OFFICIAL REPORT
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Environment, Climate Change and Land Reform Committee

Thursday 15 November 2018

Session 5

The Scottish Parliament
Pàrlamaid na h-Alba

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ENVIRONMENT, CLIMATE CHANGE AND LAND REFORM COMMITTEE
33rd Meeting 2018, Session 5

CONVENER

*Gillian Martin (Aberdeenshire East) (SNP)

DEPUTY CONVENER

*John Scott (Ayr) (Con)

COMMITTEE MEMBERS

*Claudia Beamish (South Scotland) (Lab)
*Finlay Carson (Galloway and West Dumfries) (Con)
*Rhoda Grant (Highlands and Islands) (Lab)
*Richard Lyle (Uddingston and Bellshill) (SNP)
*Angus MacDonald (Falkirk East) (SNP)
*Mark Ruskell (Mid Scotland and Fife) (Green)
*Stewart Stevenson (Banffshire and Buchan Coast) (SNP)

*attended

THE FOLLOWING ALSO PARTICIPATED:

John Ferguson (Eco IdeaM)
Suzy Goodsir (Greener Kirkcaldy)
Angus McCrone (Bloomberg New Energy Finance)
Dave Moxham (Just Transition Partnership)

CLERK TO THE COMMITTEE

Lynn Tullis

LOCATION

The Robert Burns Room (CR1)

Scottish Parliament

Environment, Climate Change and Land Reform Committee

Thursday 15 November 2018

[The Convener opened the meeting at 09:31]

Climate Change (Emissions Reduction Targets) (Scotland) Bill: Stage 1

The Convener (Gillian Martin): Welcome to the 33rd meeting in 2018 of the Environment, Climate Change and Land Reform Committee. I remind everyone present to switch off their mobile phones, as they might affect the broadcasting system.

Under agenda item 1, the committee will take evidence on the Climate Change (Emissions Reduction Targets) (Scotland) Bill. This is the fifth of the committee's evidence sessions with stakeholders. Today, we are holding an additional meeting to discuss innovation and what is required to meet the targets that are set out in the bill.

I am delighted to welcome our witnesses. Joining us in the committee room are John Ferguson from Eco IdeaM and Suzy Goodsir from Greener Kirkcaldy. Dave Moxham, deputy general secretary of the Scottish Trades Union Congress, will join us slightly later. Angus McCrone, chief editor, Bloomberg New Energy Finance, will join us via a teleconference call.

I will ask the opening question. What has and has not worked so far in encouraging innovation in Scotland? How well have approaches to encouraging innovation for and solutions to climate change worked to date? What measures have been taken, and what has worked best?

Mr McCrone should let us know if he wants to say something.

Angus McCrone (Bloomberg New Energy Finance): I will. However, somebody else can start.

The Convener: Okay. Would anyone else like to start?

John Ferguson (Eco IdeaM): On the question of what has worked well, the clean technology and low-carbon technology sector is now worth tens of trillions of dollars—you can take Apple as a proxy of a $1 trillion company—and is growing rapidly and exponentially everywhere across the world. Globally, there is a well-networked clean technology sector. The United Kingdom has focused a lot of effort through knowledge transfer partnerships and Innovate UK, and Scotland has focused on resource sector innovation in programmes such as that delivered by Zero Waste Scotland. The technology innovation therefore exists.

My business is fundamentally about clean technology, so I watch that as a scientist on an almost daily basis. The issue is not so much the technology, which is working. There are areas in which we still need innovation and improvement, and that will continue; that is just a natural part of science and engineering. The bit that does not work is that we are simply not bringing those technologies into systems or creating system transitions. Fundamentally, that is about how our markets work. The technologies and the innovation systems to stimulate technology and innovation exist and are increasingly successful, but we are simply not adopting them, bringing them in, and transferring them to do their good work quickly enough.

The Convener: I have listened to people talking about Scotland having quite a lot of small and medium-sized enterprises, which get on with doing their business and maybe do not have as much time to get involved in innovation. Maybe the links between small and medium-sized enterprises and universities or innovators are missing. Do you agree with that?

John Ferguson: There are mechanisms to encourage innovation. You can get innovation grants, but the purpose of an innovation grant is not innovation; it is to get an SME used to working with a university.

SMEs are often innovation companies—my company is tiny but innovates across a range of different sectors. I had an innovation grant with the University of Dundee and thought that it would be good to do five more with other universities, because I have five other ideas. However, an SME can only get one innovation grant and that is a limitation with regard to the connection between small companies and universities.

The Convener: Would any other panel member like to answer the broad question?

Suzy Goodsir (Greener Kirkcaldy): My focus is people and communities rather than technologies. A lot has worked over the past 10 years. The climate challenge fund has funded over 1,000 projects in local communities to engage people and community groups in innovative ways of changing behaviours and attitudes on climate change. There has been some fantastic work on raising awareness and setting the groundwork for behaviour change.

Local Energy Scotland's community and renewable energy scheme—CARES—has

supported community energy projects, and there have been some fantastic innovative projects, particularly in the Highlands and Islands. There is real potential for more of those to happen in urban communities.

The Convener: Stewart Stevenson has a supplementary question.

Stewart Stevenson (Banffshire and Buchan Coast) (SNP): In the first instance, I will direct my question to Angus McCrone, although I may come back to people in the room.

One of the measures of innovation is the number of technology patents. I understand that the number of patents is falling. I have no idea of the breakdown between the wide range of patents that are in existence and the ones in this particular area. If I may make Angus McCrone represent the whole of Bloomberg New Energy Finance, does he have any views on that and on whether patents are a good indicator of innovation taking place?

