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ECONOMY, ENERGY AND TOURISM COMMITTEE

Wednesday 23 May 2012

Session 4

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CONTENTS

ECONOMY, ENERGY AND TOURISM COMMITTEE
17th Meeting 2012, Session 4

CONVENER

*Murdo Fraser (Mid Scotland and Fife) (SNP)

DEPUTY CONVENER

*John Wilson (Central Scotland) (SNP)

COMMITTEE MEMBERS

*Chic Brodie (South Scotland) (SNP)
*Rhoda Grant (Highlands and Islands) (Lab)
*Patrick Harvie (Glasgow) (Green)
*Angus MacDonald (Falkirk East) (SNP)
*Mike MacKenzie (Highlands and Islands) (SNP)
*Stuart McMillan (West Scotland) (SNP)
*John Park (Mid Scotland and Fife) (Lab)

*attended

THE FOLLOWING ALSO PARTICIPATED:

Jeremy Baster (Orkney Islands Council)
Dr Richard Blanchfield (North Connect KS)
Duncan Burt (National Grid)
Ian Funnell (Scottish Hydro Electric Transmission Ltd)
Scott Mathieson (SP Transmission Ltd)
Paul Nelson (Allied Vehicles)
Ronald Peddie (AMEC)
Shane Slater (Element Energy)
Rebecca Trengove (Axeon)

CLERK TO THE COMMITTEE

Tracey White

LOCATION

Committee Room 4

Scottish Parliament

Economy, Energy and Tourism Committee

Wednesday 23 May 2012

[The Convener *opened the meeting at 10:00*]

Renewable Energy Targets Inquiry

The Convener (Murdo Fraser): Good morning, ladies and gentlemen. Welcome to the 17th meeting in 2012 of the Economy, Energy and Tourism Committee. I welcome members, witnesses and observers in the public gallery. I remind everyone to turn off all mobile phones and BlackBerry-type devices, which might interfere with the recording equipment.

The only item on our agenda is the continuation of our inquiry into the Scottish Government's renewable energy targets. I welcome our first panel of witnesses. We have with us Jeremy Baster, who is grid consultant to Orkney Islands Council; Dr Richard Blanchfield, who is deputy project manager and head of technical department at North Connect; Scott Mathieson, who is regulation and commercial director for Scottish Power Energy Networks; Ronald Peddie, who is from AMEC power and process Europe and is project director of the Lewis wind farm project; Ian Funnell, who is managing director of transmission at SSE; and Duncan Burt, who is head of customer service at National Grid.

Before members ask questions, would anybody like to make a brief introductory statement? It is not compulsory, but you are welcome to say something if you want to. Otherwise, we will go straight to questions.

Ian Funnell (Scottish Hydro Electric Transmission Ltd): Scottish Hydro Electric Transmission Ltd, of which I am managing director, is part of the SSE group but is separate in legal and regulatory terms. It is growing and it is impacted significantly by the work that the committee is considering.

We cover 70 per cent of Scotland's landmass. As a licensed transmission company, we are there to provide an efficient network for the generators, whoever they may be, to connect on to. Scottish Hydro, as was, has a very strong heritage in the north of Scotland and we are keen to build on that.

Jeremy Baster (Orkney Islands Council): I clarify that the main purpose of the job that I now do for Orkney Islands Council—I was formerly director of development services at the council, so I have lived and worked in Orkney for many years and know it well—is to ensure that the council's ambition that Orkney should have a major renewables industry is not frustrated by the lack of grid. I have been working on that for about three years. There has been slow progress and many problems remain. We will no doubt touch on those in the next hour.

Ronald Peddie (AMEC): I am a project director for AMEC, which is a FTSE 100 company. We are in a 50:50 gross asset value arrangement with EDF Energy Renewables to develop a large wind farm close to Stornoway. I have been involved in that for the past two years and have been actively engaged in discussions with National Grid and SHETL on the subsea interconnector to the Western Isles.

Dr Richard Blanchfield (North Connect KS): I will also get my tuppenceworth in. North Connect is a joint-venture project by Scottish, Norwegian and Swedish partners to build an interconnected power cable between Scotland and Norway by 2020. We hope that that will play a big part in helping Scotland towards its 2020 renewables target.

You might have seen on television last week the First Minister's visit to the main factory. It is all about the interplay between Scottish wind and the potential for storage of that power in the Norwegian hydro power schemes, which can help to smooth price volatility and the supply and demand balance up to 2020 and beyond.

Scott Mathieson (SP Transmission Ltd): In effect, I am here to represent SP Transmission Ltd. Our role is similar to the one that Ian Funnell described. We operate the transmission system in the central belt of Scotland and have a pivotal role in getting energy from Scotland to the wider market in Great Britain.

We have been acutely aware of the need for growth in the infrastructure to support the goals for renewable energy in Scotland. We have worked hard over a long period of time, through various industry groups, to deliver that and I am delighted to have the opportunity to discuss the issues surrounding that today.

Duncan Burt (National Grid): I am the head of customer services at National Grid, which is the Great Britain system operator for the electricity market, so we operate the network across Great Britain. We also manage the commercial side of the connections process on behalf of our colleagues at Scottish Power and SSE. In addition, we own and operate the gas transmission network across Great Britain and a number of gas distribution networks in England.

The Convener: Thank you all very much for your brief opening statements. We have a large

panel this morning and I am hoping to get through our questions by 11.30, but we have quite a lot of ground to cover. I have asked members to direct their questions to specific witnesses, as far as they can. If you want to respond to a question that is not directed to you, please try to catch my eye and I will bring you in if I can. Obviously, you cannot all answer every question, or we would be here until 11.30 tomorrow morning. I have also asked members to keep their questions as short and focused as possible. If you could keep your answers as short as possible, that would be extremely helpful.

The first issue that we want to explore is connection charges and delays in connecting to the grid. Rhoda Grant will ask the first question, about queueing.

Rhoda Grant (Highlands and Islands) (Lab): Community Energy Scotland made a submission to the committee regarding projects that would not get access to the grid because others that had not achieved planning permission had that access. It told us that, currently, a large number of dormant projects are jamming up the system and preventing viable schemes from connecting. Do you agree with that? I put that question to those who manage the grid—SSE, Scottish Power and National Grid. Has that become an issue?

Duncan Burt: At a transmission level, since the introduction of connect and manage—the new arrangements for connecting—in 2009, the picture has changed dramatically. Whereas I would have recognised that situation for transmission projects before 2009, the introduction of connect and manage has very much loosened up the process. We no longer have a queue for connection across Scotland at a transmission level other than in areas where we have particularly challenging consent or new-build conditions such as the islands, south-west Scotland and Caithness. However, I am conscious that, at a local level in some areas, there are still challenges for particular projects in transmission and distribution. I will let my colleagues expand on that.

Scott Mathieson: I wholly agree with Duncan Burt's comments. The idea behind connect and manage was to maximise the amount of generation that was sitting in the queue that could be brought on as quickly as possible because of the status of those projects' planning consents relative to other parties. Ultimately, however, connect and manage represents about 20 per cent of the overall package of solutions regarding connection to the network. What we are focused on discussing today is building the infrastructure to provide the additional capacity, which is 80 per cent of the solution. In recent years, a lot of our focus has been on building additional capacity in the interconnectors and connection circuits to ensure that every project that is viable and has planning consent can get connected as quickly as possible. In the transmission review process, which both Scottish companies have been fast-tracked on, there are a number of built-in additional incentives to ensure that the transmission companies provide quotations for connection as quickly as possible and, once a quotation has been accepted, that we get the developers on the bars as quickly as possible.

Ian Funnell: The connect and manage process is dynamic, and we review it. One recent example was that we granted consent to people further down the queue as developers ahead of them in the queue were unable to bring their projects to development. It is not a stagnant process.

Rhoda Grant: So developers cannot hold their place in the queue.

Constituents have said to me that they can get access to the grid, but not continuous access—it depends on capacity. It is almost as if some people are being given access, but others who are not at the same stage of development have priority, so those people will get access until the time when the others take up their priority place. Is that the case? That makes it difficult for people to develop projects, because they need secure access to the grid in order to get investment and make their projects stack up. People are concerned that the shaky system that is currently in place will not give them that security.

Duncan Burt: I recognise that description, and you are right that that can happen. As I said, the connect and manage process is very dynamic. If someone has consent and is ready to connect, we should be able to accelerate them, and we will go as far as we can to connect them. As Scott Mathieson said, that is subject to getting the assets and consent in place, and building the infrastructure. Given the number of on-going projects, getting all that together can take a year or two, or even a few more years, but that is not a significant issue.

Parties who are sitting around without consent should not be getting in the way of others. In particularly squeezed areas of the network, we are trying to get every megawatt on as early as we can. One example is the Orkney renewable power zone, where people flexibly come on and off based on the loading on the lines in real time. That is a smart approach to managing the system in the interim until the new grid capacity comes along. We are starting to replicate those arrangements in other agreements across northern Scotland and in other areas of the network across England and Wales. We are trying to get as many people on ahead of getting the infrastructure built.

We might say, "We can get you on next year, but for the first two years we will have to constrain your output a little bit during this particular transmission outage so that we can operate the grid securely." In effect, we are giving the connectee the choice of benefiting from getting on as early as possible, ahead of all the grid infrastructure being ready, but with the proviso that they agree to come off or reduce their output for a few months, for example, when we need to do a particular piece of work on the system.

I apologise for the long answer. I would explain the situation as one in which we are doing our utmost to help people to get on as early as possible, given all the challenges around consent and build. On your first point, no unconsented projects should be sitting in the way of consented projects, which we should get on as fast as we can consent and build the infrastructure.

John Wilson (Central Scotland) (SNP): My question is directed mainly at Mr Burt. We have been talking about the connection of renewables projects, such as hydro and wind projects. You have said that you will try to give priority to those projects that have received consent. What priority do you give the supply for renewables projects in the grid in comparison with existing nuclear, gas-fired and coal-fired power stations? We are managing to increase the number of renewable projects that are connected to the grid, but what priority do those projects have in comparison with Torness or Hunterston, for example, in terms of access to the grid? Does the National Grid give undue priority to ensuring that we continue to get power from the nuclear power stations?

Duncan Burt: Our duty is to act in a completely non-discriminatory way to ensure that we facilitate a strong competitive market for electricity supply. In that regard, we neither discriminate in favour of nor against any particular type or source of generation in terms of access to the grid, the speed and timescales for connection, or how we dispatch plant to manage that in real time. How we manage the system in real time is based on the prices that different parties put in and the economics of the market. That tends to mean renewable power because, obviously, its source of power is the wind and that is free at the point of delivery, and nuclear, which is more inflexible. Those two sources tend to be the last to be dispatched or reduced in output. I hope that that answers your question.

10:15

John Wilson: That does not really answer my question in terms of priority. We are not just comparing wind and nuclear power; we are also comparing hydro power. Some of the committee members visited a small-scale hydro scheme last week, where the local community has taken the initiative to connect the hydro plant to the grid. The connection to the grid has been secured but the supply is intermittent and is affected by, for example, the base-load from nuclear power plants. How much more renewable energy could be produced in Scotland if the projects were not being slowed down, closed down or shut off to accommodate that nuclear base-load?

Duncan Burt: From my overview of how we have balanced and managed the network over the past few years, I can assure the committee that there have been no instances in which we have reduced output from wind or any other renewable to allow base-load nuclear to run. That is not something that is played into our dispatch decisions. You will be aware that, on a number of instances, we have reduced renewables output—generally from wind farms in Scotland—to manage overloads on the transmission network. Indeed, I am aware that that also happens for some services on the distribution network. We have certainly seen output reductions from renewables where there is a limit on the capacity of the local grid, but we have not had to, at any point, dispatch down renewables to allow nuclear or fossil fuel plants to keep running.

