for smaller-scale batteries?

**Phil Sheppard:** There is 2.8 GW of storage on the system today, which is effectively hydro, and that provides a range of very flexible tools. Increased amounts of pumped storage will provide similar tools, but large-scale storage will be a great service provider both to suppliers trying to balance their portfolio but also as a system operator. The types of services we can get are vast, from providing response services in milliseconds, rather than in seconds, to moving peak demand around. If there is a surplus of energy on a bright, sunny bank holiday when there is not a lot of demand, then it is about storing that, and then reinjecting it on the Monday morning when demand picks. Those sorts of services, from a balancing perspective, including balancing of suppliers, are going to be very valuable to us.

**Q228 James Heappey:** Is there a conflict of interest in the system operator also having a large storage capacity?

**Phil Sheppard:** As the system operator, at the moment we do not own generation. Our licence prohibits us from owning generation. One of the issues with storage is its treatment. If you talk to investors in storage, what they are looking for is either a separate category so it is treated differently between demand and generation, or as a subcategory that is being suggested about it being in generation. Apart from being exposed to two charges, suppliers are looking for a separate treatment. As an operator, we will make sure that we specify the products that we are looking for, as opposed to owning it.

**Q229 Chair:** How urgently would you say that change of categorisation is needed?

**Phil Sheppard:** I was at a carbon-limiting technology conference that DECC was hosting with investors and developers, and the No. 1 thing—immediately after predictability of policy—was changing the rules on storage or clarity on how storage is going to be treated from a regulatory and policy perspective.

**Chair:** A very high priority for the industry.

**Q230 Julian Sturdy:** Mr Glover, you talked about moving from a passive network to an active network, and then you touched briefly on costs. I want to drill down further on that. The obvious assumption would be that that move is going to drive up cost of the network and ultimately the costs to consumer, or the network part of what the consumer pays, is going to go up.

**Tony Glover:** Not necessarily, because there are two aspects to this.

First, if we manage the system, if we become distribution system operators, there will more than likely be savings. The Orkney smart grid is a very good example. It is about there being a regulatory framework to allow us to become distribution system operators. I think that is the key issue for us. It is not about necessarily there being this huge chunk of costs. In fact, I would suggest that if DNOs were to become DSOs, it would ultimately reduce costs, as in the examples we have where that has taken place, where a distribution system operator has in effect operated.

Forgive me for cutting across on to the storage question, because that plays into the distribution system operator role as well. As much as we have a system operator worrying about large-scale storage, we, as distribution networks, are obviously very interested in

smaller-scale storage and the positive impact that can have on managing our network in the whole distribution system approach. One of our members, UK Power Networks, just last week published a report on the findings on their Leighton Buzzard battery storage project. They said some of the things that Phil has just said about there being a need for a regulatory framework, and indeed distribution network operators potentially having an interest in being involved in this whole storage area. At the moment we do not have that regulatory framework, and that is holding us back. As costs of batteries go down, that is going to become more attractive.

One final thing I would say on storage is that we need to think a bit out of the box sometimes. I know you heard evidence on the future of the gas networks a little while ago. Let us not underestimate the positive impact that we could have from the hydrogen economy by converting excess generation—with the recent summer outlook report pointing to that being a big challenge—and using that excess generation from renewables to create hydrogen. We can put that into the gas network very easily once that is completely plastic, and we can utilise that in our homes.

**Q231 Julian Sturdy:** I do not disagree with you on that at all. To clarify what you were saying on my earlier question, though, ultimately you do not think this move will increase the cost, but it will bring it down.

*Tony Glover:* Yes.

**Q232 Julian Sturdy:** If you break down consumer costs—and their network cost is quite a high percentage of delivering power to people's homes, is it not—it is 25%?

*Tony Glover:* Yes. It has gone down quite a lot since it was privatised.

**Q233 Julian Sturdy:** Yes, but what you are saying is that this will drive that down further.

*Tony Glover:* Yes. Ultimately, in the long term. Let us take the example—not a hypothesis—of Orkney, where £300 million-worth<sup>2</sup> of network reinforcement actually cost £500,000. That has happened because of managing that network smartly and as a system.

**Q234 Julian Sturdy:** Say it is running at 25% of consumer costs now. What can we drive it down to?

*Tony Glover:* I could not give a percentage to it. I can only give examples of where we have practised it and the impact that has had locally. I see this as driving cost down, so the 25% going down. That is a percentage of the bill, and, as you all appreciate, the bills go up independently of whatever we do. I see the cost going downward and not going upward in the longer term, particularly when you augment that with some of the smarter network technologies.

**Q235 Julian Sturdy:** Is there going to be any shorter-term blow or shorter-term hit to the consumer before we get to the longer term?

---

<sup>2</sup> Subsequently corrected to £30 million, see Q255 below.

**Tony Glover:** I cannot envisage that, no. I do not think that is the issue. The issue here is about who is the DSO.

**Julian Sturdy:** Thank you.

**Q236 Chair:** Just before we move to Matthew Pennycook, I believe what you are saying there, Mr Glover, is that costs will come down, and you are saying that active DSOs are achievable in the current price control period.

**Tony Glover:** Do I say they are achievable?

**Chair:** Do you think that?

**Tony Glover:** Do I think that? I think it is already happening. That is the point. Within the current price control period, we already have to think about some of these things—particularly in relation to solar, and it is a very good example—and manage our network as a system in a way that we have not had to do before. Indeed, just going back to the investment ahead of need, because that is all part of this, we—UKPN and WPD—are carrying out trials, in order to deal with the challenges we face now. Far from wanting to resist investment ahead of need, we are actively carrying out trials with the agreement of Ofgem to invest ahead of need where we can ultimately save money for the customer by building now.

**Chair:** Thanks. Appreciated.

**Q237 Matthew Pennycook:** Could I turn the panel's attention to interconnection? I have a series of questions that are mainly for Ms Ramsay, but Mr Sheppard and Mr Glover, do feel free to chip in. It would be useful to start with a summary or a status update of all the planned and proposed interconnectors that are expected.

**Charlotte Ramsay:** I can do that. National Grid has quite a significant portfolio of interconnectors. We own two of the four interconnectors connecting to the UK at the moment. That is the IFA interconnector, with 2 GW to France, and the BritNed interconnector, with 1 GW to the Netherlands. In addition to that, there are a further four in development within our portfolio. There are the two under construction, one to Norway, 1.4 GW with the NSL interconnector, and a further one to Belgium, 1 GW with the Nemo interconnector. Specifically within the European Business Development remit—that is the two interconnectors under development that have not yet reached final investment decision—we have 1.4 GW going to Denmark and a further 1 GW going to France.

**Q238 Matthew Pennycook:** Could you tell us a bit more about IceLink in particular? How is that likely to proceed? What are the opportunities and challenges?

**Charlotte Ramsay:** Yes, certainly. I can do that. IceLink is one of the other interconnectors in our development portfolio. Along with IceLink, we are exploring opportunities for further connections to mainland Europe and Scandinavia, over and above Viking and IFA2.