Angus McCrone: I am not sure that I can give a good answer on that. Patents are obviously one indicator. Part of the overall picture is that quite a few technologies in the low-carbon tradition have matured a lot in the past 10 to 15 years. For example, technologies such as onshore wind, solar photovoltaics and offshore wind have become mature with an established product. The innovation is generally happening in large companies and is incremental. It is not happening through small businesses in sheds inventing new products.

I will mention, in no particular order, some areas where Scotland could take advantage of its natural resources and look to push through innovation and be a centre of activity. The area of demand response will be huge with regard to the balancing of the electricity system in the future. There will be new industrial processes to take advantage of the inevitable peaks and troughs in the electricity supply. Scotland, with its large share of renewable generation, could be where new processes are sited.

Similarly, Scotland could help to pioneer projects on the use of batteries in the balancing of the electricity system. The pairing of batteries with other technologies such as wind, tidal and wave is another interesting area. Through small island grids, a lot of islands in Scotland have the potential to pair technologies such as wind with batteries and even with diesel generation and then export that expertise around the world.

Finally, onshore wind projects are beginning to happen in parts of Europe without any subsidy support. There is potential for Scotland to be a place where that happens, taking advantage of Scotland's great resources in wind, backed with corporate purchasing. You could have big companies buying electricity from wind projects and doing those deals in Scotland because of the good economics in relation to wind projects. There are a lot of opportunities.

Stewart Stevenson: I have a question for John Ferguson. In relation to your company's activities, do you use patents to protect your intellectual property? How do you protect your own innovations from unhelpful exploitation by others?

John Ferguson: I would protect the know-how just by being sensible about who I speak to about it. For small companies, it is often more about how quickly you get to market; it is about being the first mover. How do you protect patents on a global basis when you are in a globalised economy and you have China breathing down your neck and looking at everything you are doing? How are you going to take on a Chinese company that takes your ideas? That puts a lot of people off using patents, along with the cost and the time involved in patenting, unless it is such a brilliant idea that you and your investors simply have no choice except to protect it with a patent. A lot of the time, the innovation is not patentable; it is about know-how and protecting that know-how.

The Convener: We had a debate in Parliament about research funding after Brexit and we talked about universities, which can often be key when it comes to getting research funding that might drive innovation. How big a problem will coming out of the European Union be in terms of funding the driving of innovation in this area? Is that something that has crossed your mind?

John Ferguson: I think that it must have crossed the mind of everybody who is involved in innovation and research. I have certainly heard lots of academics speaking about it. I would probably leave the words to them. I think that the academics are vocal enough in standing up and saying that they have concerns about the networks, the connections and the flow of investment into research.

I do not know enough about how academics are funded through the UK Government to know whether the UK Government can take up the slack of any uncertainty that may come after Brexit. However, uncertainty is not a good thing.

Finlay Carson (Galloway and West Dumfries) (Con): The just transition partnership suggested that there is too low a rate of investment, particularly in clean energy systems, and business has suggested that a clear route map and policy would help to drive investment. However, it is not just about tech; it is also about innovation when it comes to people and activities.

Has there been adequate leadership and support for new ideas to succeed? How could we encourage more innovation?

Suzy Goodsir: It is important to include communities in energy innovation. Communities are impacted by the energy infrastructure; a lot of communities in Scotland have high levels of fuel poverty and there is also a lot of fantastic energy resource. To try to marry them up would be a great solution.

There has been some funding for community projects; historically, a lot of it has been focused on the Highlands and Islands. There is a real opportunity to do more with urban, central belt communities around community renewables. Possibly more support is needed for CARES and for organisations such as Community Energy Scotland, which works with local communities to try to ensure that they can take advantage of the innovations in the energy system that are on the way.

We have smart energy systems coming—there is a lot of change on the horizon. The traditional model of a community energy project is of a community having a wind turbine or a share in a wind farm. Those days have ended, really, so there is a real need for communities to have a stake in the changes that are coming and in the new energy projects that are on the horizon to make sure that it is not just about corporate ownership, with profits leaving our communities.

John Ferguson: I would support what has just been said and what Angus McCrone said as well. Angus mentioned some areas where we could innovate. We are looking at how we embed renewables systems into industrial contexts. It is done in much the same way as you would embed systems into communities. It democratises and decentralises and it gives those communities, businesses or people long-term future price security. It makes the market start to work for people and consumers and the environment more than for investors.

We need investors—I am not saying that investment is not important—but how we structure the market can be orientated and biased in one direction or another. We need to move away from large-scale, centralised systems and towards decentralised, embedded systems. If the power from a wind turbine is put into the grid, the sleeving costs before the power gets to the consumer are enormous, whereas if the wind turbine is put into a business park and the power is sold directly to consumers, that works for the wind farm and for the businesses that buy the power. Embedded systems for communities and businesses are one of the approaches that we need to take in future.

09:45

Suzy Goodsir: The Edinburgh Community Solar Co-op is an example of that approach working well. Lots of members of the local community have invested to enable solar panels to be put on public and community buildings in Edinburgh. The project is very successful. We could have much more of that.

Finlay Carson: The committee has heard from sectors such as agriculture that although there is technology and advice out there, the knowledge transfer is not good, which means that new technologies are not having the impact that they could have. What would make the difference to small businesses and communities who want to drive innovation? Is there a single magic bullet that would help with knowledge transfer and get more companies and communities on board?

Suzy Goodsir: For our sector, it is about having good, trusted, knowledgeable intermediary organisations, with funding support. Organisations such as Local Energy Scotland and Community Energy Scotland have the technical expertise to offer capacity building and project development support to community organisations that are doing projects on the ground.