John Wilson: It is in the local grid capacity that there has been a shutdown of the input from wind turbines in particular. When will we see improvements to the capacity to allow that energy to be transmitted into the national grid?

Duncan Burt: As the committee will be aware, there are a number of large on-going projects. The National Grid and Scottish Power were very pleased to announce recently the final decision to proceed with the western bootstrap, which is, if you are familiar with the terminology, the link that runs from Glasgow to Liverpool. That will deliver an extra 2GW capacity between England and Scotland.

There are a number of projects throughout Scotland—which I am sure my colleagues would happily describe—to increase grid capacity at a local level for an individual generator, and at regional and national level. That has played into the fact that the Office of the Gas and Electricity Markets, through the RIIO model—revenue = incentives + innovation + outputs—has announced our funding for the next eight years. Work continues apace on that.

I am happy to provide additional detail about our plans and, should the committee wish it, to provide additional evidence on how we manage the grid to explain John Wilson's original point about how we dispatch plant and balance the system minute by minute.

John Wilson: Mr Baster, have any issues been identified in relation to the energy that is produced by the Orkney Islands Council's wind farm project gaining access to the national grid?

Jeremy Baster: The council does not have projects as such—the projects are carried out by private companies. Another feature of Orkney is that it is not so much onshore wind that is the interesting renewable source as it is the marine side—wave and tidal. There are substantial plans to produce up to 1GW of electricity in the waters around Orkney.

At present, the only grid that connects Orkney to the mainland is the two cables that were put in in the 1980s and 1990s to satisfy local demand. That system is now at capacity with the renewables schemes that exist and have managed to connect. As Duncan Burt said, we have what is called the RPZ—the registered power zone—which allows more flexible use of the existing cable. However, that has allowed only up to 17MW of new projects to come on, which is not a large amount. There are certain problems. It is a non-firm connection and the people who come on last are the most likely to be constrained off when there is a need to get people off the system. Also, it is being squeezed by microrenewables, which are expanding rapidly in Orkney and are taking up space on the cable.

We need additional, new cable capacity to get the renewables potential in Orkney up and running and out to the markets in the south. That is a significant problem. Part of SHETL's plan for the next eight years is to install one cable up the west coast, which is really for the marine projects. It will not be connected in the initial stages to the existing Orkney distribution system, so it will not give access to potential projects in Orkney.

We have additional problems. We do not have a large onshore wind project to provide critical mass to justify a new cable. We tend to have smaller projects scattered around, which are community owned in some cases. As I said, there is also the marine side of things, which has a slower rate of build-up because it is an untried technology, or rather it is undergoing testing at the moment. That also presents difficulties, because the whole system for providing grid capacity is geared towards a large project with a tried-and-tested technology coming along and saying that it would like a connection and that it will underwrite the cost, which for us would be the substantial cost of crossing the Pentland Firth. Considerable difficulties still confront us in Orkney.

Rhoda Grant: My reading of the United Kingdom draft energy bill, which was published yesterday, is that it allows marine technology developers to look at setting up a marine grid, and there was some enabling legislation in the Marine (Scotland) Act 2010. Would that help with the Orkney problem or do you really need provision to be grounded on land?

Jeremy Baster: We need both. We need the marine side—Orkney is majoring in that and is leading the development of that side of things—but it needs to be linked to the more tried-and-tested technology, which is onshore wind.

I am sorry—I might not have entirely answered your question.

Rhoda Grant: No, that is fine.

Mike MacKenzie (Highlands and Islands) (SNP): My question is also for Mr Baster. What you have just described is a chicken-and-egg situation. I have talked to some of the personnel at SSE, and concern was expressed about what would happen if we proactively went out and supplied grid connections to places such as Orkney. There is a fear that we would have a stranded asset, for the want of some big developer. However, that is surely an absurd position to take. Given the developments at the European Marine Energy Centre, and given that there is no dispute that wave and tidal devices are rapidly approaching the point at which they can be commercially deployed, surely the fear of having a stranded asset is groundless and we should just get on, get the cables in and do it quickly.

Jeremy Baster: Obviously, I agree with that. There is a strong case for going ahead and doing that on a strategic and anticipatory basis. If we put the basic infrastructure into the area that has the highest resource, it is inevitable that it will be used. The chances of having a stranded asset are minimal. In any case, what is relevant is what the cost of the stranded asset would be to the consumer. When Ofgem announced that it was fast-tracking SHETL's and Scottish Power's plans for the next eight years, it said that the additional cost to the consumer would be 35p per annum, so, at the end of eight years, it would be £2.80, which is less than the cost of a pint of beer. All the projects for the islands would take up approximately £1 billion out of that £7 billion, so the potential cost to the consumer is 5p per year.

The Convener: Someone from transmission needs to respond to the point.

Ian Funnell: There are two aspects. The needs case is one of the imponderables of the regulated businesses. As Jeremy Baster quite rightly said, there is no critical mass on Orkney yet. There is no big onshore wind development on Orkney that would trigger something that would ultimately be needed. Our initial response is to put a 132kV connection to Orkney to supplement the two connections that are already there.

However, that is very much the first stage. The regulator is starting to understand the question of anticipatory investment, and we are starting to have some discussion about that, but the transmission businesses require to produce something that is fit for purpose, economic and viable, and that is tested through the regulatory process.

We see the Orkney connection as being in two stages. First, there is the 132kV connection, but we believe that there will ultimately be onshore development and more development of marine and tidal, which will mean that there can be a higher capacity, high-voltage direct current link to Orkney. However, the second part of that is not expected to be in the next price review up to 2021.

Scott Mathieson: I support what Ian Funnell has said. However, where we have not anticipated the necessary investment being made, we have asked the regulator for mechanisms that allow the funding to be given within our price control format. We have to demonstrate a credible requirement to connect the generation to our network but, even if the cost is relatively immaterial, it is still a cost to consumers throughout the UK at a time when prices are going up overall. We have to be conscious of that.

If we demonstrate that there is a credible case for connection, the new funding mechanisms will allow us to flex up our investment programme during the next decade to accommodate that type of investment. Such a measure was not in place during previous reviews; it was put in place at the direct request of both Scottish companies.

Mike MacKenzie: I am greatly reassured that the regulator is starting to understand all this, but do you not think that he or she should have got there much sooner than this?

My next question is about Ofgem's draft proposals from project transmit, which are highly prejudicial to island locations, with transmission charges that will be at six times those on the adjacent mainland. Obviously, that is a related issue. Given the importance of wave and tidal to the quality of energy in generating base-load and much more reliable and predictable levels of energy than wind can, is the regulator not once again behind the curve and needing to catch up very quickly?

10:30

Duncan Burt: Project transmit has already been through a lengthy process. For two years, many people who are at this table have been fully involved in that process. As members are aware, a number of options have been on the table, and we have put options on the table to help or increase the benefit to the island communities that are seeking to expand. Project transmit still has at least another year to run for the detailed proposals to be finalised and, through that, we will have an opportunity to take another look at options for island charging and ways in which such charges can be reduced or mitigated. We have put forward a number of options in the past, including taking account of additional demand security that those island links will bring to the communities in question and the benefit of being able to connect with renewable generation.

That aside, we are still operating within a very clear policy context, set by Ofgem, of having to reflect the costs of those links back on to those who use them. The tension for companies such as ours is that although, as Jeremy Baster has pointed out, such links form a small part of the overall plan, they still represent very significant investments totalling hundreds of millions of pounds. Our regulator, Ofgem, examines those links very carefully and it has to be said that, for those hundreds of millions of pounds, you are getting a relatively modest amount of capacity compared with certain other investments in the grid. As a result, we have to judge their timing carefully to ensure that we do not go too early. We are not putting in place any blockers to undermine investment, but the scale of the costs relative to the size of the connections that can be achieved on the islands inevitably means that, in a context where we are obliged to have a process to pass those costs back on to the people who use them, those prices are going to be high—and higher than they are onshore.

Mike MacKenzie: I am sorry to say that I am still detecting a degree of complacency. The draft UK energy bill seems to be placing our energy fortunes in the arena of gas generation, but no one is under any illusion that world gas prices will go down rather than up. Given the tidal capacity of the Pentland Firth alone, do you not agree that you should just get on and do this and that Ofgem needs to get its act together and start making up its mind much more quickly on such basic issues?

Duncan Burt: First—

Mike MacKenzie: Perhaps I can interject, Mr Burt, to stress that this is not so much about the benefit to the islands, important though that is, but about the great benefit that turning on that energy stream will bring to consumers across the UK.

The Convener: I should point out that we can put those questions to Ofgem in a few weeks' time, but I am happy to let the panel respond.

Duncan Burt: We are absolutely not complacent; in fact, we are absolutely focused on creating a regime that underpins and facilitates investment. Connect and manage is a great example of that, and we have also changed up-

front underwriting arrangements to reduce the up-front burden particularly on early-stage marine, tidal and island wind developers in getting connected to the grid. I am sure that SSE and Scottish Power will attest to the fact that they have plans for those developments on the block and ready to go, but as far as I am concerned there are questions of timing and regulatory underpinning to deal with before those plans can be taken forward.

Ian Funnell: Orkney, for example, has to be connected to somewhere—which, in its case, will be the north mainland—and that connection will have to be reinforced all the way down the north mainland. That work is on-going. We are building the network to get to that position and to be able to move to the next stage, which will be the first Orkney connection.

Mike MacKenzie: Thank you.

Scott Mathieson: I affirm the comments that were made by Duncan Burt and Ian Funnell and make it clear that for a long time now we have had a very strong focus on this issue. The industry was pushing the Department of Energy and Climate Change for the establishment of what became the energy network strategy group, which laid out a blueprint for building infrastructure to connect between 11GW and 17GW of renewable energy. Furthermore, over the past two years, we have worked with the regulator to create a price control format to deal and cope with this uncertainty, which we have never had before.

My company built an interconnector that at vesting had an 850MW capacity and which now sits at 3GW. We have the plans and the finance in place to double that capacity over the next three to four years to allow 11GW of renewables in Scotland to get to the GB market. I emphasise that there has been no complacency on the part of the Scottish transmission owners or, for that matter, on the part of National Grid.

The Convener: Patrick Harvie wants to pursue issues around security of supply, but before I bring him in, I have a question about the grid. The committee has received written evidence in which it has been suggested that if the proportion of energy that wind power contributes to the grid goes above a certain level, that will create problems for grid management, because of the intermittency issues to which Mr MacKenzie referred. Is that an issue that you recognise? Is there an optimum level of wind-generated energy, beyond which there start to be management problems for the grid?

Duncan Burt: A number of reports and documents discuss that issue, but the view of National Grid as an operator is that running the grid is already a complex and detailed operation, as I am sure that the committee can envisage. Variable sources of power such as wind add another dimension to that, but it is simply a different dimension. It is another issue that we need to manage. We are not complacent about that, but we consider it to be well within our capabilities to have available, now and in the future, the tools that we need to run the system as it arrives, even if it involves significant amounts of wind.

Wind power is probably already the single largest source of capacity connected in Scotland. Very soon—in the next year or two—it will become the largest single source of supply of electricity. That is being managed day to day, hour to hour, minute to minute in a very straightforward way.

Patrick Harvie (Glasgow) (Green): Before I move on to other matters, I would like to pursue the issue that the convener raised. My first question is for Mr Burt. I have read some of your written evidence and I have heard you speak at public events at which you almost seemed to imply that intermittency—or, at least, the kind of intermittency that comes from wind—could be seen as a positive thing and as something that helps with some aspects of management. Although there might be periods when wind output across the UK or Scotland gradually reduces, there will not be a sudden drop-off of the kind that would happen when, for example, Torness gets shut off. Is the slightly more predictable and slightly slower-changing intermittency of wind power easier to manage than the sudden impact that occurs when, for example, a nuclear plant has to be shut down?