IceLink is something of a special case, because it does not have the same business case or commercial case as a traditional point-to-point interconnector. Iceland is a very small country—it has a population about the size of Coventry—so we are not connecting into a

power market there. The sort of commercial case that drives our other interconnector portfolio would be the arbitrage opportunity. Energy traders value the capacity on our link, and that is what drives the business case for National Grid. In the case of IceLink, it does not work like that. There is not a market to connect into, so the business case would be driven by whether or not there is value for UK consumers to connect into Iceland to access their hydro and geothermal energy resources.

The driver for National Grid is around first waiting for the Government-to-Government agreement between the UK and Icelandic Government to see whether there is something that can be a win-win for Iceland and for GB consumers at that policy level.

On the progress of the project, the first step is to have the Government-to-Government agreement and to see whether or not the two countries want to step forward to even start pursuing this project, and then National Grid as a developer—and there are other developers who are interested in building the cable—would be following behind. We are in the mode of providing costing information and the views around how much the cable part of the project would cost.

We see this as being a definite possibility. It is further out in the timescale of our projects. It is high-risk, and there are a lot of constraints—things like cable supply constraints, planning constraints and all those sorts of things—which mean that it is not something that would happen tomorrow. We are hopeful that at least Governments are talking, which means in the first instance that the project is more likely to happen than it ever has been, and it is something that has been discussed for decades. We found evidence of the IceLink project being discussed back in the 1970s, so it is not a new idea.

**Q239 Matthew Pennycook:** It is fast by UK energy standards.

A recent report by Aurora Energy Research said, “The fundamental economics of interconnection dictate that Great Britain is likely to be a net importer of electricity from European markets in the future”. We know that with the mid-2020s crunch coming up, we might be relying more on interconnection. We have heard about the benefits in other contexts for consumers of general diversity of supply. Are there any risks inherent in interconnectors in terms of our security of supply, and what might happen to other European energy systems if they are under pressure? Are there inherent risks as well as benefits?

**Charlotte Ramsay:** With interconnection, it is one of the few examples of a win-win piece of infrastructure. Being better connected to other markets really can only bring benefits. Having a wider energy market for consumers to access brings down prices. Having other networks to link to and to rely upon improves security of supply. It provides us with access to renewable low-carbon generation, as well as providing new markets for our renewable generators to access.

In terms of introducing risks, I would bring focus on to the example of what would happen if there was a joint scarcity event between the UK and France. Your question is, would there be a risk of being interconnected to France that would somehow make our problem worse? What you see in reality is that being connected means that where countries can help one another, they will. Where they cannot help one another, at worst, the interconnector does not do anything; it does not provide any assistance. The rules and levels of co-operation around how TSOs work together with interconnection are very

highly regulated, and are described by European network codes. It is also a good demonstration of industry members working together to help one another. It does not really pose additional risks. It sounds a bit—

**Q240 Matthew Pennycook:** Are there scenarios in which we are reliant on interconnection for a greater proportion of our electricity supply going forward, where an event like that could mean that we cannot turn that tap on?

**Charlotte Ramsay:** It is important to make sure that the market signals are appropriate and that there is a fair and level playing field to ensure that the long-term investment signals maintain an appropriate balance of interconnection—the contribution of foreign generation, of home generation, of storage, of demand-side response. Interconnection is not a silver bullet to the energy trilemma, but it is a really important part of solving the energy trilemma. Until recently, there had been a bottleneck in new investment. What we are seeing now with a real uptick in new projects is filling a gap, whereas previously we were not accessing a really important additional part of solving the energy problems we have. For sure it needs to be part of a balanced mix. Getting the market signals right both in the wholesale energy market and in the capacity market, and any new markets that are created, is the important part of ensuring that there is the appropriate balance.

**Q241 Matthew Pennycook:** A final question from me. The National Infrastructure Commission has suggested, as they put it, a greater diplomatic role for Government in supporting interconnector development. To the whole panel, do you agree, and what specifically would that mean in terms of action on behalf of Government?

**Charlotte Ramsay:** Our experience over the last several years has been that Government have already been very helpful in this space. I would agree that there is a real diplomatic element to two countries being physically joined together. With a lot of the countries that we connect to, the decision making around whether or not you build an interconnector and how you connect two markets rests with the Government rather than with the regulator. That pushes our Government to also be in a position of facing off against a counterpart. Certainly over the last few years we have found Government helpful and active in that space of supporting British industry going out into new markets. Things like British embassies in the countries that we have been connecting to have also been very helpful in facilitating new investment.

**Q242 Rushanara Ali:** Can you say a bit about what organisations own and operate interconnectors and what the nature of the relationship is with National Grid?

**Charlotte Ramsay:** The relationship with National Grid, the system operator, is codified in a number of different aspects through the life cycle of the interconnector. National Grid, European Business Development and all of the interconnector projects and companies that we run are wholly separate from the UK core activities, which means that the relationship we have with the system operator is the same as any other connectee into the system.

You heard a description of how generators connect into the UK system and how they request access. The same thing is true for interconnectors. It is very much a customer relationship that is codified by the same rules. Through the Ofgem regulatory process, the award of the regulatory regime, you get scrutiny into that process to ensure that it was

open and transparent and the appropriate rules were followed to find the right connection point, let us say, on the UK shoreline. That optimises the outcome for UK consumers in terms of reinforcements in the transmission system. At that early stage, it is about a connection relationship that is the same as any other generator.

As you progress into the operational stage, the rules are again codified. The interconnector has to publish access rules, which explain to anybody who is interested—mostly energy traders—how to access and purchase capacity on the link. If there were any restrictions on the capacity available on the link, the system operator would be publishing this through an open and transparent methodology. Any other interactions would happen in the normal markets that you can see. Everything is codified through rules and processes, which, although maybe not of general interest to the general public, are all accessible to the general public.

**Q243 Rushanara Ali:** You would contend with the argument that there may be some conflict of interest? Some have suggested that there may be some conflicts of interest because of National Grid's relationship with interconnectors as subsidiaries.

*Charlotte Ramsay:* Where there is the possibility for conflict of interest, things like the codified methodologies and ways of interaction, and the customer relationship, mean that that conflict does not manifest itself. Decisions are not being taken at a group level about how the interconnectors are operated—either the interconnector as a company, who operate with their own separate boards, or how the interconnector interfaces with the system operator. There is potential for conflicts, and I think that they are thoroughly mitigated through the processes we have in place.

**Q244 Rushanara Ali:** One final question. Is it only National Grid subsidiaries building interconnectors, and would you see a role for competition in this sector?

*Charlotte Ramsay:* The way that the Ofgem regime—the cap and floor regime—works is that it is an open and competitive process already. If you look at the first round of the cap and floor regime, at the first window that opened, two other parties alongside National Grid have been awarded under the initial cap and floor, and there has been considerable interest in the second window from other developers, who are starting to see that this is a viable and open regime. This may be a question for Ofgem later on, but we have also been supportive of, and talking with Ofgem about, an open call for evidence they had last year around how to improve the financeability of the cap and floor regime in order to make it more accessible to companies beyond National Grid. It is definitely not a big area, and there are not a lot of competitors, but it is certainly growing and there is growing interest in the regime.