John Scott (Ayr) (Con): Mr Ferguson, I was particularly impressed by your evidence and your obvious desire to innovate, which stimulated my thinking. You and Suzy Goodsir both talked about community schemes, but we can take things to the even more granular level of self-sufficient households. In the context of the move towards electric vehicles, will it be possible to install solar panels and batteries in individual houses, so that the solar panels operate during the day and people can charge their cars through the night? That seems to be a virtuous circle. Is that a practical thought or a flight of fancy?

John Ferguson: It absolutely is a practical thought. Angus McCrone mentioned demand-response balancing; I would add load balancing to that. Those systems of storage can function in that context. I will hand over to Suzy Goodsir, because she was talking to me earlier about heat batteries, which are another approach, given that more than 50 per cent of our gross energy demand in Scotland is for heat for commercial and domestic spaces.

Suzy Goodsir: My organisation, Greener Kirkcaldy, runs an energy advice service. We go out to households across Fife to give people advice on home energy use. A lot of that work is about fuel poverty and a lot is about carbon reduction, because people are interested in reducing their carbon footprint. We have found that there is a small but growing interest in battery storage. People are interested in the idea of self-

sufficiency. If they have solar panels or other renewables at home, they are interested in making the most of that energy, especially as the feed-in tariffs and financial subsidies are decreasing.

We find that people are interested in heat batteries. There is a product called Sunamp—Sunamp is the name of a Scottish company—which is relatively low cost to install. It is a fairly small piece of equipment, which can go in the attic or next to the boiler and connect up to home renewables and the home heating and hot water system. It will probably pay for itself over the lifetime of the equipment—probably much sooner. There is a real and growing interest in that kind of technology. People are up for it.

John Scott: A game changer in that regard is that quite a lot of homes have sufficient room to install a battery, given the different configurations and shapes of batteries. When I was a child, our electricity did not come from power lines; a whole shed was given over to batteries to store electricity, which must have come from a generator. It is quite possible to store energy on an individual household basis. How much thought has been given to the development of self-sufficient households?

John Ferguson: The growth in technology and innovation in the different ways of storing energy in batteries is exponential. It is all about balancing. If we want to make a change at scale, we need to know that the natural resources are there, so a technology that uses a lot of gallium, for example, might not be viable, because there is simply not enough of that rare earth metal.

The technology innovation in that space is very rapid. I would keep an eye on heat batteries and energy storage batteries as part of the solution, certainly for wind, because you are getting a balancing of load. You will get a baseload system out of a wind farm that could not be baseload otherwise.

The Convener: Before we move on to a supplementary question from Claudia Beamish, I just want to say good morning to Dave Moxham.

Dave Moxham (Just Transition Partnership): I apologise for my lateness.

The Convener: No problem.

Claudia Beamish (South Scotland) (Lab): I appear to be asking this question from a negative position, but it is a reflection on the past that I hope will lead us to a positive future. Some would say that, when it comes to research and development, Scotland is fantastic. We have already highlighted lots of things that are happening now.

However, there is a perception that sometimes comes to me in my brief that we do not always get to commercialisation. I will use the example that everyone uses, although I am sorry to do so in a way—Professor Salter's ducks and wave power. There are lots of examples. Why have we not seen manufacturing of renewables here on the sort of scale that is perfectly possible? Do the witnesses have any comment on that beyond what has already been discussed?

Angus McCrone: The issue with wave energy is not that Scotland has missed a manufacturing boat, because the manufacturing boat has not left the harbour yet. That sector has not got going anything like as quickly as anyone in any country hoped.

In retrospect, the mistake that Scotland made was in investing large amounts of public money in individual technologies; as it happened, several of the companies behind those technologies went out of business and quite a bit of money was lost. Some lessons have been learned from that and a different approach is being tried via Wave Energy Scotland. Certainly on the tidal side, there has been more of an emphasis on backing some of the early projects, such as the Maygen project, rather than putting money into particular technologies. That is progress.

Whether Scotland could become a hub for mass manufacturing of some of these new technologies is not just a Scottish issue; it is also a UK issue. Invented in the UK, developed in the US and made in Japan is what we used to hear with a lot of technologies a few decades ago. That same principle is a danger when you get early Government support for a technology, the Government goes lukewarm on it and somebody else picks up the baton and develops it. Consistency of Government policy is important.

It is not just important to focus on manufacturing and factory jobs; it is important to focus on building expertise. Expertise and service skill make up a lot of the valuable export opportunities. I mentioned a few areas earlier. A moment ago, we were talking about electric vehicles, which are an up-and-coming low-carbon area. We forecast that 55 per cent of global car sales in 2040 will be electric vehicles, which will totally transform the transport sector. There is an interesting interplay between electric vehicles and the grid via what we call dynamic charging, which is the ability to charge an electric vehicle when the electricity price is low rather than when it is high. That will require public acceptance of the use of smart meters and other information on the prices of electricity coming into the home. There is a lot that the Government can do to encourage that take-up. Early success in developing that kind of dynamic charging will provide skills that can be exported to other countries.

Dave Moxham: I have a little less expertise than my colleague, but I have a couple of other points. There have been failures in the past, but it would be a mistake to think that, because we have had our fingers burned before, we should not try again. There is an element of risk taking here, but it is necessary risk taking because of the stakes.

I have a position in the Scottish Trades Union Congress, but I am here specifically on behalf of the just transition partnership. It is very important to learn from the negative experiences of transition that people have had in the past, and to begin to reverse those experiences. We need to find a better way of connecting some of the R and D that I think we all agree needs to be undertaken, with the market. There is a key role for Government in that. A couple of the examples that have been given would be ideal from our point of view.

We see the potential for some good work to be done, particularly though the establishment of the just transition commission, which should have as much power over direction as possible. We need to ensure that the innovation from the R and D is properly built into an industrial strategy and that, if there are gaps between the technology and the delivery, we can deliver the plan, even if that involves Government investment. In advising the Government, the just transition commission has a real role in filling that gap.