Duncan Burt: In the same way that we are non-discriminatory around access, I would like to be non-discriminatory in answering that question.

You are right to say that a very large thermal plant—a coal or gas-fired plant, or a nuclear plant—poses us an operational challenge in that its output can suddenly drop off all at once, whereas the output from wind farms tends to come off more slowly; wind farms have a number of turbines, so they do not cause that issue. The variability issue that wind poses is not one that we get from a thermal plant. At a very high level, it is just a different challenge. Nuclear and fossil-fuelled plants provide some challenges, while wind farms provide others.

Patrick Harvie: I will quote from some evidence that we got from a group called Communities Against Turbines Scotland:

> "As renewable energy sources produce power intermittently, they cannot replace gas, coal and nuclear generation, even with further development."

A paragraph later, it says:

"Increased investment in wind turbines will do little to reduce carbon emissions and fossil fuel consumption."

Do you agree that that is not a credible statement?

Duncan Burt: I totally agree with you. From the point of view of grid management, we see every megawatt that is generated from wind as avoiding the need to generate a megawatt from an alternative source. At the moment, given the market, that alternative source would be a mixture of coal and gas. Wind power reduces the carbon intensity of the grid. That is not just a National Grid view; it is entirely consistent with the view of the Committee on Climate Change.

Patrick Harvie: I want to explore the three scenarios that you mention in your written evidence, which are entitled "Slow Progression", "Gone Green" and "Accelerated Growth". You talk about the gone green scenario and produce figures for that. For example, you say that renewable electricity production will reach 106 per cent of Scottish consumption by 2020. However, you do not tell us what the accelerated growth scenario would look like. Is that a suggested scenario in which we could produce much more than the 100 per cent equivalent by 2020, or is that about longer-term growth?

Duncan Burt: It is a bit of both. It suggests that it is possible to do more by 2020. I do not have in front of me the figures for the accelerated growth and gone green scenarios of renewable energy production by 2020, but I am happy to provide those to the committee. The accelerated growth scenario generally anticipates a higher level of renewable and wind penetration by 2020.

I guess that the second part of your question is about whether that is possible. Yes, we already have more than 100 per cent renewables connected to or contracted with the grid, providing 14GW in total across Scottish Power Transmission and SSE's area, and those are just the major transmission projects—that ignores the contribution from small-scale and community projects. We do not expect all those projects to proceed to completion and connection, so that figure of 14GW will reduce, but there is sufficient generation at the top end to deliver more than 100 per cent.

Patrick Harvie: Is that in terms of gigawatt capacity rather than output?

Duncan Burt: Absolutely.

Patrick Harvie: Let us move on to Scottish Power's written evidence. It is perhaps a self-evident statement, but it is clearly put, that

"commitments from both the Scottish and UK Governments to provide supportive policies are essential to maintain ... momentum".

You go on to mention the electricity market reform. Is it your view that those supportive policies are in place, or do you share the concerns that have been raised particularly since the publication of the energy bill down south?

Scott Mathieson: On the policy front, one of the key issues for us is the planning consents for transmission upgrades. There are two aspects to the policy. Does it create the right incentives for renewable generation projects to connect and come forward? I think that EMR moves us forward. Does it go far enough? We need to review what was published yesterday in a bit more detail and cogitate on that.

We definitely need more help from the Scottish Government and the UK Government in the area of planning consents. We now have a framework from a regulator that allows us to finance the investment that is required to facilitate the connection of the renewables. We also have the plans in place to recruit the resources and to engage the contractors. In the Scottish companies' case, we have begun that process a year in advance of the new price control coming into effect on 1 April 2013. We have engaged with David Wilson and his team on the planning application process. In our business plan, in particular, on the environmental side we have been careful to make use of existing assets. Where we can uprate conductors and use existing tower profiles, we have sought to do that. We have also sought to use new technology in terms of series compensation and capacitors on existing substations to provide higher capacity. However, there is no doubt that, overall, there is still a need for more help on planning consents from the Government. That is my response to your first question with respect to the policy.

On the basis of the evidence that we have, we have built a plan that is predicated on connecting 11GW of capacity across Scotland. We are very much the jam in the sandwich. Our interconnectors have to get all the energy out of Scotland into the GB market and also, in some circumstances, energy to support security of supply from England and Wales into Scotland. About 4.5GW to 5GW of that 11GW will connect within our franchise area. By 2013, we will have exceeded 2GW of capacity already connected—that is, projects that have been constructed or that are under construction. Given that and what I have seen coming out of the Scottish Hydro patch, I am confident that we will meet and exceed the 11GW overall, as Duncan Burt said.

Some of the incentives, such as renewables obligation certificates and feed-in tariffs, are still there and are pushing forward despite some of the dubiety around EMR.

10:45

Patrick Harvie: With regard to what you describe as dubiety, we will have an opportunity later in the inquiry to put some questions to the UK minister with responsibility for energy. I would be keen to hear what members of the panel think are the key issues that we should raise in order to ensure that the UK Government hears the concerns that exist or clarifies some of the areas of the plans down south around which there may still be some dubiety.

Scott Mathieson: Our position from the start has always been that we need clear signals from Government. Ultimately, we are a core transmission business. We are electrical engineers who facilitate the connection of a balanced portfolio to our network to secure access to the grid for those who want to sell energy and to secure security of supply for the end customer. We need an overall system that provides certainty about the blueprint that we are building towards. We think that we have greater certainty now than we have had over the past five years to a decade. We are looking for support from Government and legislators to enable us to meet the extremely ambitious targets that have been set. Those targets come not only from EMR, but from our plan that requires us to recruit 1,500 resources in our supply chain for our £3 billion investment—that is before we have taken account of Scottish Hydro or, indeed, National Grid's investment plan in England and Wales.

We need a combinational package across the legislation that focuses not only on EMR but on facilitating a learning and recruiting environment that will provide us with the resources to meet our targets and a planning framework that is conducive to delivering the projects on time and as required. We also need legislators to give us the right blueprint, so that we have guidance on what we should connect and when.

Ian Funnell: To reinforce that point, I cannot stress enough the need for certainty throughout the supply chain—from the planning consents to support for individual projects, whether it comes from the regulator or the Government. UK plc is increasingly competing in a global market, so we must attract those who supply the plant and materials to build that infrastructure. We have to make this a place where it is easy to do business. Certainty is what drives that.

Duncan Burt: I echo that. In order to develop a balanced portfolio and secure energy supplies across Scotland and the UK, with a low-carbon mix of wind, nuclear, marine and hydro technologies, along with potential carbon capture and storage developments, that is balanced by gas, which is used to smooth things out on occasions when the wind is not blowing, we need a climate of strong political support and engagement in order to deliver the long lead-time items in the supply chain. As Ian Funnell said, we need the international investment to help fund that and we need to develop our skills base in order to deliver the expertise that people need if they are to build and run the industry.

Ronald Peddie: I concur with everything that has just been said. We are all looking at massive financial investment, whether in the grid or in renewable projects. The investors in those projects will have to take a long-term view, which means that there has to be certainty and transparency. The rules must not change every five years.

The Convener: Mr Burt, if I heard him rightly, said to Patrick Harvie that a higher level of wind power would displace gas-burning production. Who makes that judgment? Is that something that National Grid does? Do you decide to turn down the output from gas when you have X amount of wind? Do you have a policy approach that favours low-carbon sources of energy over high-carbon ones?

Duncan Burt: The majority of plant or generation running choices in the UK are made by the wholesale market and therefore by the economics of each generation technology. Naturally, because wind in effect has a zero-cost input fuel and very low costs when it is running, it will tend to run when it is available and market economics will mean that gas or coal—whichever is the most expensive—will naturally run down when it is windy. Likewise, when there is less wind or less nuclear or coal, other technologies that are slightly more expensive in the short term will pick up and run.

The full answer to Mr Harvie's earlier question is that, when the wind is running, we reduce the carbon intensity of the grid. The fundamental aim of Government policy is that low-carbon nuclear and low or zero-carbon wind, CCS and marine will, in the next 20 years, gradually reduce the carbon intensity of grid supply in electricity. However, a balanced portfolio and a strong grid that is interconnected across the UK and Europe will mean that we can manage the variation in supply from variable renewables such as marine and wind, and from thermal and nuclear plant. That balanced mix gives a strong security of supply signal. That, combined with energy efficiency—to absolutely pin down as much as we can the underlying demand—as well as smart demand and smart grid to take power when it is available locally, will come together to produce a very low-carbon grid at the best possible value for GB consumers.

Chic Brodie (South Scotland) (SNP): Mr Mathieson has already answered some of my

questions, so I will throw a curve ball at you. Yesterday, the draft energy bill was published. There is a dash for gas, a major fillip for nuclear power and blows to renewable energy. Regrettably, we still have to comply with some decisions that are made by the London Government. You have talked about getting signals from legislators. What input did you have or were you asked to provide to the Westminster Government before the draft energy bill was published?

Duncan Burt: National Grid is working closely with the Department of Energy and Climate Change on electricity market reform. We have had direct input into the draft bill via the team that is working on that. We are looking at the overarching design for electricity market reform and some of the underlying policy issues. As Scott Mathieson said, we are in the early days of digesting the full contents of the draft bill, so it is difficult to comment on particulars. However, the overarching policy perspective is not particularly targeted at one source or another. We see the bill as an important tool in underpinning large capital investment in lots of low-carbon technologies, whether that is onshore wind, offshore wind—

Chic Brodie: Or nuclear.

Duncan Burt: Exactly. We do not see it as particularly—

Chic Brodie: So you do not see a bias in the prolonging of existing nuclear power stations and the building of new ones.

Duncan Burt: No.

Chic Brodie: Mr Mathieson has already alluded to the next issue that I want to ask about. The written evidence from National Grid talks about the need to engage communities and to reduce the "passion" in relation to the development of major energy projects. I ask Mr Burt, Mr Funnell and Mr Mathieson to give an indication of how they are engaging and to say what role local councils play in that engagement, particularly planning personnel in the planning cycle.

Ian Funnell: I will come in first. Our community involvement has been transformed in the past few years. The amount of investment that we put into working with communities bears no resemblance to what we were doing four or five years ago. We have full-time community liaison officers who work proactively with local communities and community councils, which has paid dividends to us and to the communities.

There are numerous examples of that engagement. Our sophistication in general stakeholder engagement—which goes beyond the communities—means that we are taking a much more proactive stance in working with communities on designs and possibilities for various scenarios. We do community briefings almost before we put pen to paper to say that we are coming and that a connection is required. We will talk through that and hold public meetings in the town hall on a regular basis. That is now the bread and butter of what we do.

The Beauly to Denny project, for example, was—as we all know—controversial at the time. However, we can compare and contrast that scenario with the extremely small impact that communities are now having on our works on the ground. Where we have local issues, we are addressing them locally and they are not being escalated.

We might compare and contrast that to some of the connections in England and Wales, particularly in north Yorkshire, where the National Grid had an extremely challenging time during the construction phase. Our works are not causing the same degree of angst in the community. That is not to say that we have no issues, but we are on a glide path and things are getting significantly better.

Part of the challenge—as the regulator has identified—involves the way in which the transmission organisations engage with the broader stakeholder community. Targets have now been set for us, to which we will respond.