*Tony Glover:* Just to add to that, as ENA, as I said to the Committee in a previous session, we operate the OFTO Forum for offshore transmission operators, and have been doing a lot of work on onshore competition, looking after that on behalf of the key players. We are in the early stages now of forming an interconnectors forum that will bring together all these players with National Grid, so that there is in effect a separate voice. It will not be the voice of ENA, it will not be the voice of National Grid, but it will be the voice of the potential future interconnector players that we may have. There is a desire, as Charlotte has said, for more players to be involved.

**Q245 Chair:** Charlotte Ramsay, you said that interconnection brings benefits. With the IceLink—I know it has been in embryonic stages since the 1970s—what thought have you given to connection with the Faroe Islands and with the Scottish islands as well with that link as it comes through? It would seem that if you are not using geothermal or hydro, you could be using wind from these four island locations.

**Charlotte Ramsay:** Yes. Certainly the link into the Faroes has been part of the discussion when we have been talking about IceLink, and some members of my team have been to visit the Faroes to talk to some of the wind developers and the communities there. It is something that the Icelanders are also particularly interested in. They feel and see a connection with the Faroes in particular. It has to become part of the overall project optimisation. It is already a complex project just to try to achieve a point-to-point connection from the UK to Iceland. It adds a layer of complexity to bring in Scottish islands along the way or to bring in the Faroes along the way, but it should be part of the overall discussion to try to find an optimal solution. You start running into other challenges, because there are things like the challenge of creating multi-terminal HVDC connections. It is not completely straightforward.

It is something that we think about and are being encouraged to think about—how you can create offshore grids or offshore networks where they are optimal. As a commercial developer, it is something that National Grid are starting to turn our minds to in business development in a bit more of a focused way. We have done a lot of point-to-point interconnectors because the commercial case is really straightforward and it is really obvious how it brings benefits for UK consumers. We can see that there could be, under some arrangements, benefits for offshore grids such as connecting in the Faroes, but it would suddenly become of a more challenging order of magnitude with things like the commercial arrangements, the regulatory arrangements and the political arrangements.

**Q246 Chair:** A final point before I move on to James Heap. We are talking about the European grid and interconnection within that area. Who is responsible for ensuring that there is enough generation capacity to meet expected or projected demand in that area? I just hope it was not a blind market going on, and that we do not find ourselves in the California situation that there once was. Is there an overall system eye making sure that supply will meet demand?

**Charlotte Ramsay:** From a European perspective, ensuring that everything connects up together, ENTSO-E play a strong role there. They publish regularly their summer and winter outlooks to see what is going on across the mesh network. Certainly something that we have found as interconnector developers is that, as you start making the connection into other system operators, you are building those physical links, and it means that you are also building that human link.

**Q247 Chair:** Is there an overall eye making sure that there is going to be enough in the connected area, or are we just hoping the market sorts itself? Let us say the Czechs or the Germans take a sudden move and decide they are not playing any more, and we find we just cannot get the electricity we want for the demand in the interconnected area.

**Charlotte Ramsay:** That is the role of the internal energy market. If the internal energy market is functioning well, that should ensure that there is this overall eye. We do not have a single entity that ensures security of supply overall. In terms of member state

sovereignty, I do not think any member state would want that, and there has been some resistance towards the idea of a single European TSO, let us say. What happens is that entities like ENTSO-E perform that function of bringing together TSOs to ensure that there is an overarching vision, which means that then, at member state level, you can ensure that there will be sufficient generation to cover an entire interconnected area.

**Q248 Chair:** Would Brexit have any effect on this, or any influence, or lead to any change?

**Charlotte Ramsay:** Undoubtedly there would be some disruption as we work out how we re-engage with some of the European institutions. One experience that we have had on the interconnector side is looking at how the Norwegians engage with the energy market. They have certainly worked very hard to continue to be influential in a space where they want to be interconnected, both physically and through their markets, and they also want to continue to be influential to make sure that changes in Europe do not change things for the Scandinavian area. Being outside the European Union, they have had to work very hard to continue to be influential, and they have managed it. Looking at the Norwegian example, would Brexit make a difference for us? Yes, it would, because we would have to try even harder to be influential in that space if we wanted to continue to access and change things for the good of UK consumers as well as the overall European consumer base.

**Q249 Chair:** Thank you very much. To wrap this session up swiftly and promptly, I am going to move over to James Heappey for a variety of questions.

**Q250 James Heappey:** Before we move on to the conflict of interest, I want to talk about interconnection for slightly longer.

I have here the statistics for the amount we have been drawing, principally through the French and Dutch interconnectors, over the last year. They have been running pretty much at their maximum import for the entire year. There have only been two occasions when we have been exporting to France—that was very, very brief—and, as far as I can see, two occasions when we have been exporting to the Netherlands. Most of the time, National Grid has been choosing to import the absolute maximum capacity. You make money when you do that. It just strikes me as more than a coincidence. As we develop more interconnection capacity, can we assume that we might coincidentally be running those at maximum capacity as well?

**Charlotte Ramsay:** I would pick out a few different things there. First, National Grid, as the system operator, and the interconnector companies do not choose which direction the interconnector flows in. It is to do with market price differences. The power will flow from low-price markets to high-price markets. The reason why you have seen power flows into the UK the majority of the time is that the UK is a higher-priced market, and our consumers are benefiting from being able to draw power from the lower-price markets of mainland Europe. We do not choose when the power flows.

The second point is the interconnector business makes money whichever direction the power flows in, because what we are doing is selling our capacity to energy traders who want to trade across borders. Whether they sell power from the UK to mainland Europe or vice versa, our business is run on the basis of just selling that capacity. We do not care which direction it flows. The market will determine that.

**Q251 James Heappey:** With the security issue, I accept absolutely that interconnection is a way of balancing the prices between the markets, but if we have been running on average at 3 GW of imported power through the interconnection from Holland and France, and we intend to expand that, what impact do you foresee on the domestic generation market, and does that give you cause for concern over security of supply?

**Charlotte Ramsay:** This comes back to the point of how you make sure you get the appropriate balance. For United Kingdom consumers, they are looking for secure supplies, they are looking for sustainable supplies, and, really importantly, affordable supplies.

**Q252 James Heappey:** Exactly. Principally, everybody is looking first of all at the price. So we have 10 or 12 GW of interconnected capacity available to us, and in the short and medium term, once that capacity is built, it is predominantly an inflow of energy. We may come to realise at some point in the future that the impact of that has been that we have insufficient domestic generation capacity, because we have not needed it because we have been drawing the full amount through interconnection. That worries me a little.

**Charlotte Ramsay:** To assuage the concern, at the moment we are not very heavily interconnected. We have 4 GW of interconnection, and we are looking at about between 9 and 11 GW being on stream by the early 2020s. While that is a proportion of the total generation base in the UK, it is still a relatively small proportion.

What we see is a focus on trying to improve the wholesale energy market's competitiveness and create an ever more efficient capacity market that delivers on its aspirations, and a good focus on creating other new markets that allow all different things—not just domestic generation, but also domestic demand-side response and storage as well as interconnection. That good focus on trying to improve market signals means that you can be confident that the right mix will come. There is a good focus on markets being able to send the right long-term signals for appropriate investment as well as short-term signals that mean that we operate the system as safely as possible.