Mark Ruskell (Mid Scotland and Fife) (Green): The climate challenge fund has been a phenomenal success in supporting more than 1,000 projects. I was involved in some of the early discussions about the establishment of the fund, and I always saw it as a community laboratory of innovation and ideas. However, it poses a question about how we mainstream some of the approaches. Some fantastic work is going on in individual communities, and that is having some reach, but are there particular lessons from CCF projects that should be taken forward as mainstream approaches? How do we do that? There is a danger that, in the voluntary sector, people continually try to innovate to get the next batch of funds.

Suzy Goodsir: That is a real risk. The climate challenge fund has supported more than 1,000 projects, as you said, with £100 million over the past 10 years. One of the challenges is that the fund looks for constant innovation. The funding tends to be relatively short term—often it is for only one year—and it takes longer than that to embed projects in communities. A key priority in any future development of the fund, certainly from the community's point of view, is for funding to be available over periods of at least three years, in order for learning to be identified and changes to be embedded.

The climate challenge fund has made measurable impacts on carbon but, more important, the key success is that it has led to us learning a lot about activating behaviour changes and about opening up possibilities for people that they had perhaps not previously considered. For example, there has been a lot of good work in relation to battery storage and electric vehicles that has helped people to overcome barriers. There has been a lot of learning on what the barriers are to the uptake of green technologies in people's homes and lifestyles.

There is probably scope for a review of the fund at this stage. I know that reviews have been done in the past to pull together some of that learning and to think about where it could be mainstreamed. The Scottish Government has behaviour change programmes, but a lot of such programmes focus on communications—in effect, they are marketing campaigns—and delivery through organisations such as the Energy Saving Trust, rather than on mainstreaming through grass-roots, bottom-up, community-type work.

Mark Ruskell: I have a slightly bigger global question on targets. We will need to make a critical decision on the targets that we put in the bill. We have already talked a bit about the role of business in meeting a 90 per cent target, but how would business and innovation react to a net zero carbon or greenhouse gas emissions target by 2040 or 2050? What signal would that send to markets, and how would it become a driver for innovation?

10:00

John Ferguson: I come back to my previous point that it might not be the innovation market that needs such a stimulus and that this is more an organisational system issue of national Governments and local government installing the new ideas and options to allow these technologies to do the work that they can do. I worry that we are constantly running after a moving ball: every time that we think that we get to it, we find that it is actually 50 yards ahead of us. Things are just moving too rapidly.

Indeed, that is why our submission focuses on developing rapid transitions by changing how we do things. We could, for example, have joint councils in regional areas, have special powers or bring in agencies such as Scottish Enterprise and make them work together under a specific mandatory framework. In the submission, I give the examples of the western edge project in Tayside, where there is the potential for fossil-fuel-free district energy concepts and new smart grids to be installed, and the Binn Group's plastics project, which will completely change how we address plastics recycling. Those are real

commercial projects, but that kind of technological innovation can be a catalyst if we can spread it across regions and make sure that it is applied quickly—which we can do, because we have the mechanisms in place.

For me, then, the issue is to find ways of applying the technological innovation that is already taking place. Things will keep changing; indeed, the offshore marine renewables that Angus McCrone mentioned are one area where we keep needing to innovate until we see things that work. We then need to get such projects transiting at scale, but our strategies are just not good enough to make such transitions happen. We have to find new ways of speeding that up.

Dave Moxham: I agree. In a way, it is a case of show, not tell. The high targets are a positive move, and they will probably have a positive effect on the research and development environment. Indeed, it has been shown globally that, if you set high targets, you get a positive response to them. However, such an approach does not necessarily do the "show, not tell" or guarantee that any of the benefits, which need to be felt economically and industrially in the form of jobs in communities, will necessarily reside in Scotland. That is what we need if we are to win the other big battle, which is about how we change behaviours. It is all about the nuts and bolts of delivery; we need to get ahead of the ball by ensuring that the things that work can be expanded quickly and at high volume. If we can do that, the people whom we represent and communities more generally will, I think, see the higher targets as something that they can relate to.

Suzy Goodsir: To communities and individuals, a zero target sends a very strong signal and message that the Government is leading from the front, and it will catalyse a lot of change.

Angus McCrone: I admire the setting of tough targets. It gives a sense of direction, which is very important.

Looking at the different pieces of this picture, I think that the targets for the electricity sector are translating into change; indeed, progress is well under way in that respect. The United Kingdom's performance in reducing emissions from electricity generation has been good, and you can see that continuing. The technologies are there, and the choices are more about how they can be implemented quickly and what more can be done to encourage such moves.

Although it has come about a bit later and progress up to now has been on the slower side, a similar thing has been happening in the transport sector. The path ahead for electrification is pretty clear, and by the mid-2020s, the economics will be switching very decisively in favour of electric cars. You can see how targets can be achieved in so far as they relate to transport.

However, the big issue is heat. It is great to have a very aggressive target for the heat sector, but it is also necessary to bear in mind that the path by which we might get to that target is nothing like as clear as it is in the electricity and transport sectors. There are technologies available, but it is not clear which of those technologies will make a significant difference. It is obviously a massive issue in Scotland, with its housing history and the challenges that it faces in keeping people warm. It is good to have the target, but a lot more work needs to be done on what the pathways are on the heat side.

The Convener: Stewart Stevenson has a supplementary question on that theme.

Stewart Stevenson: I will start with Angus McCrone. It is a very simple question. Who should determine what the targets are—scientists or politicians?

Angus McCrone: It has to be a combination of scientists and politicians. In the end, politicians should set them, because how they go about setting policies to meet the targets is part of the democratic process, and they need to be answerable for that, but the targets must be strongly based on the scientific evidence. Long-term targets are difficult, because we do not know how technologies will evolve over time. There must be some flexibility to make targets more aggressive or less aggressive, depending on how the technologies evolve. However, it is important to have strong targets as a statement, so that people know what the direction of policy is.