As Scott Mathieson said earlier, the great advantage of the fast-track process is that it gives us 12 months to get our act together before the price review kicks in on 1 April next year. We welcome that, as it is a fantastic opportunity to get ourselves aligned and ready to deliver, which is what we are there to do.

Scott Mathieson: We have seized that opportunity. Agreeing the fast-track process a year in advance meant that we were able to contact the Minister for Energy, Enterprise and Tourism to say that we would like to establish an energy upgrade forum. We invited SHETL, and the National Grid will be invited too.

We are conscious that the greater sight that we can give Government and local authorities—and the planning parties within them—of the major infrastructure projects in our plan, the easier their task will be. We are conscious that the planning teams in local authorities need support and greater communication, and need us to engage more effectively with them.

We are about to launch a seminar on 28 June, which will be led by the company. It will involve looking at working with developers on the quality of the planning applications that they submit to us and to the authorities, and with the local authorities and the Scottish Government on the quality of our planning applications in terms of what is required.

Chic Brodie: That is fine—I appreciate that, and I was aware of it, but there is a level below that, which is the community itself. One would wish the planners, either individually or collectively, to reflect the community's views. How are you reaching down into the bowels of the country to the communities that are being affected?

Scott Mathieson: As Ian Funnell outlined, our strategy is that every major project has an appointed community liaison officer who will engage directly with the affected communities and try to understand exactly what the impact on them will be. The nature of the infrastructure that we build is such that some people do not find it as aesthetically pleasing as engineers do—there is no doubt about that—and we need to work with people in that regard.

The Beauly to Denny line has obviously attracted an awful lot of headlines. We are also looking to leave an energy-related resource legacy for the local community in that area. We are looking to build an electrical footprint and a legacy for the company and the industry that will reap a dividend for the future.

11:00

Chic Brodie: I interpreted Community Energy Scotland's view as being that the planning system has not engaged fully with the community and some projects are jamming up the system.

My final question is for Dr Blanchfield. The interesting thing about our forward looking and projections is the North Sea and the overall network. One of the concerns that has been expressed to the committee, and to me when I have spoken to people in the industry, is about getting people with the required skills. When we are working in liaison with Norway and Sweden, what demand do you anticipate for Scottish-based skills being employed in that project, especially given the development expertise that already exists in Norway and Sweden?

Dr Blanchfield: There is certainly a big opportunity in the renewables sector, particularly with offshore wind and interconnection, to pull through the Scottish experience in working in the North Sea. We are in the early stages of development. In the early part of this year, we went through the tender process for our main consultancy packages for the environmental impact assessment survey and consenting phase of the job, and I am pleased that AMEC is now on board as our EIA consultant, and that Exodus is the route engineering consultant looking at the options for the route across the North Sea.

The scoring mechanism in the quality sections of our tenders had a weighting for experience of working across the North Sea. Picking a route across the North Sea, the knowledge of oil and gas assets, and liaison with the oil and gas companies could be project killers if we get them wrong. I am therefore very pleased that we have those two organisations on board because they have a long and strong track record of working with the—

Chic Brodie: But are the skills being provided from Scotland? I presume that part of the tendering process was about where the skills are or how they can be developed.

Dr Blanchfield: Indeed it was.

Chic Brodie: Do you see a problem with that?

Dr Blanchfield: I do not think so, no. Those skills are here and come from the oil and gas industry and its long history. We certainly weighted the tendering process towards that and those companies that have a strong presence in Scotland. Both of the companies that we have engaged have offices in Edinburgh and Aberdeen so there is no issue with picking up on those skills. It was also good to see that other sectors are moving into the area: two thirds of the responses to our requests for interest were from more traditional power sector consultants and one-third to half of them were from the oil and gas sector.

Chic Brodie: That is my concern. In the energy industry, companies are poaching people from each other when what we need is a feed in of skills to the overall industry. Do we have that? Is there a level of entry of engineering skills into the overall sector?

Dr Blanchfield: It probably has some way to go in that respect, but we are on the journey towards that situation. At the conferences that I attend, I see much greater engagement between power sector people and oil and gas companies. They are working together now to build the industry, which is good to see.

The Convener: Mr Funnell wants to come in, but John Park has other questions on skills. I will let John in first and let the panel members come back to the point.

John Park (Mid Scotland and Fife) (Lab): I will broaden out the discussion. When we have heard evidence about skills from a lot of people during the inquiry, we have focused on potential future manufacturing opportunities in the renewables sector. Given that we have spoken about grid capacity and the skills that will be needed to build and sustain that capacity, it would be good to try to understand the skills needs that the likes of SSE, Scottish Power and National Grid see for the future and whether you believe that we have the structures in place to ensure that those needs will be met.

If such structures are not in place, what Government intervention do we need to start thinking about? What should the committee suggest that the Scottish Government needs to do to ensure that the pipeline of skills comes through to help your organisations to do what you need to do?

Ian Funnell: My answer will cut across the questions from Mr Park and Mr Brodie. In the past three and a half years, the head count in my business has grown tenfold. To respond to Mr Brodie's questions, I recognise that the pool in which we are fishing for skills is quite limited. The sector is no different from many others in trying to pick up on a lost generation. From the early 1990s to the mid-2000s, very little recruitment was undertaken in the space that we are discussing, so all of us have a similar challenge.

One thing that characterises what we are all trying to do is that we are looking at skills that can be transferred from other sectors into our sector, rather than unhelpfully trying to poach from one another. We are an engineering-based company, for sure, but the company is not populated entirely with engineers. There are plenty of other skills that I have recruited successfully from almost every other sector that can be imagined, including the railways, the water industry, the oil and gas industry and the petrochemical industry—you name it. That attracts a degree of experienced hires to the organisation.

We all recognise that we must major on two things. Number 1 is the development of our own skills. When the capital programme finishes, we will need the skills to operate and maintain the assets for the next 60 years—for a lifetime. Number 2 is developing the supply-chain skills—not just the manufacturing skills but particularly the service skills—to do the same task.

All of us separately are working closely with the supply chain on that, and all the transmission operators are working collectively with the broader supply chain. We have a session planned for early September to understand how UK plc can bring the quality and quantity of supply-chain skills to the level that we need.

Duncan Burt: I echo all that. We are talking about both high-grade engineering graduates and the general uptake of the science, technology, engineering and mathematics—STEM—subjects in schools. The process starts at school and round the kitchen table at home. We need to build from there.

We have a number of programmes that go into schools to engage in imagineering in STEM subjects. We also support an energy badge in the scouting movement. We start engaging children from the basics up so that, when they decide at 12, 14 and 16 what they will do, such roles are in their minds and they see them as a career, and—to use a cliché—they do not think just of what they see on television about things such as forensic science. We are determinedly pursuing that challenge right the way through from the kitchen table to university.

Ronald Peddie: I am thinking of the Scottish Council for Development and Industry conference that I went to a couple of months ago at Our Dynamic Earth, which celebrated 40 years of oil and gas. Today, there are 400,000 people in the UK working in oil and gas, and we know from the recent Scottish Renewables survey that there are about 11,000 people in Scotland working in the renewables space.

I listened to the key executives of various oil companies at that conference, and in those four decades the most capital that was invested in any 10-year period was £75 billion. Collectively, the renewables industry is probably looking at about £100 billion to be spent in the next 10 years, and we have a fraction of the people.

John Park: From my perspective, and I am sure that other committee members will agree with me, it is heartening to hear that, although we are in a competitive market in one sense, you recognise that there is an interdependence and a wider reliance on ensuring that skills levels are kept at a point that will help you to recruit people at sensible levels of pay and ensuring that the skills pipeline comes forward so that we have an industry going forward. That applies not just within your organisations, but throughout the supply chain.

We have heard from sector skills councils and various other bodies about the partnership activity that is going on. As I said earlier, it is predominantly on the manufacturing side. Is there anything more that the Government can do, or anything that we can suggest in our report, to facilitate that strategic approach to skills? There is a range of interventions around apprenticeships and support for people to go into higher education, but it strikes me that there is a longer term gain to be achieved—Ian Funnell mentioned the next 60 years—and that we need to ensure that there is a strategy that scans the horizon for problems that might exist in future.

What should that look like in terms of support? Is the current support sufficient? Should there be more? Do you believe that there is an overall strategy for the energy industry in Scotland?

Scott Mathieson: I do not think that we can emphasise enough Duncan Burt's point that it is important to create at an early stage in schools a learning environment that promotes science, technology, engineering and maths, because those are the basic building blocks. We should not

think that that will necessarily drive everybody towards being a chartered engineer, because there will be highly technical craft jobs. As we go forward, the technology that operates in the industry will fundamentally change. The fitter who is working on an oil circuit breaker today will not be doing the same on the high voltage direct current link in a converter station.

It is important to promote science, technology and so on in schools, but it is also important to create the right learning environment and partnerships between industry and the learning institutions, including colleges for the craft apprentices as well as universities. We have invested in—and held on to through a difficult period—two state-of-the-art training centres within our company, because we knew that, given the age demographic of our workforce, we would come to this bow wave at some point.

There is an opportunity to pool resources with the industry and academia. In fact, we are doing that in building a research centre in conjunction with our colleagues at Dealain House in Cumbernauld. It is important to create an environment that incentivises partnerships between the learning institutions and industry, and to tailor career paths that drive people towards highly skilled apprenticeships as well as highly technical engineering skills. We need to give people those opportunities and value them equally in terms of the supply chain, and we need to create an environment in which all those parties can come together.

Ian Funnell: We work with the University of the Highlands and Islands and Highlands and Islands Enterprise to look at training facilities and what we can do, not just at the engineering level but at the semi-technical and craft levels.

However, when I have asked people about the landscape for funding and supporting agencies, nobody has ever been able to draw it out for me. It is a confusing picture, which does not help organisations such as mine that are trying to tap into these things. In our company, we have experts who sift through the maze of support to try to articulate it for us. It is a confusing landscape.

11:15

John Park: That is a common theme.

Dr Blanchfield: I come from a civil engineering background and I am new to the power sector, having joined it two years ago. It has struck me how narrow the market is for skills, resources and the supply chain, particularly for some of the specialist kit. You mentioned manufacturing. We are facing a narrow market with the HVDC technology. There is a risk in narrow markets of overheating prices and delays in timescales.

One example is our subsea survey prices. The Norwegians are doing a massive survey of their sector of the North Sea this year and that market has become completely overheated, with prices doubling. We are looking at €4.5 million at the moment. Although we are not doing our survey until next year, if that turns into €9 million it will be a big hit to take. There is that danger if the issue is not addressed strategically by Government policy and by the organisations and supply chain involved in it.

John Park: If there are examples of how you are building capacity, particularly to support the supply chain—which is one of the key areas—you would be more than welcome to share them with the committee at some point.

Stuart McMillan (West Scotland) (SNP): My questions about the supply chain have been answered, but I have some other questions.

I found what Transport Scotland said about electric vehicles in its submission interesting. We will discuss transport with the panel after this one, but the issue is relevant to this panel, too. Transport Scotland states:

> "In terms of EV recharging, the aim is for the majority to take place overnight, avoiding the evening peak in electricity demand. This is convenient for drivers, and also enhances the environmental and economic benefits of plug-in vehicles by using cheaper, lower carbon night-time electricity generation."

The Scottish Power submission says something similar.

There is a debate about peak electricity demand. When it comes to tariffs, it is cheaper at night. However, demand is likely to increase because of electric vehicles and, I daresay, hybrid ferries, when they are launched—there is the potential for even more of them along the coast of Scotland. Is there any guarantee that the two power companies will continue to offer cheaper power at night? If demand increases at night, might you change your tariff structures to bring in more revenue?