**Q253 James Heappey:** I have a note that says, “Get your skates on”, so I had better rattle through the remaining questions.

National Grid will make more revenue under future revenue controls if it has a greater regulatory asset base. Does this give it a marginal preference for building out infrastructure, rather than making more effective use of smart grid systems or demand response?

**Phil Sheppard:** One of the clever pieces of regulation in RIIO is that we are incentivised around our total expenditure. That is a combination of revenue and CapEx. Therefore there is an incentive on National Grid as a TO, as it is with all TOs, to find ways of not building and delivering an output that is part of the regulatory deal. If we can find a way, similar to the Orkney example, of spending half a million pounds and getting the same output as £300 million<sup>3</sup>, then we effectively share the benefit of that internally to National Grid or the TO that is doing that, and the other half of that goes to consumers. It is a very powerful tool, a very big change in regulation that is incentivising us to do the right thing.

---

<sup>3</sup> Subsequently corrected to £30 million, see Q255 below.

**Q254 James Heappey:** I know you are very sensitive to any charge that there is a conflict of interest between the businesses. Would you talk us through how you prevent that seepage of sensitive information?

Also, how much staff turnover is there between the system operator part of your company and the European business development part of it? Is there a mechanism for quarantine for employees who are moving between the two? Are you two allowed to have lunch together?

**Phil Sheppard:** If Charlotte came to visit me in Warwick, she would be treated as an external visitor and escorted to the meeting room. We would have the meeting, and then she would be escorted out. We are physically in different locations, with different security systems, and our IS systems are all separate. In terms of that process, the governance is different. We have different boards. Our main board have all signed undertakings that they are never going to require or allow a licenced entity to breach its licence as a consequence of actions. There are a whole load of very thorough rules and regulations around that.

We have a whole piece of internal assurance. We have group assurance, and we have third party assurance around that. Because all this is very transparent, Ofgem spend a lot of time making sure that we do the right thing. There is absolutely no incentive for us to breach the rules—the consequences are huge. It is just not in our interest. Our policy is, do the right thing. That is how we describe our ethics. That is how we describe our processes, so we do the right thing.

In terms of turnover, it is not huge, and there is a process. To give you an individual example, a colleague of mine a couple of years ago wanted to join the interconnectors business. The day that decision was made, all the IS systems were shut down—all his access to information—and he spent a pleasant summer gardening before he was allowed to join the interconnector business, to make sure that any knowledge he might have, or any legacy information, was not current at the time he moved across to start in the other business.

**Q255 James Heappey:** Last month we saw documents leaked, purportedly from DECC, regarding the creation of an independent system operator, which was reported in *The Times*. I am asking you whether turkeys should vote for Christmas, but what is your attitude to the creation of an ISO, and how would you advise DECC to proceed?

**Phil Sheppard:** We are currently working with DECC and Ofgem looking at what Amber Rudd said in her recent speech was a greater separation of the SO. There is some benefit, we can see, in separating and addressing some of the perceived conflicts of interest. In terms of timing for an ISO, we do not think that is in the best interests of consumers at the moment.

If you look at the models used elsewhere in the world, there is a whole raft of market rules that have to work with an ISO, because the incentivisation and the methodology of delivering value to consumers is very different. Injecting that sort of uncertainty into the UK market at this point in time seems counterproductive.

If investors are looking for certainty around making investments, and increasing that certainty, introducing an ISO and, consequentially, a potentially large raft of market

changes in order to make that work effectively, does not seem the right timing. We are not saying never—at some future point it may be appropriate, but certainly not in the short term or the medium term.

**Chair:** Thank you very much. Thank you for coming in this morning. We do appreciate your time and the expertise you share with us. Thank you.

**Tony Glover:** Could I just say one thing? Forgive me. When referring to the excellent Orkney smart grid, I may have said £300 million. I meant to say £30 million. My over-enthusiasm got the better of me, but it is still a fantastic saving on what it could have been.

**Chair:** What is a factor of 10 between friends? Thank you.

### **Examination of Witnesses**

*Witnesses:* **Maxine Frerk**, Acting Senior Partner, Networks, Ofgem, and **Andy Burgess**, Associate Partner Energy Systems, Ofgem, gave evidence.

**Q256 Chair:** Thank you, panel, for coming this morning. You are both from Ofgem. Would you state your names and positions at Ofgem for the record, please?

**Maxine Frerk:** Maxine Frerk. I am the interim senior partner for networks.

**Andy Burgess:** I am Andy Burgess. I am associate partner for energy systems.

**Q257 Chair:** Thank you. We are here to discuss how regulations can help develop low - carbon network infrastructure. I will begin with your network innovation stimulus, which in evidence to this inquiry has been widely praised, you will probably be pleased to know. Do you accept, however, that there remains an unfunded gap between trialling and commercialisation?

**Maxine Frerk:** I do not accept that. Our innovation funding mechanisms have a number of different elements, as I think you have probably heard through the course of your inquiry. We have network innovation allowances, which are for small projects that can be quite early on in the research cycle. We have network innovation competitions, which provide bigger sums where capital investment is needed to start development and demonstrate projects in the field. We have an innovation rollout mechanism for the companies who have something they believe is demonstrated to be of benefit to consumers and who need additional funding in this price control to roll those out. Across that, we see funding giving support across all the different stages of development of innovation. There are some real examples, as we discussed in the last session, of companies taking innovative projects that have been funded through our innovation allowances, and turning those into business as usual, whether it is around active network management or flexible grid connections. I do not see a gap in support for network innovation.

**Chair:** I like confidence, and I am pleased to hear that. I would appreciate it if you could give us some examples in writing after this. I think it would be useful. Before I go on to Tom Blenkinsop, Rushanara Ali, do you want to follow up on anything here?

**Q258 Rushanara Ali:** I had a question about the fund. We understand that £245 million of the £400 million has been used so far. Could you explain the underspend? Is that because you do not have sufficient numbers of organisations taking up the innovation challenge?

**Maxine Frerk:** We have a maximum amount that we can give away in any one year, and it is dependent on what projects come forward. We do not always award funding to all the projects that came forward. Last year, there were two projects that came forward that we felt were not quite developed enough in their thinking to be confident that they would give benefit to customers. We are dependent on companies coming forward with enough projects. Some years, we are oversubscribed, if you like, and some years we do not get enough.

**Rushanara Ali:** What could you do to try to drive the agenda further, so that more companies come forward and there is more awareness of the possibilities and the opportunities? It seems you could potentially do more to attract new innovators.

**Maxine Frerk:** One of the things that we are keen to do as part of that is bring in more third parties as partners for the network companies. Many of the ideas will come from third-party companies who think they have some way that they can help. ENA run a portal for companies who have an idea and want to find a network partner, and we are doing some work at the minute. We have a consultation out that is just closed, trying to find out what more we can do to involve those small third parties who might have innovative ideas; how we can better bring them into the process, as you say, to help make sure that we are getting as many good ideas as we can.

**Q259 Tom Blenkinsop:** Should storage be classified as a distinct asset class rather than just generation? I know my view, but what do you think?