John Ferguson: Good policy is evidence based and, in that context, scientists are fundamentally important, but we also need to take business and communities with us. It is for global society—not just politicians and scientists—to resolve the issue, and each group has a role to play in that.

Dave Moxham: I hope that my answer is not too wide, but an enormous polarisation is taking place in world politics, in the US, Europe and other places. Politicians—not in this place, on this issue, as far as I can see—are responding to what they perceive to be the concerns of the dispossessed working class and the concerns of people who do not feel that they have been part of or included in the six significant economic and industrial changes that we have seen.

I trust politicians, but the politicians I trust are the ones who also pay attention to how those arguments are won at community and trade union level because, without that buy-in, we undoubtedly risk, in every country in the world, the polarisation that I have referred to, which one might describe as the collapse of the centre. That is a particular

danger to our shared aims on climate change and carbon reduction.

Mark Ruskell: To come back to targets, there is not a clear pathway in Scotland's climate change plan for getting to a net zero target. Are there examples of other Government targets or aspirations on which there has initially been uncertainty yet which business, through innovation, has worked—with or without communities—to establish a pathway towards and achieve?

John Ferguson: I am sorry—I did not pick up specifically what you were getting at with your question.

Mark Ruskell: One of our questions is about a clear pathway to a net zero target. Have there been other Government targets or aspirations in the past in relation to which there has not been clarity at the outset on the pathway to the objective but which business has had a role in addressing through innovation over a period of time?

Suzy Goodsir: I have an example from the future rather than the past. The Parliament is considering the Fuel Poverty (Target, Definition and Strategy) (Scotland) Bill, which will set an aspiration for fuel poverty to be reduced to 5 per cent, or perhaps lower, by 2040. Given that there is a link to the decarbonisation of heat, there will be some good synergies on both targets. I am not sure that there is a clear plan for how to get to fuel poverty of 5 per cent by 2040—a lot of innovation will be required there, too—but let us hope that the work on that and on the climate change targets will lead to a win-win.

Mark Ruskell: The obvious example is the aspiration of the US Government to put a person on the moon for the first time. There was no clear pathway to achieving that. What collaborations with academia or business would work in addressing such a gap, filling it and innovating in those sectors? Perhaps Angus McCrone has thoughts about energy in that regard.

Angus McCrone: Sorry—would you mind saying that again? I just missed the end of the sentence.

Mark Ruskell: Okay, I will try again.

My question is about how industry manages to innovate. I mentioned the example of meeting a target, such as a Government's aspiration to put somebody on the moon. Industry, academia and Governments then need to work together in order to understand the uncertainty, innovate around it and achieve the target.

My point for Angus McCrone is about energy. Are there examples from energy in which there was no clear pathway to achieving a goal, yet the industry managed to innovate around the problem?

Angus McCrone: Not in the clear way that you set out in relation to the moon programme. I suppose that, in that case, the US Government threw vast amounts of money at the problem, which always helps.

The UK has more than met its CO_2 reduction targets from the 1990 benchmark. Similarly, it will either meet or come incredibly close to meeting the 2020 renewable energy target. Therefore, targets can be hit. The private sector always proves to be very versatile and adaptive in thinking of ways to meet targets, as long as the crucial incentives and the price signals to make it happen are there.

As I have said, the issue with a long-term, very ambitious CO_2 reduction target, such as we are talking about here, relates to what happens on the heat side. Until there is a little bit more clarity on which technologies will win through, it is difficult to be certain about how the Government can bring that about.

John Ferguson: I give Mark Ruskell the specific example of zero waste. Before zero waste was a popular concept, it had become very clear that we had to deal with landfill. In 1996, the landfill tax was brought in, which internalised the external cost that landfill placed on the environment. When I started in the business, 97 per cent of our waste went to landfill, so the tax had a significant impact as regards methanogenic potential to drive climate change. The ban on landfill changed how the industry structured its innovation, investments and assets. It drove innovation towards reusing, recycling and finding cleaner ways of making energy from the waste with which we can do nothing else. That was one way of saying, "You cannot do this any more."

It would drive massive displacement in the energy sector if we were to say that, within a few years, people will not be able to use diesel-generated power systems and will have to have an alternative in place. One of the businesses for which I work generates almost all its energy from diesel generation. It is trying to be a low-carbon business, but how can it do that? We are trying to put alternative renewable systems in place. People might think that we can create transition and innovation by saying, "This is a really bad thing. We will stop doing it, but we will do so in a transitory period when we will have time to adjust and deal with it." However, at some point, we will not be able to do that any more. Putting in alternative systems is one way in which we can make such transition happen.

Mark Ruskell: But at the beginning of that process—when the landfill ban target was set—there was no clarity about how to get there.

John Ferguson: Absolutely. Nobody knew how that would pan out, but it set the environment for change. We said that there would be a cost for landfill, and as that cost rose, the response rose in proportion to it, to the point where we can now say that, by 2021, we will pretty much completely ban waste from going to landfill. You move from one mechanism to another.

Mark Ruskell: Are there other examples?

Dave Moxham: I have a general comment. I agree that the setting of targets can provoke positive innovation and reaction, even if it is not known exactly what the path might be—there is certainly no dissent from us on that. There are risks if it becomes profitable not to innovate but to find other offshoring or importing alternatives. We have to be clear that, in setting a target, we are also giving guidance about what constitutes a positive economic or social benefit—and what might be the opposite. I would be slightly careful about saying that a top-down mechanism, such as using the market to encourage people to decide, can automatically do that, although undoubtedly it can in some circumstances.