Scott Mathieson: The industry is beginning to tackle that issue. There is a joint group with industry called the electricity networks futures group, which is looking at building a number of scenarios. It is not just electric vehicles. In the Department of Energy and Climate Change projections, there is the potential for an increase in reliance on electric heating sources. In addition, because of the feed-in tariffs over the past year, about 750MW of photovoltaics have been connected to the UK grid. A number of technologies will be seeking access to the grid, all of which have very different load characteristics. We are beginning the process of what we call RIIO-ED1—review 1—which is the same as the

transmission review but for electricity distribution. That will take effect between 1 April 2015 and 31 March 2023.

We are considering the impact of all those scenarios. It is not necessarily the case that providing charging infrastructure in some areas will have no impact on our networks—in fact, I expect that there would be a fundamental impact on the distribution network, and on the low-voltage network in particular. That also depends on other technologies, such as storage. If people charge their batteries during the day and release energy from those batteries to their car overnight, there is not necessarily a change in the load profile in the daytime network.

What I am trying to say, in a rather long-winded way, is that there is a huge amount of uncertainty about what is connected to the grid. The important thing is that there is engagement with the companies. We discussed earlier the need to provide clarity at the transmission level, and a blueprint for policy on what is driving to connect to our transmission grid. We need the same for the distribution network.

All companies are acutely aware of the impact of energy prices. Transmission is about five per cent of the consumer's bill, while distribution is typically around 15 per cent. Significant levels of investment will be required to facilitate the grid. Smart meters, which are funded by retailers alone, will probably have an impact on our networks and services. Our meter distribution boards cost about £2 billion across the UK, just to facilitate the smart meters.

There will be rising capital investment in distribution, but we will seek to ameliorate that through the calculation of our revenues. In that respect, we have extended the life cycle over which we recover that investment from 20 to 45 years, and we will seek to do the same for distribution.

The answer, in basic terms, is that we need a blueprint for a central scenario on which we can build in terms of price control. We will then look at using the revenue toolkit to seek to ameliorate the impact on the consumer.

Ian Funnell: I can add only a little to that. The challenge is perhaps more technical than anything else. The network that connects your home and mine to the grid copes with our cookers, power showers and all that stuff, but if everyone comes home of an evening and plugs in their cars, that would be equivalent to everyone turning on two or three power showers instantaneously. The network was not designed for that.

There are issues around smart technology, demand-side management and how we will cope with that demand. I think that we will drive towards a different solution, but I am not sure that any of us can, as yet, say what that solution will look like. There is a real challenge in that regard.

Duncan Burt: I will bring all that together. We have talked a lot this morning about the development of transmission networks. I want to leave in your minds the thought that, in this decade and beyond, there will be a growth in transmission, but towards the end there will be a significant and equivalent growth—as Mr Mathieson and Mr Funnell have said—in distribution, which will be consumer driven by the pick-up of electric vehicles, electric heat pumps and everything else.

With regard to the economics of the market and the peak/off-peak arrangements, our view is that, in the medium term, there will be a shift from the concept of a peak price during the time of evening peak usage. We are likely to see price variation based on when renewables are running or not running.

When it is very windy, your electricity is likely to be cheaper, so, although you will charge your car overnight for the foreseeable future, there will come a time when you will charge your car—or your ferry—when it is windy. Likewise, you will try to charge up your heat system when it is windy. People will take the power when it is available, which will start to reduce the need for things such as back-up plants, to which Patrick Harvie referred earlier.

In the medium term, all that will come together in a very different energy system that is built in a different way. It will be designed around renewables and a low-carbon grid, with things such as smart metering and the development of the networks underpinning that.

Stuart McMillan: Obviously there are huge challenges to deal with, particularly in distribution, but my plea—which the committee has made to energy companies in the past—is that the tariff structure be kept as simple as possible in order to ensure that, instead of the confusion that we have had up to now, the consumer understands how much they are paying when they use power.

I have not had the chance to read the publication that came out yesterday, so if my question is answered in that, I apologise and will read it later. In response to the committee's question 11, Scottish Power says in its submission:

> "We also note the UK Government's commitment to exploring the localisation of business rates from renewable developments to local authorities, as is often done in Continental Europe."

Would such a move unfairly affect areas where there is little or no renewable development?

Scott Mathieson: It is difficult to answer that, because we are still considering the consequences of the bill that was published yesterday. However, the predominant factor that drives the location of renewables is resources—in other words, access to land and wind. To be honest, I do not think that there is a direct correlation, but we need to think through the proposal and consider whether it will have any indirect impact or unintended consequences.

Angus MacDonald (Falkirk East) (SNP): Slightly changing tack—and perhaps going to the other end of the scale—I want to ask a number of brief questions about the heat target. Last week, the committee heard about a number of local district heating schemes, and in its written submission Scottish Power says:

"High ambitions for renewable heat are unlikely to be met without a substantial contribution from district heating. However, there are significant barriers to delivering schemes under current market conditions ... A knowledge and skills gap also exists that could continue to restrict the development of district heating in Scotland."

Apart from that "knowledge and skills gap", which we have already acknowledged as an issue, are there any other barriers that might hinder the development of district heating? The submission does not go into the matter in any greater detail.

Scott Mathieson: We are more than prepared to elaborate in further written evidence, but at this point I simply note that the industry's current set-up has a number of quirks. For example, as a distribution or transmission business, I am not responsible for the contractual relationship with or the end bill to the customer, and distribution network operators that run district heating schemes in franchise areas cannot have a direct contract with a local authority in that respect.

Although the situation is beginning to change a bit, relatively little research has been done. Some low-carbon networks funding has been provided to one of the operators to examine such schemes and how they might interact with the distribution network, but more work needs to be done. It is about a combination of skills, changes to existing industry structures and the requirement for more work on the impact on the LV network and the interaction with smart meters.

Angus MacDonald: Clearly, we still have some way to go with regard to district heating. I believe that the report that is referred to in the Scottish Power submission is being compiled by WWF with support from Scottish Power and the Scottish Environment Protection Agency. Is that final report likely to be available before Parliament's summer recess? If not, could you arrange for committee members to have sight of it as soon as it is ready?

Scott Mathieson: I will check on that and advise members.

11:30

Angus MacDonald: That would be appreciated. Thank you.

I have a quick question for Dr Blanchfield. I am certainly pleased to hear that the North Connect interconnector is due to come on stream in 2020. I am sure everyone would agree that it is just a pity that it will not be earlier than that. I am not sure whether you will be able to answer this question. There has been talk of another interconnector linking to Iceland and the Shetland Islands, although that project might well still be at an early stage and we are rightly concentrating on interconnectors from our own islands at the moment. Is there a realistic prospect of a Scotland-Shetland-Iceland interconnector in the future, or links with any other of the Nordic reaches?

Dr Blanchfield: I have heard of the scheme, but obviously I am not in a position to comment on it. I represent a joint venture of partners whose sole aim is to develop and build the interconnector with Norway. All I would say is that the greater the interconnection that can be put in place by 2020 and beyond, the greater will be the facility for getting power from the cheapest source at any point in time—to refer back to Mr McMillan's point—to where demand is. We want to get the cheapest power from anywhere in Europe to wherever it is required, or to store it in Norwegian pump-storage hydro. If Scotland is to meet its 2020 targets, it is important that it is well interconnected with the rest of the UK, Ireland, Europe and possibly Iceland. That will help to achieve those goals.

Ian Funnell: To my knowledge, the link with Iceland has been talked about for at least 15 years, if not more. It is technically feasible. The economics, certainly in the short term, are probably entirely questionable and landing points are similarly entirely questionable. I doubt very much whether Shetland is the right landing point—it is probably absolutely not. The landing point should be much further south than Shetland. The project is at an embryonic stage.

Angus MacDonald: I think that Shetland was brought into the equation to help with the transfer of energy from Shetland. We will wait and see what happens there.

The Convener: In closing, I want to pursue a couple of questions about export and import. Dr Blanchfield, I understand the conceptual argument for your proposals. How does the business case stack up? What is the payback on the very

substantial up-front capital investment that you are going to make?

Dr Blanchfield: We are talking about a large investment. We are in the early stages of development, but we are looking at an outline capital cost of upwards of £1.5 billion, which is €1.7 billion or so. The business case does stack up, but you should appreciate that it is based on what we know about current daily price fluctuations. A daily cycle of cheaper nighttime electricity might go across to Scandinavia to supplement peaks in demand in the day. The wind-hydro interoperability works across that as well, and we can predict that and model it for 2020 because we can look at various scenarios. There is also a seasonal cycle. The Scandinavians have significant problems in dry summers and icebound winters because they are so dependent on hydro power. The interconnection works both ways; it is a win-win.

However, we have to recognise, as the committee will appreciate, that we are crystal-ball gazing eight years into the future. The things that might happen to influence the supply-demand balance are the sorts of things that keep us awake at night thinking about the business case.

All I can say is that we have constantly to test things as we go along and as new information becomes available. We need to look at various scenarios and consider what is likely or unlikely. Finally, we need to rely on a little hope that whatever the supply-demand balance is when we get to 2020, there will be fluctuations and differences between the UK and the Scandinavian region and there will be price differences as a result. We have to keep testing as we go along.

The Convener: That is interesting.

Finally, I have a slightly broader question on exports and imports that touches on what you have said. The committee has heard in evidence that, when countries such as Denmark that have invested heavily in wind power overproduce, they end up selling that power at low cost at times of low demand and then buying it at much higher cost when their output is low. Do you recognise that scenario?

Dr Blanchfield: That is certainly a risk. The concept has been suggested by a lot of people about Denmark. However, one of the main pieces of empirical evidence that counters that is that Denmark and Norway are currently developing their fourth interconnection link, and there have been three in the past 30 years. If the situation was harming Danish industry and the country's economy, we would not expect Denmark to be going for a fourth interconnector with Norway. However, we must consider such scenarios to find out what the impact might be. You referred earlier to Scottish wind having to be constrained at certain times. Although you might get a low price for that power in exporting it to Scandinavia, that is better than it being constrained and off the network entirely.

Duncan Burt: We definitely recognise the scenario. As Dr Blanchfield said, it is a risk. However, many measures can be taken to mitigate that risk, such as ensuring that we get right electric-vehicle charging and the smart use of energy, so that we use the energy locally when it is available and capture wind power locally in the community and in the region, rather than export it all to Norway for storage in hydro to be imported back later.

There is a mix of things that we can do locally, regionally and nationally. A wider robust European grid also has a part to play. As Dr Blanchfield explained, that would help to manage supply issues, either during an ice-bound Norwegian winter or a spell of particularly high demand in the UK. Interconnection provides strength and robustness so that we do not have to rely just on what is available locally.

The Convener: I apologise to the members who want to ask supplementary questions, but we are already over the planned time and we have had a long session. I thank the witnesses for their evidence, which has been extremely helpful.

11:38

Meeting suspended.

11:46

On resuming—

The Convener: I welcome our second panel of witnesses. Shane Slater is the director of Element Energy, Rebecca Trengove is the head of marketing and corporate affairs at Axeon and Paul Nelson is the managing director of Allied Vehicles. I invite you to make brief introductory remarks.

Shane Slater (Element Energy): Element Energy is a low-carbon-energy consultancy that is based in Cambridge and London and we have been doing quite a lot of work on low-carbon transport. We produced for WWF a report in 2009 on electric vehicles in Scotland.

Rebecca Trengove (Axeon): Axeon is Europe's leading independent designer and manufacturer of battery systems for electric vehicles. We are headquartered in Dundee, where we have 75 people, and we have a manufacturing facility in Poland.