**Andy Burgess:** It is probably best if I answer this one.

Storage is one of the five priority areas we are looking at in a piece of work on something called flexibility in the energy system. What we are trying to do is look at how storage is treated, and make sure it can compete on a level playing field with other forms of flexibility.

Defining it as a specific asset class might be the answer, but from the analysis we have done so far that is not the immediate solution. It is a question of making sure that storage is a viable option in all the relevant markets; making sure that people understand where it fits in; looking at how it is charged to make sure that there is no double charging of storage; looking, with our colleagues in Government, at environmental levies, to make sure storage does not pay them twice; and making sure it fits into the overall system.

We will, together with DECC, be issuing of a call for evidence, a joint document, which will include questions on storage. One of the questions we will be asking is about licensing and asset categories. It might be that a modified generation licence is the best option, but we think that the priority is to make sure that storage can compete in relevant

markets, and that those who want to invest in storage, because we think it has quite a big future, have a bit more certainty about how it can operate, and what sort of markets it can be active in.

**Q260 Tom Blenkinsop:** Could you foresee any problems if you had a modified asset class for storage?

*Andy Burgess:* If you have a modified generation licence, that is not particularly a problem. If you create a new licence, then it is a question of what goes with that licence. You would need to amend primary legislation to create a new licence category. We would need to check that whatever we were doing was consistent with wherever European law was going, because storage is quite an important issue at European level.

There are no fundamental obstacles. I guess the big question is whether that is the solution or whether it is more about how storage fits into different markets. I think storage sometimes is generation, sometimes is demand. The important thing is to treat it in the right way depending on what use it brings to the system.

**Q261 Tom Blenkinsop:** The National Infrastructure Commission has recommended that network companies be allowed to own and operate storage. What do you think about that? What do you think the pros and cons are on that?

*Andy Burgess:* Our principle is that we want to see competitive markets develop—generally competitive markets and flexibility—and storage is part of that. Procuring storage is fine, and using storage is fine. Owning and operating storage immediately raises some issues about whether you can develop a natural competitive market for storage if you allow natural monopolies, particularly with regulated income, to start playing in those markets. Therefore our principle is that the network companies should not own or operate storage. We recognise there might be some exceptions to that based on particular circumstances or needs, or where you define storage as something where you just could not develop a competitive market. However, we think if you want competitive markets to develop it is important to keep the regulated monopolies out of them.

**Q262 Tom Blenkinsop:** The National Infrastructure Commission has also called on Ofgem to start on an immediate review of the regulations and commercial arrangements surrounding demand flexibility. Will you be doing that? What exactly do you think needs addressing?

*Andy Burgess:* We are already doing a major piece of work on flexibility. We published a document on 13 September last year. We have five priorities: storage is one, and aggregators and the role of industrial and commercial customers in demand-side response are two of the others. The move to the DSO and DSO-TSO relationships is another one, and charging is another one. We are also working jointly with DECC on a broader piece of work on flexibility. That would be subject to the call for evidence that I mentioned earlier.

To go back to demand-side flexibility, I guess our focus is primarily on what might be impeding the larger customers, the industrial and commercial customers, from offering demand-side response more. The reason we are prioritising that is that all the available research shows that for domestic customers it would take quite a lot to engage them in demand-side response. I think many domestic customers are still trying to get to grips with the existing market, let alone demand-side response.

For the industrial and commercial side, there ought to be natural economic incentives to try to save money, so we are interested in what might be impeding them from acting in this market. Part of it is the same as with domestic customers. It is about confidence, about knowing what they are buying and having confidence that their bottom line will not be affected adversely if they get it wrong. Therefore we are engaging with industrial and commercial customers. We have issued a survey to them to try to understand better the challenges they face. We are also very interested in National Grid's power responsiveness campaign, which is trying to do the same thing—to increase engagement of industrial and commercial customers, which we think is a very positive step in the right direction.

On aggregators, it is a bit like storage, in that they are a new entity, and we want to see how they fit into the system, but they are another source of demand-side response, as are a variety of third parties who could come into the market. We are very interested in new business entities who might want to come into this market, and making sure that the rules in the sector allow third parties to operate and, in this case, offer more demand-side response.

**Q263 Tom Blenkinsop:** On the impediments you talk about, do you think the slow pace of change in regulation to do with technological changes has been an impediment as well?

*Andy Burgess:* I would not say it has necessarily been an impediment so far. If we do not do anything, it could be an impediment, so we are very conscious that the existing market rules were written for an old world that is rapidly changing. What we do not want is for some of the existing regulatory or commercial rules to be the barrier to something happening, so we are very actively trying to identify what the barriers are and then remove them if they are unnecessary.

**Q264 Glyn Davies:** I want to ask you one or two questions about distribution system operators.

The National Infrastructure Commission is recommending that enabling the transition to more actively managed local networks should be a Government priority. Does that equate to establishing distribution system operators? Do you agree with that?

*Andy Burgess:* Again, it is part of our work on flexibility. A distribution system operator is essentially a more proactive, creative, dynamic network operator. Having active network management and having a range of options in managing the system is part of the move to a distribution system operator, and that is something that we think needs to start to happen now. In fact, it is already happening.

We have been telling the distribution network operators that it is for now and not for the future, and we have been looking at how the role might develop over time and how you might start to see more of a blurred line between distribution and transmission, and who makes decisions on what. We would agree with the recommendation. It is an important area, and we expect the network companies to respond to it.

**Q265 Glyn Davies:** Are we moving quickly enough in this process? Some of our written evidence calls on Ofgem to make provision for DSOs now, before the RIIO-ED1 ends in 2023. Is that possible? Is it something we should be pushing for?

**Andy Burgess:** There is nothing to prevent the DNOs from becoming DSOs now, or at least the early stages of DSOs. Being more creative about dealing with a particular problem on the network; having an interruptible contract for a new generator; trying to have more demand-side response; trying to use storage—there is nothing in the current system that prevents them doing that. The incentives on expenditure to avoid artificial incentives to invest in infrastructure point them in the direction of doing the most efficient thing.

The key question is how far you go in having decisions at local level, and there needs to be quite a big discussion and quite a lot of analysis about how the future system develops. That is something we are actively looking at.

**Q266 Glyn Davies:** There is some criticism that it has been too slow. RenewableUK said that Ofgem have completely squandered the opportunity to make provision for DSOs when introducing RII0-ED1. Why did Ofgem not make provision? I am repeating the point that RenewableUK were making. Why did you not act quickly enough to deal with it? People outside are being critical of the pace that Ofgem have operated at.

**Andy Burgess:** First, the framework incentivises them to do the right thing and to do the efficient thing. As you heard, there is revenue sharing, so if they can deliver the outputs more efficiently by spending less and using more flexible resources, then the network companies will be rewarded for that and consumers will also be rewarded. So the framework is right, but then also, in our ED1 price control we assumed a certain level of benefits from smart initiatives and we took money away from the network companies. So it is a bit unfair to say we were not on the case, because we very much were.

**Q267 Glyn Davies:** Are you learning from what is happening in other countries where distribution system operators already exist? Denmark would be one example. There are probably other examples around the world. Are you actively going out and looking at how other countries are promoting this development?