I do not want to sound like a broken record, but returning to an enterprise environment and a connected strategy—involving the Scottish national investment bank and others—that promotes the best possible socially inclusive responses is very important.

10:15

John Scott: I am interested in the sort of macro ideas that you have been dealing with, and I want to ask about practical issues. Can I have the witnesses' perspectives on whether large-scale systemic change now is required to ensure decarbonisation, and how structural change can be facilitated and financed?

Dave Moxham: There are a couple of points to make about that. All available investment mechanisms, including the national investment bank, will be absolutely vital. I make no apology for saying that increased Government investment is absolutely vital. We have seen increased investment in R and D, and we would certainly not criticise what has been undertaken thus far. However, if we are looking at systemic change, whether we are talking about major systems or the redesign or partial redesign of a whole economy, we are undoubtedly talking about significant traditional state investment. I realise that, in this Parliament, you are already talking about a competency that is partly UK and partly Scottish, and I make no apology for saying that we need to jump now for carbon capture and storage, and to do that we need to have the investment in place. The same is true of electrification. Those are things that we need to do now, and we cannot rely just on the private sector investment landscape to deliver.

Suzy Goodsir: On a micro, individual household scale, we are talking about asking people to make significant changes to their existing homes in many cases, particularly older properties, so we need continued investment in the grants and loans that are currently administered by the Energy Saving Trust and Home Energy Scotland. Those schemes are popular and successful, and they need to increase and continue.

John Ferguson: We are looking at how we can use the combined systems of planning, fiscal taxation and statutory regulation to create transition levies, where you put a small marginal cost on something over a period of time to fund a change, or to provide a subsidy to help people change. There are fiscal instruments that could come in.

We have to get our planning system fit for purpose, and I genuinely think that it is not. I do not mean to offend anybody who is involved in planning, but I have used the planning system for many years and I think that it is part of the problem. It is far too slow and it does not set the strategic frameworks correctly. The national planning framework is a great idea but it is underachieving. We have to start with planning because that is the framework within which everybody has to work to do anything about infrastructure on the ground. You will not change systems without changing infrastructure.

Angus McCrone: The building side is absolutely crucial. Are we doing enough via new building regulations, and through regulations for the conversion of properties, to enforce strong energy efficiency requirements? Is enough being done when it comes to replacing buildings when they have reached or passed the end of their life? Is there enough incentive for the owners of those buildings, whether they are landowners, councils or individuals, to go about replacing them with something much more energy efficient? I do not know the answer to those questions, but they are areas to look at.

John Scott: Would you regard that as a business and economic opportunity to be grasped in the process of mitigating and adapting to climate change? What do we need to do to maximise that? One thing that strikes me is that there is a supply chain going from ideas to enterprise companies and on to Government approval, but a big gap in all that is the education of people such as ourselves. For us, this whole

process has involved a learning curve in relation to the potential that exists out there—there has probably been a learning curve for Government and civil servants, too.

We have the innovation and the science out there, but, as Mr Ferguson said, there is a real problem in getting things to the next stage, whether through Scottish Enterprise or HIE. Will you develop that theme a little more by identifying the problems and telling us where the sore bits are and how you think they might be sorted—if you can do so easily?

John Ferguson: One of the issues is the timescales required. You need to make rapid transitions, but for some developments a rapid transition might be a five or 10-year period. At the rate that we are going, we might never do it. We are not good at doing the infrastructure. Waste is a good example of that. We have a tremendously good zero-waste strategy but no infrastructure to deliver landfill bans and so on, because we have not focused on some unpopular issues.

We need to understand that the timescales required do not necessarily fit the political paradigm of short-term Governments being in power for four years followed by a changing of the guard; in other words, you do something for four years and then there is a change so you go in a different direction.

We need political parties to do a little bit of time planning on a cross-party basis and to agree that certain things are sacrosanct. We should say that we all agree that we need to do this and put it into a safe environment, and that would be our framework for 15 years. That would create stability for investment, planning and business and it would allow time for adjustments to be made and for the public engagement, messaging and culture change that are needed to happen.

We should work on a cross-party basis and do medium-to-long-term planning to get consensus on some of these issues to stop them being political footballs. There is enough politics in politics for all of us—that is fine—but certain things are of mutual benefit to all people. We have to try to find consensus among all parties on certain things and just say, “That’s it. We have nailed it down and we aren’t going to mess with it. That’s the framework so let’s get on and do it.” Within such a framework, we could then perhaps accelerate transition.

John Scott: It makes sense that if we are going to set targets for 2030 to 2050, we have an agreed position across parties. Could that be achieved? I do not know.

John Ferguson: That is the challenge for politicians.

John Scott: The point that you are making is that some broad themes and principles could be agreed, but that has to go hand in hand with setting the targets. That is a valuable point. I am sorry—I did not mean to cut across what other people were going to say.

The Convener: If anyone else wants to join in, they can do so. Otherwise, I will invite Claudia Beamish to ask a supplementary question.

Claudia Beamish: I have a specific question for Angus McCrone about the targets. Shall I wait and see whether I have time to ask it at the end?

The Convener: You can ask it now, if it is a short question.

Claudia Beamish: Okay. Thank you. I just want to play devil’s advocate for a minute. If I heard him correctly, Angus McCrone said that there should be the ability to alter the targets depending on how the technology evolves. Should there not also be political leadership? I take the point that John Ferguson made that there should be leadership across parties to drive innovation and confidence in all sectors. Would that not guide new technology, bearing in mind that we have successive climate change plans to set the policy frameworks?