Paul Nelson (Allied Vehicles): Allied Vehicles is a medium-sized Scottish company with 355 employees and it is located in Glasgow. We have

a £65 million turnover. We adapt about 3,500 vehicles a year, which are mainly wheelchair vehicles and taxis. However, we have branched out into electric vehicles. In the past couple of years we have made about 150 electric vehicles, which makes us one of the largest—if not the largest—UK-owned electric vehicle manufacturers.

The Convener: Mr Nelson has provided us with the opportunity to look at an electric vehicle after the committee meeting.

Chic Brodie: The only problem, convener, is that you have to sit in the front seat and go "Vroom, vroom."

The Convener: I look forward to looking under the bonnet.

Paul Nelson: It is quite quiet.

The Convener: We will go straight into questions. John Park will start this time.

John Park: I apologise to Shane, because I know Rebecca and Paul quite well, having been interested in the production of electric vehicles for some time.

My first question is around the existing infrastructure. We are on the cusp of something pretty big with electric vehicles, but the ordinary man and woman in the street will say "That's all very well, but how are we going to get from A to B?" I think that Rebecca will be able to say something about how the battery technology is improving. What support can the public sector give to ensure that there is infrastructure for recharging and so on to make the vehicles viable?

Shane Slater: That is a very good question about one of these chicken-and-egg issues. We did a piece of work on the issue in the report for WWF in 2009 and in a number of studies for the United Kingdom Committee on Climate Change around the same time. We have done a more recent study for the Energy Technologies Institute that looks at the appropriateness of electricity recharging infrastructures for EVs. There are a number of dimensions to that. We have to look at the availability of off-street parking, for example, because a common issue in urban areas is the lack of availability of such parking, which is much more common in less urbanised areas.

The second issue is the kind of recharging infrastructure that will be most appropriate and whether, for example, we need home charging, chargers at the end of every street or something associated with workplaces. The issue is still being debated, but the evidence suggests that home charging and workplace charging are both extremely valuable and will guarantee that the infrastructure is utilised a lot.

Rebecca Trengove: The evidence from electric vehicle trials suggests that two different types of charging are needed. I am sure that John Park will be aware that vehicles can be charged at different rates and that, with a slow charger, it might take up to eight hours for a vehicle with a completely run-down battery to be fully charged. Clearly that would not be feasible for people trying to drive from Edinburgh to Aberdeen.

As a result, we need—as Shane Slater made clear—chargers in the home, at the workplace and at various other destinations, including shopping centres, places of leisure activity and so on. In those areas, you could get away with slower, cheaper-to-install chargers. However, you also need en route chargers that can deliver much faster charging. I do not know whether members are aware that the all-energy exhibition is taking place in Aberdeen: two days ago I had a phone call from someone from an electric vehicle company who was driving his car from Edinburgh to Aberdeen, needed somewhere to charge en route and wanted to use our facility. We are happy to do that on a one-off basis, but we need to look at Scotland's transport routes and think about how we ensure that people can stop for coffee and get the fast charge that will allow them to reach their end destination.

We also need a dense penetration of charging posts to match people's needs. SSE, which has run a number of trials, has noted that 80 per cent of energy is supplied through only 20 per cent of charging posts. That has two implications. The first is the need for a dense penetration of charging posts in order to offer widespread charging to those who need it. Secondly, there is the corollary of that, which is that only 20 per cent of posts in use are commercially viable. Both the utilities companies and the public sector need to consider that issue.

Paul Nelson: There is a price drive behind fast charging. Electric vehicles have only a limited range and if that range can be achieved only after a very long charge it will be very difficult to make such vehicles price competitive. If faster charging allows vehicles to cover more miles in a period, you will be able to recoup the difference.

Indeed, all of this leads on from Mr McMillan's earlier comments about pricing of energy. My concern is that as people move away from hydrocarbons to electricity to fuel their vehicles, Government might change its pricing from a tax on hydrocarbons to a tax on electricity. That is probably the biggest threat to pricing of electricity for vehicles.

John Park: On a more general point, we have discussed the sort of infrastructure that will be needed and the public sector intervention that will be required to make it happen. Might public sector

procurement policy or any other Government policies help in that respect?

Paul Nelson: Government really needs to do some pump priming here. I mentioned the significant price difference with regard to electric vehicles; I have to say that I do not see that difference ever being totally eliminated. After all, if you compare the components of an electric vehicle with those of an internal combustion engine vehicle, you will find that although that they have a similar motor and drive system the electric vehicle will always have a battery. The battery in the vehicle that members will see after the meeting is about 28kWh, whereas the battery in your phones is about 1.5kWh. Of course, you can compare that as much as you like, but that battery will always cost money. The only way the price will be recovered will be by having cheaper energy to keep the vehicle going. The Government has to pump prime with that price difference. It has to lead by example, which it has been pretty reluctant to do so far.

We can give you examples of difficulties with leading by example. Indeed, purchasing criteria have to be pushed towards delivering products in low-carbon vehicles. If you really mean to hit your targets by 2020, the Scottish Parliament's milk should be being delivered in a low-carbon vehicle, but that is not happening.

Rebecca Trengove: I would echo many of Paul Nelson's comments. Some of the trials that the Scottish Government has been running with initial public procurement have found good evidence that savings can be made. For example, Dundee City Council replaced six diesel vans with four Mitsubishi i-MiEVs, which are fully electric vehicles. The council reckons that, by implementing use of the electric vehicles and rejigging the way in which vehicles are used, it can make annual savings of £1,500 in fuel costs and 11.4 tonnes of CO_2 emissions. Big savings are there to be made.

The one thing that I do not completely agree with Paul Nelson on is that electric vehicles could become competitive if the Government were to choose to introduce a carbon tax. I realise that politically that is difficult, but if carbon ends up being priced into the system, internal combustion engines will not be competitive.

On what the Government can do, we absolutely need a firm commitment on public procurement of electric vehicles. As Paul Nelson said, that will prove the technology to the general public, act as an exemplar to the private fleet, and help to achieve economies of scale, which will start to bring the cost of the vehicles down. Our company would certainly welcome the Government committing to a clear road map showing how it will achieve 100 per cent low-carbon vehicles by 2020.

Paul Nelson: When we tendered in London on electric vehicles, we had to listen to a presentation from the Metropolitan Police insisting that the vehicles on which we were tendering had to be the same price as internal combustion vehicles. I pointed out to the chap that if he factored in the fines that the European Union is going to levy on London for its lack of clean air, he would see that our vehicles are very cheap.

John Park: Should we be looking at any international comparisons to learn some lessons?

Rebecca Trengove: There is an interesting example in Paris, which has introduced a fairly major fleet of about 8,000 electric vehicles that can be hired. It is like a Parisian version of the Boris bike but with electric vehicles as opposed to bikes, although bikes can also be hired.

John Park: They do not have Barclays Bank adverts on the side, do they?

Rebecca Trengove: No. I think it is called Vélib. That is a great example of a city looking at how people use transport. In urban areas in particular, we probably need to have a complete rethink about how individual transport is used. We are now moving into a world in which it might not be practical or affordable for everyone to own a car.

It is interesting to look at the United States because you can see that demographies are changing. This is the first time in American history that young people in the 15 to 25 age group are not buying as many cars as their predecessors did. Perhaps they cannot afford to, or they are living in urban areas in which it might not be practical or necessary to own a car.

Moving to a club system for cars and other forms of transport would be a great way to do things because it could integrate all transport methods. For example, a Scottish Oyster card that would allow people to travel on the train, pick up an electric vehicle or an electric bike when they get to Edinburgh, and use to it to get to their destination is the sort of thinking that is required. Electric vehicles will certainly help with the reduction of CO_2 emissions, but they need to be part of a bigger package.

12:00

Shane Slater: It is important to incentivise the outcome that you want. If that outcome is reduced carbon emissions from the transport sector, and the public sector is going to help with that, it ought to be the metric that is used rather than just looking at particular technologies. The evidence shows that technology can change very quickly, so it is difficult to ensure that we choose the right technology. We could have something along the lines of a target for CO_2 emissions per kilometre, a

feed-in tariff or the transport equivalent of a renewables obligation certificate.

We can step that up if we decide that certain technologies have a strategic advantage for Scotland in terms of employment, for example. Double ROCs are used in this country, so we could go down that route.

In policy making, it is important to realise that the issues are not short term and will not be solved in three years or a parliamentary session. We are facing a medium-term to long-term challenge, and those technologies will need support over the medium term.

On a total-cost-of-ownership basis, many of those technologies look quite promising in particular sectors. In the area of light-duty delivery vehicles, for example, the public sector has a need and a mechanism to interfere in that market in a positive way, and the economics look pretty good. The challenge is capital cost, but the argument can be made in terms of the total cost of ownership. As Rebecca Trengove said, the running costs might be extremely low, but we have to get over the capital cost hurdle.

Stuart McMillan: I touched on that issue in the question that I put to the previous panel. You raised the issue of technology. I do not come from a technical background, so my question might seem silly to some.

I understand that technology develops all the time. I used to work for an information technology company that manufactured personal computers and, as soon as a PC was out of the door, it was out of date, because the sector moved on so quickly.

I dare say that lithium battery technology now is vastly different from what it was five years ago—although I see that Mr Nelson is shaking his head.

Paul Nelson: It is not vastly different.

Rebecca Trengove: No, it is not vastly different. Stuart McMillan raises a great point by mentioning PCs, because the analogy does not hold. Battery technology does not change at that rate. We know that because we have recently done a piece of work with Shane Slater—on which he might want to elaborate—on projected battery costs over the next 15, 20 and 30 years.

We can get a good proxy for what is happening by looking at what has happened with batteries for consumer electronics. Those have certainly changed, but the type of batteries that are needed for electric vehicles are infinitely more complex than the batteries in a mobile phone or a laptop. They require a great deal of electronics to make them safe and reliable.

We know what is likely to come out in the next 15 to 20 years because we can see what is happening in university laboratories at present. Axeon does a great deal of work on development and research, with a small "r"—we work closely with the University of St Andrews, which has one of the top battery chemistry departments in the country, so we have a very good inside track on what is likely to come out.

The real challenge lies not only in seeing what those technologies are and what they might be able to deliver, but in making them commercially viable. We know that there are lithium chemistries in development now that might give us a much greater energy density and therefore a greater range for a vehicle. However, we do not know whether those chemistries can be made to last for the lifetime of the vehicle, and whether they can be made cheap enough that the cost of the vehicle will start to be brought down.

Paul Nelson is right about battery technology. There was a significant change a few years ago when lithium-ion started to become commercially viable, which is what has really made electric vehicles viable. There are different flavours of lithium-ion chemistry, but it is not changing as rapidly as one might expect. Perhaps Shane Slater can go into some more detail on that.

Shane Slater: I ask Stuart McMillan to elaborate on his question. Is your point that it is difficult to set policy in the context of changing technologies?

Stuart McMillan: No—I was going to tie my question into the point about the cost of energy. Rebecca Trengove talked about the potential in the next 10 to 15 years. If even some of the developments are successful and commercially viable, as was said in the previous evidence session, the issue then will be that this is not just about electric cars or ferries, because there are all the other elements. There is no guarantee. I understand supply and demand, so I know that there is no guarantee that the off-peak costs will remain fairly low.

Apart from, "Keep your energy cheap," what message would you give to the Westminster Government—at present, many of the powers are reserved to it—and the Scottish Government about what is needed to make the sector, with the new technology and possible improvements, fully commercially viable? If it is fully commercially viable, more people will be employed, so there will be greater economic benefits, as well as the benefits that we want in relation to the environment and reaching the targets that have been set.