**Andy Burgess:** We are working very closely with all the other countries in Europe. We are also interested in what is happening outside Europe. I spend a fair bit of my time with other European regulators in a distribution-systems working group. We published a document on the future role of the DSO in July last year, and we are doing more work on the DSO-TSO relationship and on other important aspects of the DSO role. We are trying to learn from other people's experience.

It is fair to say that there is no world leader in distribution system operation. Most countries around the world are facing the same challenges at the same time. Yesterday, I was talking to someone from Australia who is trying to address the challenge of DSOs; he is interested in the work that we are doing. Everyone is facing the same issues, which is quite a good thing in a way, because we can share experience and ideas and test different ways of doing things.

**Q268 Glyn Davies:** Am I right to assume that you do not see any reason why a distribution system operator should not be the same company as a DNO?

**Andy Burgess:** In principle, we think it probably makes sense for it to be the same company, because you introduce an extra complication if you separate it out. That is partly because of the number of distribution networks. We have 14 distribution network operators in this country. Would you want 14 independent distribution system operators, or would that just be an undue complication? We see it, essentially, as the same company, but the important thing is to make sure that the monopoly DSO does not impede competition, that there is the right level of regulatory control over what markets it can be active in and, as far as possible, that we have competitive markets providing services, rather than the DSOs.

**Q269 James Heappey:** Do you agree that the National Infrastructure Commission's recommendation that enabling transition to more actively managed local networks should be a Government priority? Does this equate to establishing distribution system operators?

**Andy Burgess:** I agree it is a priority. I am not sure it is a Government priority. I see it as a priority for us as regulator, and as I have just been saying, the move to DSOs starts now. It is something we want to see. We want to see more of it. We are doing some thinking on the scale of it and how far people should go. I think it is a priority in terms of getting the best out of the future energy system and having the right result for consumers.

**Q270 James Heappey:** Forgive me, I went off on the wrong track there, and I apologise profusely.

It has been frequently observed, including by this Committee, that there are potential conflicts of interest in National Grid. You heard their response to those questions earlier on. How do you monitor these, and how satisfied are you that National Grid is doing as it should in this regard?

**Maxine Frerk:** As you have already picked up, there is the potential for conflicts of interest, and that comes from their role as SO owning the interconnectivity, and also their role as SO owning network investment. We have had to grapple hard with how you deal with those conflicts of interest. Particularly when DECC introduced EMR, they thought about the conflicts of interest involved there. When we put new obligations on Grid to do its network options assessment as the SO, effectively saying what additional network investment was needed, we thought about conflicts of interest there. We are thinking about them again in the context of onshore competition for networks, where we would like Grid to take on a bigger role.

As you heard, they have a number of obligations in licence, and they have to submit an annual report to us that sets out how they have complied with those strictures in licence about legal separation, building separation and employee separation. They have a number of specific rules that they have to abide by, and they report to us on what they are doing on that front. In our general market monitoring, we would expect to pick up if there was something where the SO was taking some balancing action that looked odd to us in that context, and we could follow that up. I am sure industry would be quite quick to come knocking on our door as well if they felt there was something going wrong. We are confident that, at the minute, we are able to manage those conflicts, and that there are not any issues.

Clearly, as we want to give Grid a bigger role going forward as we have onshore competitive, and we would like them to be taking some of the roles that we are not technically competent to do—evaluating tenders, for example—the bigger the role you give them, the more those conflicts arise. That is why we have this debate now going on about the need for even greater separation of the SO role, which goes with a desire to give them bigger responsibilities.

**Q271 James Heappey:** What are the mechanisms by which you can hold them to account? What are the mechanisms for when you can say, “We think that you are doing something here that is not quite right”, right the way through to sanctions if you are convinced that they have wilfully blurred the line?

*Maxine Frerk:* As you say, there is clearly a spectrum between a conversation and ultimately taking enforcement action if they were in breach of their licence—these things are set out in licence. That involves being able to impose financial penalties on them, up to 10% of turnover, so we have a big stick if we need it, because they are set out in licence in that way.

**Q272 James Heappey:** If the Government were to create an independent system operator, would it be best for this to be directly under DECC control, or would you want to control it, or should it be an entirely separate public entity?

*Maxine Frerk:* The importance of having an independent system operator, in our view, it that it is independent of Government, as well as independent of National Grid. So if there were an ISO, we would expect it to be a licensed entity that we regulated in the same way as we regulate Grid.

**Q273 James Heappey:** Presumably you prepare for such an eventuality. I am keen to understand what you would like it to be; a completely standalone entity, or something that comes under DECC, or—

*Maxine Frerk:* At the minute we are part of the conversations. This will ultimately be a DECC decision looking at whether we need to go all the way to an ISO model or whether some greater separation now would be sufficient. I was answering your question by saying that if we were in the ISO world, to us that means we would want it to be independent of Government as well. That is an important part of maintaining confidence in the whole energy infrastructure regime—that you have somebody who is independent and taking decisions in customers’ interests. The way that we would expect to do that would be that it would be a licensed entity, as the SO is now. It would just be separate from Grid rather than part of the Grid organisations.

**James Heappey:** Thank you, and apologies for the false start.

**Q274 Matthew Pennycook:** I have a few questions about gas and heat networks and then a couple on the whole-systems approach. Time is pressing, and I hope we can rattle through these pretty quickly.

**First, on the gas networks, we heard in the last session about the increasing use of biomethane, or the consideration of biomethane, and hydrogen, and the ease of plugging that into the system. What support do those networks receive from Ofgem in terms of**

**the innovation fund? What do you do to share information, ensure that these gases are injected at safe levels and monitor performance where this is taking place?**

**Maxine Frerk:** The first thing to say is that our statutory role covers gas going through pipes. It does not matter if it is hydrogen or if it is biomethane or natural gas; it falls within our ambit. What we are doing falls into perhaps three areas. There is a bit of business as usual, as you implied, in making sure that when new biomethane plants are connected to the network, that is done consistently with safety and gas quality regulations, and in encouraging companies through the RIIO framework to offer connections and proceed in a speedy way and help customers get connected. In the last year, we have seen a twelvefold increase in biomethane being connected to the network. That is something that is happening on the ground now as a part of our business as usual work.

We then have the second strand, which has been alluded to—the innovation funding. We have funded a number of significant projects through that. There is a big project in Oban looking at the impact of different gas quality on the effective operation of appliances to help us make the case for allowing a wider spec of gas on to the network. This year we have funded some work on synthetic biomethane, Syngas, for one of the companies to look at how that could be used. NGN are using part of their network innovation allowance to look at the potential for hydrogen around Leeds. A number of different projects coming through the innovation funding are helping that thinking get going.

Finally, there is a bit about helping to take that debate forward. Certainly biomethane is being connected now and is part of the mix. How far you can go with that is a question. Hydrogen is still at the early thinking stage but could be an important part of the mix. In fact, there are debates around the use of gas in transport, which is not necessarily low-carbon gas but is an alternative use of gas that is helping the general decarbonisation agenda, because it is lower-carbon than using fuel. Again, we had an innovation funding project looking at the use of gas in HGVs, trying to get that debate going. We have kicked off our own horizon scanning project recently, trying to look further out and help think about what the future landscape might look like. I think quite a lot of our pushing of the companies has led to National Grid publishing a report recently on the future of gas. The ENA are doing some work as well, so the industry is now beginning to coalesce and be a bit more proactive in thinking about what that future might look like.