Angus McCrone: Yes, that is all reasonable. The issue that caused me to give a more nuanced answer was heat and what the winning technologies would be in that segment. That is not just an issue for Scotland; it is an issue for all northern countries. It is not clear which technologies will win through and at what speed they will emerge. It is very hard to be sure about whether targets that are set now will be overachieved or underachieved. What we have learnt up to now, with the European 2020 targets, is that rapid progress was made on the electricity side but much less progress was made on transport or heat.

The transport side is becoming a lot clearer, but there are still a lot of question marks over heat. A lot of political oomph can be created by the right noises being made, but there need to be commercial technologies within sight to bring that about, and it is not yet clear what those will be.

Angus MacDonald (Falkirk East) (SNP): We know that the transformational change that we need is a tall order. To achieve that change, should Governments regulate lifestyles and reduce consumer choices, or will markets adequately innovate to allow continued growth?

John Ferguson: It is a combination, I think. There are times when we simply have to say, “That is just not working—you have to stop doing it.” Markets will operate wherever they can make money. For example, every year we put 300

million tonnes of new plastics into the environment, of which we recycle 12 per cent, so 88 per cent is going into landfill, incinerators or the oceans. Part of the problem is that we allow the manufacture and sale of complete and utter nonsense and its movement, using carbon, all over the world.

Why are we such a consumer-based society? Why are we not focusing more on the global equity issues of ensuring that everybody has enough food, clean water, security, good-quality air and suchlike? If we invested in those things globally, there would be a vibrant global economy and we would not be wasting time and resources and damaging the planet doing unnecessary things.

Sometimes it is good to say, "We're just going to stop doing that." However, I am not persuaded that that is necessarily a good way of regulating society. We have to let people have a degree of freedom. I am in the middle on that. Sometimes there is a case for doing it and sometimes there is a case for letting markets determine things. Markets working in sensible places should be determining sensible approaches. They should not be left entirely to their own ends.

Dave Moxham: I am kind of in the middle on that, too. There is clearly a case for some regulation of consumer choice, but we also know, as I have said before, that buy-in is really important to the whole process. We have to be careful that, in the regulation of consumer choice, we are equitable in terms of people's choices and experiences. It is dangerous to limit the choices of people who already have very limited choices while others can do things more freely and without the same impact on their lifestyles. Should we regulate consumer choice? Yes, but we should be careful about who that impacts on and how.

There is a general case for auditing as we go along the impact of the decisions that we make. We need to audit the jobs impact, the consumer impact and the community impact. As we go along with things, we need a process so that we can regularly judge what they mean for people. If we do not do that, there is a real risk that we will leave people behind.

Suzy Goodsir: In one of the committee's previous evidence sessions, someone talked about behaviour change. I will not go into too much detail on that, but the Scottish Government uses the ISM model of how behaviour change happens. That model talks about three levels: the individual, which is about attitudes and behaviours; the social, which is where a lot of community work comes in as it is about setting norms and encouraging people to engage with their peers to make change; and the material, which is about regulation and incentives. For behaviour change to happen on the scale that we are talking about, we need all three levels to come into play in a coherent way.

The Convener: We move on to some questions from Rhoda Grant about the effect on people in different areas of Scotland.

Rhoda Grant (Highlands and Islands) (Lab): Previously, we took evidence on transport, and we recognised that some of the incentives to get people out of their cars have an impact on rural areas. We have heard this morning about fuel poverty and how it impacts on urban areas, including cities, as well. How can we ensure that the necessary change is fair to all socioeconomic and geographical sectors of society? It seems to me that those who have previously been left behind will be left behind again. In more affluent urban areas, every roof has photovoltaics because people can afford to invest in them. The people who have the knowledge and the finance can make the transition, which leaves others behind.

10:30

Suzy Goodsir: The point is really important. I am particularly concerned about fuel poverty and how it relates to climate change. There are great Scottish Government schemes, such as the warmer homes Scotland scheme, which is making huge improvements to homes for vulnerable households, and a lot of that work is done in rural areas. However, we could do more—there are people who fall into the gaps.

More affluent people can afford to make changes to their homes, and people who fulfil criteria such as having a passport benefit are eligible for the warmer homes Scotland scheme, but a swathe of people in the middle whom the Energy Saving Trust classifies as able to pay are not really able—they do not have the money for such changes. We need more grants, incentives and programmes such as boiler scrappage schemes to help people to make changes and benefit from the drivers that are in place, particularly in relation to home energy and heat.

The Convener: Not everyone is a home owner, and people who rent cannot apply to such schemes. What is your response to that?

Dave Moxham: I do not disagree with anything that has been said. We need to share the heat benefits as widely as possible, which applies even more to people who are in accommodation that they do not own than it does to others.

We need to show rural communities that a better integrated transport network can have benefits. More investment is needed in that, as is an extension of public ownership. That is vital to reducing car emissions, but it is also important to show the benefits.

We are not making enormous gains in agriculture, and any agricultural measures could affect rural communities disproportionately. However, reafforestation and peat measures would have a positive impact and bring jobs and growth to the areas involved.

Rhoda Grant: How do we proactively get the information across? Some people in urban areas and inner cities struggle to keep a roof over their heads, never mind look at who will give them a grant or advice. They struggle day to day; they do not sit back to do horizon scanning and think about where they want to be. We must be much more proactive.

Suzy Goodsir: Our energy advice service engages about 2,000 households per year. We go out and find people; we go to mother and toddler groups, pensioners lunch clubs and any organisations that will accept us. Anywhere that people are, we will talk to them about home energy use. We tell them about things that they can do themselves and we have a handy service that does simple tasks for people, such as changing light bulbs into low-energy LEDs for older people who cannot do that themselves. We put people in touch with grants and schemes to get significant works done to make their homes more energy efficient. We talk to people about behaviour change, about simple things that they can do to save energy, about what is coming—what is on the horizon—and about reasons why they might want to make changes now to save themselves quite a lot of money in the longer term.