Shane Slater: We should look at other countries that have been successful in

incentivising new technologies. An example is the photovoltaics industry in Germany. While this country—or I guess London—was wondering whether to develop, say, 10 buildings with photovoltaics, Germany had developed a feed-in tariff, which transformed the landscape. That was about 10 years ago. For an investment of about €5 billion, there was around €4 billion of internal investment in new manufacturing capability. The Germans got the timing right. Before the industry developed and matured, Germany got in early and captured that. One of the objectives should be to understand where the potential might be to do that in an early and emerging market. Germany basically developed a market for the product—it incentivised the development of a whole market. Batteries are relatively heavy, so it makes sense to produce them relatively locally. Therefore, it is feasible that that might happen here.

You must try to put everything in the context of reducing emissions. One must not forget to try to limit the billion vehicle kilometres that are undertaken every year and to decouple traffic growth from economic growth. It is absolutely vital, in a growing economy, to limit the growth in traffic. Scotland has started to go awry on that—the targets for limiting traffic growth have not been achieved. Do not be thrown off track when you see how efficient internal combustion engines become. Those engineers are clever and they have not really been incentivised much to improve their technologies, but now they are incentivised and they are pulling out improvements. However, those will be exhausted by 2020. That is the low-hanging fruit, and electric vehicles are the only remaining option, as biofuels will not work. There are not many options on the table.

There is an emerging market that will grow to be significant in scale, although not necessarily in the short term. There is an opportunity to try to capture some of that emerging market by incentivising local end uses.

Rebecca Trengove: An additional point, which is a little tangential to Shane Slater's point, although it harks back to the question, is to do with energy storage. The Scottish Government has ambitious targets for the amount of renewables to come into the grid. By their nature, renewables are intermittent, so the energy needs to be stored in a way that can be used. Electric vehicles could have a role in that through vehicle-to-grid technology. On a sunny day such as today, if I had driven to the Parliament in my electric car, it could be sitting outside being charged up by solar panels. I could then drive the 5 miles home and the unused electricity could be fed back into the home grid. There are opportunities that might mitigate some of the potential cost increases as energy prices rise.

Paul Nelson: There is no lower-carbon output than an electric vehicle that uses energy that has been renewably generated, as it is 100 per cent carbon neutral. The more that we can replace internal combustion vehicles with that type of vehicle, the better off we will all be.

Electric vehicles can provide an element of energy storage, which will allow consumers to balance the pricing of electricity. Scotland also has the opportunity to develop a battery industry for houses, so that battery storage is available in housing to enable people to buy energy at the cheapest times, store it and use it later. We need to look at how we exploit that opportunity before German battery companies start to build batteries in Germany out of chemicals that they import from China and Bolivia and import them into the UK.

Rebecca Trengove: I will follow up on that last point. We are doing that as a company. We are involved in a couple of projects that are looking specifically at domestic energy storage for, in this case, solar panels. We see such energy storage as another potentially fairly major revenue stream and one that could be required in Scotland.

The Convener: I know that other members have supplementaries, but I will probe slightly more fundamental issues that Mr Nelson touched on. For the finances to stack up, this all has to be based on the assumption that there will be a supply of cheap electricity. However, hydrocarbon fuels are not, in themselves, horribly expensive; they are horribly expensive only because the Government taxes them so much. If I were the Chancellor of the Exchequer and I saw a huge shift from hydrocarbons to electricity, I would know that there would be a huge hole in the public finances. Would I not therefore just lump the tax on electricity?

Paul Nelson: That is my concern.

The Convener: And that will make electric cars no longer competitive.

Paul Nelson: No, it will not make electric cars no longer competitive. You have not brought two factors into the argument. First, although we have perhaps not reached peak oil now, we will reach it shortly. I am an accountant and I know that, as something gets scarcer, its price goes up, so there is that cost implication. The other factor that you have not brought into the equation is the cost to us of carbon emissions.

The Convener: I understand that point, but if I were Chancellor of the Exchequer, I would be concerned about balancing the books.

Paul Nelson: I totally agree. The point that I made previously was that I can see no alternative to taxing electricity at some stage.

Rebecca Trengove: I return to that point. That is already happening because, as Shane Slater said, car companies are already investigating how to make petrol cars far more fuel efficient. Making the existing car stock more fuel efficient is already reducing the Treasury's tax take and it is already concerned about that. The Treasury will have to fill that hole somehow, but the money does not necessarily have to come from electricity.

The other point is that there is a huge difference between supply and demand for electricity throughout the day. If there is additional demand at peak time, that will cause problems, but if we start to fill some of the valleys in the middle of the night, electricity would not necessarily have to go up in price.

Chic Brodie: Rebecca Trengrove mentioned economies of scale and Government involvement. It seems to me that, without talking about long-distance travel, there are many opportunities in local travel to use electric vehicles, for example as taxis, ambulances and buses. How engaged are local authorities and health boards with the likes of yourselves?

12:15

Paul Nelson: We have had a lot of support from the Transport Scotland sustainable transport group, from local people and from individuals within Scottish Enterprise and Scottish Development International.

When it comes to local authority support we deal with fleet managers who are doing it under sufferance—they resent doing it. I have an example of a recent transaction. The Scottish Government provided some funding to support the purchase of electric vehicles for councils. One of our vehicles was rejected three days before we were due to deliver it, because it was overdue. The council switched the order to Ford—it has its vehicles made in Turkey by a company called Azure Dynamics Corporation. Two weeks after the council submitted the order to Ford, Azure Dynamics went into chapter 11 bankruptcy in the United States. Therefore, I am left with a £40,000 vehicle sitting in my yard—built and ready to deliver to a council—and because of a perception that electric vehicles were late, the order went to an American company that cannot deliver it.

Another example of a recent transaction is a Technology Strategy Board project that Rebecca Trengrove and I are involved in. In the initial stages, I applied to Scottish Enterprise for a research and development grant for the project. As you do in Technology Strategy Board projects, when I completed the application document, I pointed out that I had applied for the Scottish Enterprise grant. The Technology Strategy Board reduced the amount of my grant by the amount of Scottish Enterprise money that I had applied for. Scottish Enterprise proceeded to not give us the R and D grant because the Technology Strategy Board was funding us. Our company ended up being £120,000 out on the project because joined-up government does not work.

The project, which is a rather large demonstration project, is continuing at the moment. One of the councils involved has some vehicles that are not operating because it has real operational issues around keeping the vehicles on the road.

Those are the difficulties that we face. We are pioneers in this area. I mentioned the size of our organisations earlier on. We do not feel that we are getting joined-up government support.

Rebecca Trengove: Interactions with local authorities are piecemeal because local authorities do not work collectively with the Scottish Government. When there were the Scottish public procurement grants—initially two years ago and then last year—rather than there being one order from the Scottish Government, the funding was disbursed among all the different local authorities. That meant that the local authorities were not getting economies of scale through purchasing. It also means that the experience from all those trials has not yet been aggregated and presented collectively. That is a pity, because there has been a lot of good practice.

To go back to Dundee City Council, the head of transport there is extremely enthusiastic about the experience that the council has had. However, that enthusiasm is not necessarily shared by some of the drivers who have taken part in the scheme. This is where it comes down to individual behaviour. Some of the council drivers used to have their own van that they used all day. They would then take the van home at night and use it for homers. Drivers could not do that with the electric vehicles, because the vehicles went into a pool, so the drivers resented their introduction. It would probably be going too far to say that the drivers sabotaged the vehicles, but certainly they did not fully buy into the outcomes of the trials. Overcoming such behaviour and mentality is challenging.

Paul Nelson: It is also very frustrating.

Rebecca Trengove: It is very frustrating, particularly when Scotland has the leading battery company in Europe and an electric vehicle manufacturer. We sometimes feel that we have to work quite hard to get the support locally, whereas in England—in the West Midlands in particular—people are falling over themselves to support the industry, because they can see that that is the way that the automotive industry will go.

Chic Brodie: I cannot imagine that anything like that would ever happen in Dundee.

Thank you for your honesty in your responses so far. We have talked a lot this morning about skills and support for manufacturing, but what do you think the Government might do or should be doing to ensure that the pioneers are being supported in their manufacturing, particularly with regard to the key element of generating the skills base?

Rebecca Trengove: One example of good practice elsewhere would be what is happening in the north-east of England. Nissan, which has a big plant in Sunderland where it is producing the Leaf and will be manufacturing batteries, is collaborating with Gateshead College on courses to teach the apprentices who will work on electric vehicle batteries how to service them and on allowing them to go into local manufacturing companies such as Newcastle-based Smith Electric Vehicles. That is an excellent example of what could be done with colleges in Scotland.

Chic Brodie: And that is not happening anywhere in Scotland.

Rebecca Trengove: That is right.

Battery manufacture requires a different skill set; after all, this is high-voltage equipment and working on it has a number of safety implications. You cannot just come in off the street and build batteries; we spend a lot of time training our people to do that work.

We are also struggling with getting engineers who have experience. As Scotland has no indigenous automotive industry, we are trying to recruit people from England, but that is proving quite a challenge, particularly getting them to come to Dundee.

Chic Brodie: You are talking about the city I love.

Rebecca Trengove: I do apologise.

The other area on which we must concentrate is the university sector, because we need graduate-level skill sets for our engineering systems. Given our need for not only mechanical engineers—who, I should add, you can get in Scotland, although they do not necessarily have battery or automotive experience—but electrochemical engineers, our proximity to St Andrews has proven very useful, because we can take graduates from there.

In short, we need to work with colleges and universities on the necessary skill sets. I think that this takes us back to Stuart McMillan's question about how technology changes, because the Government must continue to fund the fundamental research that goes on in universities—and I stress the word "fundamental", because applied research ultimately evolves from the fundamental research that is undertaken. Technology transfer from universities is important, but you do not get that unless you have guys getting together in a room, getting a bright idea and getting it funded.

Paul Nelson: Allied Vehicles recently won the Institute of the Motor Industry national training award because of the training programmes in which we have been involved. However, when we had initial discussions with Skills Development Scotland and Transport Scotland on setting up a similar college in Glasgow, we got the distinct impression that we would be treading on the toes of some of our educational establishments if we were to do that and felt that Government support would be directed more at setting up such a facility in an educational establishment rather than on-site in some factory.

Secondly, I note that when John Park asked the previous witnesses about training, the person who replied talked about developing people when they were young. The fact is that all of this needs to start in primary school and particularly in secondary school. We are participating in the UK Department for Business, Innovation and Skills-sponsored see inside manufacturing programme and in June will open our doors to schoolchildren and training establishments. When we initially went round schools, the response was shallow. We had to go to Glasgow City Council's director of education to get schools to come to our factory. We now have a two-week programme, and about 20 schools will visit the factory.

Chic Brodie: Do you take teachers into the factory as well?

Paul Nelson: You have hit the nail on the head. We must educate our teachers in the fact that manufacturing jobs are essential and that manufacturing is a good place to work.

I have spoken to schools. We seem to be educating accountants, lawyers and retail salespeople—I am an accountant, so I cannot say that that is too bad, but we are no longer educating people who can work with tools.

Rebecca Trengove: I will pick up on that point briefly. We have done work on encouraging kids to get involved in STEM subjects. The introduction of the curriculum for excellence provides a great opportunity to incorporate more of that in schools. Companies would be up for that. We have gained a lot from our activity, as did the school that we were involved with.

The Convener: A number of members want to speak, but I am conscious of the time, so if people are brief in their questions and responses, that will help.

Rhoda Grant: Rebecca Trengove mentioned that electric vehicles have the potential to iron out peaks and troughs in electricity demand through being charged when there are troughs and being discharged in houses when there are peaks. How much of a move from normal vehicles—for want of a better phrase—to electric vehicles would be needed to increase the demand for electricity? Does the system have enough potential for a major move?