**Q275 Matthew Pennycook:** Turning to district heating, the ADE has called for a regulatory investment framework. Do you think that is a good idea, and what would Ofgem's role be in facilitating that?

**Maxine Frerk:** In contrast to what I just said on gas, we do not have a role more broadly in heat. We have not done any major thinking in this space. Following a discussion with your predecessor Committee, we committed to publishing some thoughts about what was needed in terms of additional consumer protection around all the various forms of off-gas-grid heating. We published that last December. That touched very briefly on the question about whether you should have network regulation within the heating market, but we have not done a significant amount of work in that space, because it is not within our remit unless we were asked to pick it up.

**Q276 Matthew Pennycook:** But you are aware of what is going on around the country. I have seven of these district heating schemes in my constituency. I did a survey of thousands

of customers. The standing charge for the new plant kit varies widely, even in the same development. It is a very high standing charge per month. Even when someone goes on holiday for four months, they come back and they have a bill for a standing charge of £200. Do you think it is fair to say that these district heating customers are being used as guinea pigs, in a sense, for the roll-out of new infrastructure? They are paying for the roll-out of new infrastructure. Is that a fair comment?

**Maxine Frerk:** Our report published last December raised some of those same sorts of issues, and Which? has raised concerns about the very different levels of prices being charged. You have the problem that once you have a district heating system in place, it is a monopoly. Customers cannot change supplier. There are a number of different ways to address that. It does not have to be through network regulation. I think you are aware that there is a voluntary code in place. On whether that could be given more teeth, there is the EMA, and there are general consumer protection regulations that could apply in this area. There are a number of different ways that it can be addressed. I am not sure it is about them being treated as guinea pigs at this early stage. I think there is an inherent issue in the fact that it is a monopoly provision of a service that has a long infrastructure cost.

**Q277 Matthew Pennycook:** It is the consumer rather than Government paying for the roll-out of the long-term infrastructure. That is my concern.

I have two questions on the whole-systems approach. There has been criticism that Ofgem fails to take a whole-systems approach. Do you think that is fair? I assume not. If not, what is being done by Ofgem to facilitate a whole-systems approach?

**Maxine Frerk:** If I can kick off on this, I might then pass over to Andy if he has anything to add.

We absolutely recognise the importance going forward of a whole-systems approach, looking across gas and electricity together and increasingly looking at the boundaries between transmission and distribution, which are expected to blur. We absolutely see it as critical. In our last restructuring—so from the beginning of January—we created a new energy systems division, which was intended to respond specifically to that challenge. Andy is part of that division, so I don't know if there is anything you want to add to that.

**Andy Burgess:** Just a couple of things. We recognise that it is important. As Maxine said, we put together various bits of the office designed to have a whole-systems approach. The part of the office that I am in, which is dealing with flexibility, storage and DSOs, is the same bit that also does the wholesale markets, so that we can look across the piece, and we also have a gas team so that we can look at gas and electricity and start to develop more of a whole-systems approach.

We recognised in the review that we are conducting of our network innovation competitions that we don't want to just have very narrowly focused innovation projects. We want projects that can benefit the system as a whole, and if necessary, we need to change the rules of the competition to make sure that happens. It is something we are very conscious of, and we hope to deliver some of the thinking in due course.

**Q278 Matthew Pennycook:** An easy one for me to finish on. Do you think there should be a systems architect, and if so, what would it look like?

**Maxine Frerk:** Again, the problem that the systems architect is trying to solve is one that we absolutely recognise, which is that needs to be joined up end-to-end. What I am not convinced of is the need for a new body in what is already quite a complicated landscape, with different responsibilities shared between what we do, what Grid does as SO and what Government does. There is the work that is being carried out by the Energy Systems Catapult and the IET, which is trying to go back and say, “What is the problem that we are trying to solve? What are the functions that need to be dealt with?” Then we can work out who is best placed to solve them, rather than starting with the answer being a new body.

**Q279 Matthew Pennycook:** You think greater co-ordination gets you there.

**Maxine Frerk:** Yes, I think greater co-ordination is vital, and that should be able to get us there.

**Andy Burgess:** I think it is about having coherent system architecture rather than necessarily having a single architect.

**Matthew Pennycook:** Thank you.

**Antoinette Sandbach:** That very neatly takes me on to generation connections, which is where we started this morning at 9.30 am.

**Chair:** The circle of energy.

**Antoinette Sandbach:** It is.

**Q280 Antoinette Sandbach:** We were exploring the quicker and more efficient distribution connections project. Can you update us on where that is at?

**Andy Burgess:** Yes. As you know, we have been looking at what we and the distribution network companies can do to speed up the process of getting a connection. Where we got to—I think we published something a couple of months ago—is that we think the distribution network companies can make better use of the existing capacity. That means looking at connection queues, because sometimes people get a connection offer and then they cannot get planning permission and they are effectively sitting on capacity. We want there to be a form of “use it or lose it” applied to connection queues.

We have also been pushing the distribution networks to have more flexible contracts with generators, so that generators can connect quickly in return for having an interruptible contract, so that if there is a problem on the system the network company, or possibly the SO, can do something about that. I think there are examples in the south-west of England, where there have been lots of constraints on the system and the solution has been to have more active system management, including involving National Grid, to manage the problem and allow people to connect in the meantime.

The other areas we have been looking at are more to do with anticipatory investment—how we strike the right balance between getting the network companies to plan ahead and protecting consumers’ money. If the network company invests and the investment is not needed, then consumers ultimately pay, so we want to get the right balance.

**Q281 Antoinette Sandbach:** I am glad to hear that. Earlier you were discussing the whole-systems approach. Often consumers in rural areas are hit from any which way. They cannot access dual-fuel deals because they are not able to access the gas grid, and because they are at the end of the line in terms of transmission, very often their connection costs are prohibitive for renewables. Looking at your whole-systems approach from a consumer angle, are you looking at the impact on rural consumers, and is that something you will take into account when looking at this potential new pricing mechanism?

*Andy Burgess:* We are interested in how the overall system benefits consumers in general, and what we will probably see in future is greater differentiation between different types of consumers. Some consumers who are further away from the grid will have more energy use options in future. If you start to think about having batteries at local level, people having their own generation of some sort and people having heat pumps, people could become more self-sufficient and less dependent on the grid. That could be a real solution for people in rural areas.

We are also looking at what different scenarios might mean for the overall costs of the system and how that might pan out. If you have more and more people who are self-sufficient and not using the network, what does that mean for the overall costs of maintaining that network, which has a very high fixed cost? We want to make sure that is dealt with fairly as well. We are very conscious of the effect on different consumers, but I think there are also some real opportunities for people to be more self-sufficient and to get their heat and light in different ways than has been the case in the past.

**Q282 Antoinette Sandbach:** That does require a high up-front capital commitment from them to be able to access that, particularly for customers who are struggling with bills. At the moment we have very low oil prices, but it was not that long ago that oil prices were extremely high for off-grid customers. That had a big impact in rural areas. What I am asking is whether Ofgem will take rurality into account in delivering that systems approach, because otherwise you will see a whole section of consumers who are effectively penalised because they are remote.