Rebecca Trengove: There is potential. If a number of electric vehicles charge up in the same neighbourhood—on one street in Chelsea, say—that is enough to impact on the electricity supply, so smart charging is important to the introduction of electric vehicles. That means that people do not just go home, plug in and charge straight away at what is likely to be peak time. A smart charger selects the time that is cheapest and at which demand is less.

Even a small number of vehicles can have an effect locally. I do not know how many vehicles would be needed to have a national effect. Does Shane Slater have a view on that?

Shane Slater: I ask Rhoda Grant to clarify the effect that she is thinking about.

Rhoda Grant: I am talking about needing further generation to cope with demand.

Shane Slater: If smart charging operates—it will almost certainly be required in any case, for a whole bunch of business reasons that have nothing to do with electric cars—vehicles will be charged overnight or the opportunity will be available to dispatch vehicles. That block of energy can be moved around during the day to a great degree and we can take advantage of the electricity system.

Vehicles do not need to be charged with green electrons. It will be a very long time before the uptake of battery electric vehicles or plug-in hybrids manifests itself in the need for a significant increase in the percentage of renewables in the system, because there will be some fossil fuel generation for some time to come. I understand that the renewables targets in Scotland are high and that our energy systems must move in a particular direction but, until we get there, the system will have some fossil fuel energy.

Rebecca Trengove: I have brought with me a useful graph from SSE, which I can pass round for members. It shows that using smart charging to shift when vehicles are charged means that the peak is not added to. Charging overnight fills the trough.

Paul Nelson: On the chart, the off-peak demand is 40GW and the peak demand is 60GW. Using the area between 40GW and 60GW would mean no additional demand.

12:30

Patrick Harvie: I would like to explore some of these areas a little further. There has been some discussion of the impact of the change to electric vehicles on the way we travel and use transport. Part of the issue is that, as Shane Slater made clear, CO_2 reduction is not going to be dependent simply on switching one technology for another; it will be about the level of traffic and whether we stabilise, reduce or continue to increase transport demand. We are not talking about simply stopping putting fuel in a tank and starting to put electrons in a battery; the issue is a change in our relationship with energy. That is what I would like to explore.

I can quite see that the rapidity of the take-up of electric vehicles will depend on people feeling sure that they can charge their electric vehicle where and when they like because there are rapid chargers on the high street, outside the supermarket or halfway up the motorway—people need to know that they can charge their vehicle at home, at work or wherever. As Rebecca Trengrove just said, the grid management issues are more about how the system manages the times at which people can charge. How do we square the issue of the consumers' desire to be able to charge where and when they like with that of the system's need to manage that? How much of a problem is that going to be? If it is going to be a problem, what will that mean for take-up?

Rebecca Trengove: The trials that have been run to date of consumers using personal cars all suggest that most do not use anything like the range that an electric car has. Something like 50 per cent of journeys in this country are less than 5 miles; 64 per cent are less than 10 miles; and 90 per cent are less than 25 miles. The typical range of an EV is around 70 miles, which means that people would generally use only a small amount of the battery each journey. I could drive to work and back and need only a fairly small top-up.

The demand on the system is not likely to be that great during the day, for most journeys. In the trials, people typically put the smart charger on when they go home and the vehicle tops up when it needs to, overnight—only a small part of the capacity of the battery needs to be topped up.

The rapid chargers, which are the ones that would be a drain on the system, are more likely to be used during the day, when people are doing long-distance journeys. The graph that I talked about shows that there is less demand during the day, so that is less likely to have an impact on the grid at the moment.

Shane Slater: The work that we have done showed that the consumer's desire to have the infrastructure in place for any electric vehicle that they might purchase is terribly important. The perceived disutility of not having such infrastructure is significant.

Your question was to do with whether there would be a point at which the capacity of our electrical system would restrict our ability to charge during the day—

Patrick Harvie: It was partly to do with that, but it was more general. Forgive me if my point is a wee bit abstract, but there seems to be a tension around the consumer's desire to use the new technology in a way that they feel comfortable with, but which is sometimes irrational. I am in the Green Party, so I should not admit this, but I do not like going out of the door without fully charging my phone, even if I know that I will probably use only half the charge during the day. The issue is about not only what is technically achievable but what irrational behaviour there will be. Is there a tension between what people want and what the system needs? How much behavioural change can we expect? How does that impact on the way in which we move about?

Shane Slater: You are absolutely right. There is a massive tension between what people want and what the vehicles can deliver. From the evidence that we have generated to date, I am not particularly concerned about what the system can provide in the foreseeable future—that is, the next 10 to 15 years. The issue is that, although trips of 10km to 20km or even 40km are well within the technical range of an electric vehicle, when people purchase vehicles, they look at the fact that cars at the moment can go for 400km or 500km. Journeys of that length are extremely rare, but you lose the ability to make them when you purchase an electric vehicle. I would argue that it will be a long time before a battery-powered electric vehicle will be able to deliver that range at a competitive cost, if it ever happens.

In answer to your question, when we talk about electric vehicles, we need to be careful to make it clear that we are talking about not just battery electric vehicles but plug-in hybrids. The evidence that we have developed for the Energy Technologies Institute is that having a hybrid drivetrain—a fuel tank that is used irregularly as a back-up, like a mobile charging station for a mobile phone—is much more valuable than distributing charging stations everywhere so that there is one at the end of every street, which will not fix the problem. It is about dealing with consumer perception and the fact that consumers will always want to be able to get home, which is reasonable. That is where hybrid vehicles are a solution. Plans in Scotland should not be constrained so that they fit battery electric vehicles. Electric drivetrains, of which there are a number of different types, is the way to get out of that particular consumer desire problem.

Paul Nelson: Just to allay Patrick Harvie's concern, you would only be topping up the battery unless you left the charger plugged in. That is what we do with our electric vehicles.

To add to Rebecca Trengrove's statistics, in the UK, vehicles travel an average of 35 miles a day.

The issue is a mental one. Studies have been done in Japan showing electric vehicles circulating around charging points. If you put a charging point in the south of the city, all the electric vehicles circulate around it but never use it. If you then put a charging point in the north of the city, they will circulate around that and never use it. The evidence is that the more charging points you put in, the more vehicles will circulate around them but never use them. I have concerns about individual charging points.

I am certainly one of the people who say that electric vehicles are not the total solution at the moment, although they are part of it. However, I can see a way forward for them: fast charging. Mr Brodie mentioned taxis and delivery vans, which is an area of the market that we are already in. People who use them will want to recover their cost by doing a large number of miles a day, and they can do that by fast-charging their vehicles.

Another point that I would like to emphasise is that if we ever get a battery that can take a 2 or 3 tonne electric vehicle 400 miles, it is going to need either a very very fast charger or a very very long time to charge.

Mike MacKenzie: I would like to be ahead of Patrick Harvie in the queue when it comes to buying my first electric car, especially because we are getting to the position that, although the capital cost might be higher, the overall costs over a three-year period will be lower. However, I live in a rural area and I am beginning to become concerned that I will never get the opportunity of that good value and, as usual, Patrick will have an advantage over me because he is an urbanite. Is the realistic assessment simply that people in rural areas and the Highlands and Islands region will be left behind and will not have the benefit of this technology?

Rebecca Trengove: As Shane Slater said, there is a range of different types of electric vehicle. I suspect that a purely electric vehicle might not suit your needs, but a plug-in hybrid electric vehicle such as the GM Volt, which will be launched later this year as the Vauxhall Ampera, might be a solution. That will have both drivetrains. The electric drivetrain will probably do you about 40 miles on a single charge, but if you need to

drive from Kingussie down to Edinburgh—I do not know where you are based—you could do that with the internal generator. That could be a solution for you.

Mike MacKenzie: I am old enough to remember the battle between VHS and Betamax.

Chic Brodie: He still has them.

Mike MacKenzie: You are not wrong.

Will things such as hydrogen fuel cells be the emerging technology that makes the battery charging model redundant? As a careful consumer, I would like to make sure that I get the right technology and not one that, in effect, drives me up a blind alley.

The Convener: You do not want to buy Betamax again.

Mike MacKenzie: If I am to be an early adopter, where should I put my money? What should I buy?

Rebecca Trengove: I would buy a plug-in hybrid. That sounds like the sort of thing that would suit your needs. Hydrogen fuel cells have been talked about for decades and they have still not been delivered, although they probably will be at some point.

It is reasonable to ask which technologies will be superseded by other things. As far as electric drivetrains are concerned, there will be a range of options to suit different needs. For urban areas, fully electric vehicles will be ideal, particularly in the sort of circumstances that Paul Nelson was talking about—for delivery vans and so on—but they will probably not meet the needs of people who live in more remote areas, for whom plug-in hybrids could definitely be the way forward.

The Convener: The final question comes from John Wilson.

John Wilson: It has been interesting to hear about the new technology and the developments that have taken place. I was particularly interested in Ms Trengove's remark that although her company is based in Dundee, it manufactures its batteries in Poland. She should not worry—she is not the only person I have a question for.

Mr Nelson's company constructs its vehicles in Glasgow, but where does it source the motors and the parts for those vehicles? Given that we talk to the renewables industry about the technology, the jobs and the opportunities that are available for Scotland, I am interested to know why the batteries that Ms Trengove's company uses are manufactured in Poland rather than Scotland, and whether the parts for the electric motors that Mr Nelson's company installs are manufactured in Scotland or the UK, or whether they are imported from elsewhere.

Mr Nelson said that the vehicles that Allied Vehicles produces are 100 per cent carbon neutral, but carbon is used in the production of the vehicles and their parts, so it is not true to say that they are 100 per cent carbon neutral. I put that on the record so that no one can come back to the committee and tell us that the evidence that we heard was wrong, because carbon is involved in the production of the vehicles.

Paul Nelson: That is the case with any vehicle. The position would be pretty comparable with that for any other vehicle.

Rebecca Trengove: Perhaps I could make a correction; thank you for picking me up on that point. Axeon is an international company that is headquartered in Dundee. At the moment, we make all our electric vehicle batteries in Dundee. The manufacturing site in Poland, which is the result of an historical acquisition, services the other side of our business, which is in power tool and electric bike batteries.

At the moment, we plan to retain Dundee as the engineering technology centre. We will continue to make electric vehicle batteries there for the foreseeable future. If we choose to make them elsewhere, that will probably be driven by our customers' needs—they may want manufacturing proximity to their site.

I guess that your question was partly about jobs. The sort of jobs that we are creating in Dundee are high-value-added jobs. We are looking at adding more manufacturing jobs as customer demand increases—which we hope will be the case.

Paul Nelson: We get the major drive components from the European Union—from Italy—which is really strange, considering that this room is dedicated to the memory of the guy who invented the electric motor. We try to source as many of the components as we can in the UK. Our batteries come from Axeon in Dundee. They are composed of Chinese cells. We also have batteries that are composed of imported Korean cells, the casings for which we are starting to manufacture.

We have built only 150 vehicles, so we cannot get efficiencies of scale. When we can build components, we will do so, and when we can source components in the UK, we will do so. We have done that extremely successfully in the rest of our business—in the taxi business and in the wheelchair-adapted vehicle business. Components that were designed and previously built in the Czech Republic are now sourced in Scotland. Fife Fabrications and Galloway Boats and Mouldings are two of our major suppliers.

It is in our interests to source locally as much as possible. It is cheaper to do so, because the UK is a cheap manufacturing country at the moment.

John Wilson: I thank the panel for their answers, and I look forward to both companies making more major announcements about the creation of job opportunities in Scotland.

The Convener: Thank you very much. It has been quite a short session, but I think that we have got through the major points in an hour. I am grateful to members of the panel for coming along.

Meeting closed at 12:45.

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