*Andy Burgess:* We want consumers to be treated fairly and have the right opportunities, so we will do that.

**Q283 Antoinette Sandbach:** Our current understanding is that Ofgem remains committed to locational charging, meaning that remote renewables pay the full cost of their grid reconnections. Is this appropriate when renewables often lack the flexibility of conventional plant in choosing where to site? I guess that is speaking about the bigger projects rather than the smaller ones.

*Andy Burgess:* As you know, at distribution level we effectively have locational charging. It does not necessarily mean that the whole cost is paid by the generator—it depends on the circumstances—but a significant proportion of the cost is paid by the generating customer, because of the burden placed on the system. The alternative would be for consumers in general to pay. We think at the moment the current system is probably right. It is different at transmission level, where I think, based on an overall feeling that the overall system benefits from more generation coming on, there is a certain amount of what is called user commitment paid by the connecting party. But overall, more of the costs are borne by consumers in general.

One of the things we want to do in looking at the whole-system approach is to compare the difference between the approach on transmission and the approach on distribution and think about what is right for the future. Because the old thinking behind the different distinctions between transmission and distribution is disappearing, we want to look at that kind of thing. I cannot promise anything, but we are trying to make sure there are not artificial differences between different types of arrangements for different types of network.

**Q284 Antoinette Sandbach:** You spoke earlier about queuing and the rush to grab a connection offer, which may well be because there is a substantial difference in price between the early connectors and the later ones in an area where there is, for example, wind farm development, where one connection may be £9 million or £10 million cheaper than another.

**Andy Burgess:** That is an area that we are looking at. As you might know, there are already some rules called the second-comer rules, which basically mean that if someone pays a cost up-front and then another customer comes along later, the first customer gets some money back. We are looking at whether those rules could be expanded, and that is in conjunction with DECC. We are also looking at the circumstances under which the distribution network might invest ahead of need and then get the money back later. One option is doing that by getting all the distribution network's customers to pay. Another is by the distribution network itself paying up-front and then recouping the money later. Another option we are looking at is where third parties can all put a certain amount of money on the table, and then the distribution network company can invest in reinforcing the network. You can trigger more investment there without risking any unnecessary investment that might be borne by consumers.

**Antoinette Sandbach:** That is encouraging to hear, I have to say.

**Andy Burgess:** We have active trials of all those different areas.

**Q285 Antoinette Sandbach:** Finally, again considering again the cost to consumers, I don't know whether you heard the earlier questioning in relation to charging around north Wales, where for historic reasons of east-west lines—obviously there is a devolved Administration now in Wales—the consideration of the charging is not looked at on a national basis but looked at in the way that the actual distribution lines run. Is Ofgem going to reconsider that and look at it on a national basis in the way that you can talk about Scotland as perhaps being an exporter of electricity? Those in the rural parts of Wales should not be paying more just because of a historical accident of the way that the transmission routes run.

**Maxine Frerk:** We do not have any specific plans at the minute to look at doing something different for Wales on charging, but as National Grid said, the way that the charging arrangements work for transmission—and it is the same for distribution—is that they can propose to us changes in the charging arrangements. The aim is ultimately for these things to be cost-reflective, and—

**Q286 Antoinette Sandbach:** It must be fair if you are a net exporter of electricity, which Wales is, particularly because of Wylfa. There is a total population in Wales of 3.5 million people, and an enormous amount of electricity generation that comes out of Wales. If the

question is one of fairness to consumers, can I ask that you at least consider that or have it on your horizon when you are looking at your charging mechanisms in the future?

**Maxine Frerk:** I think it is certainly fair to say you have made the point, so it is on my horizon.

**Antoinette Sandbach:** Good.

**Maxine Frerk:** As Andy has indicated, a lot of work will be done on charging in general, so I take your point.

**Antoinette Sandbach:** Thank you.

**Chair:** In areas that are generating a lot, quite often their consumers are costing a lot as well. Glyn, you wanted to come in.

**Q287 Glyn Davies:** Yes, just one question. It is helpful for me to try to understand something relating to investing ahead of demand—perhaps National Grid would be the best to answer this. My understanding is if a generator asks for a connection, National Grid are statutorily obliged to provide it. That is the position. So what you might finish up with is National Grid having a massive scheme and having to take it forward when there is no actual generator who has planning permission. That is a huge waste of money. Are there any rules, standards or proportions of grid capacity used up that justify the investment? Or can there be almost no actual planning permission, but the National Grid is required to spend a huge amount of money preparing the transmission system?

**Andy Burgess:** It all boils down to people putting money on the table. At transmission level, if someone wants a connection to the transmission system they have to make what is called a user commitment, which means that they need to put a certain amount of money on the table for National Grid to then consider investing in the infrastructure. The money needs to stack up for National Grid to invest. That will only normally happen if you have generators at the end of the line willing to put that amount of money on the table. Sometimes when there isn't enough money on the table, it is a question of waiting to see whether circumstances change and there is enough money.

At distribution level, there isn't user commitment as such, but more of the cost is borne by the entity that wants to connect. There is an obligation on the distribution network to make a connection offer to that party, but then depending on where the party wants to connect, there is a certain cost that has to be borne, and the connection will only take place if the person wanting the connection actually pays.

**Q288 Glyn Davies:** What is interesting to me is that putting the money on the table is not beyond the financial capability of generators, because it probably does not have to be that great an amount of money. Of course, if you get enough money you have National Grid going forward and there is no planning permission granted at all. Then there is work on a stranded asset. There is pressure on the planning permission providers not to just leave a stranded asset and to deliver the planning permissions, otherwise they would not do so. Is that a fair reflection of the current system?

**Andy Burgess:** It depends. The bigger the investment in the infrastructure, if it is at transmission level, the clearer National Grid will be at an early stage about whether there

is planning permission or not, and probably the work will not be wasted. There might be a slight amount of it. At distribution level that is where you get into the queue problem, which I mentioned earlier, where you get smaller generators who ask for a connection, put a certain amount of money on the table and then effectively hold capacity even though they do not have planning permission. That is where we want the distribution network operators to be more active in talking to the people who have the capacity and trying to use it for other purposes so that more people with genuine capacity needs can connect to the network.

**Q289 Glyn Davies:** Can I make just one brief point? When the public try to find out from National Grid what the trigger points are, they will not tell you. You cannot find out. The public cannot find out what the issues are. It is just something that is kept within National Grid. I obviously speak from experience, but it must be general across the country. There is a deep frustration among the general public that National Grid are taking massive decisions on their lives and they cannot even find out where the trigger points are.

**Andy Burgess:** I find that hard to believe that National Grid cannot tell people where the trigger points are. Distribution network companies have things called heat maps, where they have a map of their network and it shows which parts of the network are most congested. I don't think those heat maps go down to street level, but they show an overall picture of where the networks are most congested, so I cannot really understand why National Grid could not do the same.

**Chair:** Thank you, panel, for coming in this morning and for sharing your information with us in this inquiry. It is very much appreciated. Thank you to both Mr Burgess and Ms Frerk for that.