The energy advice service produces win-wins. We can put people in touch with other support services such as befriending services to tackle social isolation, and with Citizens Advice Scotland to get benefits checks. The approach is holistic and we go out to proactively find the people who need the service.

Thousands of people in Scotland are in fuel poverty and a lot of them are not asking for help—they are suffering in silence. We need significant boots on the ground in communities—workers and volunteers—to actively find those people.

The Convener: I will bring in John Scott on that theme before Rhoda Grant asks her questions about the workforce.

John Scott: I applaud what Suzy Goodsir is saying. Dave Moxham talked about incentivising farmers and the agriculture sector to do the right thing, which we talked about on Tuesday. Should we also be looking at incentivising people in the home energy and heat sectors more than we currently do?

We have already suggested that people should benefit from a rates reduction if they do the right thing in their homes, but I do not think that there has been a huge uptake in that programme. If we were to proactively further market the idea of doing good and sensible things to improve the quality of homes in relation to heat loss, perhaps something could be worked out. The scheme would pay for itself in a three to five-year window.

Suzy Goodsir talked about the need to embed change within communities, the cost of that and the fact that it would be a three-year project. Will she say a bit more about that?

Suzy Goodsir: People have to be motivated to make energy efficiency improvements to existing homes. It involves a lot of upheaval to get a new boiler and insulation, especially where wall or under-floor insulation is required. It is a hassle for the householder, so there needs to be an incentive to do it. An element of education is needed about measures that might pay for themselves, but there are also measures for which a stronger financial incentive is needed. The Energy Saving Trust has an interest-free loan scheme that is supported, I believe, by the Scottish Government. There is a very small cashback grant component to that, but I do not think that it is a strong enough incentive for people in existing homes.

Rhoda Grant: I turn to the economy and how we can change from being a consumer-based society, which John Ferguson talked about. We need to shift the economic focus, but how do we ensure that we do that without a cliff edge for workers? Do we have the right skills and knowledge in the workforce for that transition to be seamless? In changing the focus of society, how do we avoid some of the post-industrial societal change that we have seen in the past?

John Ferguson: I am not a specialist or expert on this by any means, but we have to see that question as a global issue. Going back to the earlier question about why we do not manufacture things in this country, I note that there is James Dyson, one of the UK's greatest innovators, who is pro-Brexit, but his next factory will be in Singapore. We are probably all wearing clothes that were made in Indonesia, and many of us probably saw a very good programme on textiles and their impact.

We are allowing our products to be manufactured in countries where the environmental impacts are dumped straight down the pipe into the water that local communities use and then out into the ocean—plastics and everything. I am not necessarily including Singapore in that, but it is certainly true of textiles in Indonesia. We have to stop that. We have to stop allowing our consumer supply chains to give us products that exploit the environment. If we deal with that as a global issue, we will create global equity.

In the case of those textiles, the impacts on the environment affect many of the poorest people in Indonesia, but they also harm our global environment, and we all suffer from that. There has to be an expectation that we will ask the question about how we can protect everybody's interests.

Rhoda Grant: We are talking about some of the poorest people in the world, so we do not want to take the jobs away from them. How do we make that step change? We are ahead, to a large extent, and that is why our costs are higher. They are desperate for that work and they do not have the money to invest in cleaning up the output of those industries, which makes them cheaper. How do we get people to pay more to ensure that we are all in the same place?

John Ferguson: Surely the fundamental issue there is fair trade. They have every right to make goods and services and send them around the world, but they have to do it to a standard and we have to set that standard and pay for it. That is the issue. We are consuming too much because it is too cheap, as the cost to the global environment is hidden. That does not help workers anywhere.

The Convener: I want to raise a specific issue that relates to my area. I come from Aberdeenshire, and for me the elephant in the room is that, in my area, many people's jobs are dependent on oil and gas. There has been a fear that, if we move to our targets, many people will lose their incomes. As Rhoda Grant said and as we have seen in the past, many people will fall off the cliff edge if we do not put things in place to make a just transition and provide jobs. I ask Dave Moxham to talk specifically about that. We are talking about thousands of people in a particular area of Scotland.

Dave Moxham: Yes. There is a tendency to look at the issue in straight quantum terms rather than to look at the quality of jobs and particularly middle-income jobs, which are not particularly prevalent in the UK economy just now and which we need to hold on to. I am sure that members know that many people who previously worked offshore now work as labourers. There is nothing wrong with labouring work, but it is not particularly good for an economy that people who were on £40 an hour now work for £10 an hour.

It is a question of the quality of jobs. The issue is difficult for our members and the unions that represent them. I return to our hopes for the just transition commission. We need real, forward-looking analysis of where the hotspots in the supply chain lie and where the opportunities exist, and we need to look at maximising opportunities in areas such as decommissioning, where we believe there is still work to be done.

We need to engage with companies such as Burntisland Fabrications—or what we hope will be an operational BiFab at some time in the next few months—to look at parts of their potential operations. We need to sell their services abroad, but we want to sell abroad the services that are the most carbon helpful. There is a real job to do there. There is also a real threat but, with a joined-up industrial strategy that is informed by serious forward-looking analysis of where job flows will be, it will be possible to do that.

Many people whom we represent, who work in gas and other areas, are not necessarily looking at immediate job losses. It is fairly uncontroversial to say that gas will continue, but we should already be looking at and asking questions about things such as hydrogen and the training and skills needs to deal with them, because they are not uncontroversial. To be frank, it is not the case that there will be no pain there, but there are definitely prophylactic and investment-led things that we can do to mitigate the impacts on the workers whom we represent.

Rhoda Grant: Are schools, colleges and universities looking at that? Are we bringing up a generation of people who will be ready for such change and innovation? Are employers looking at their workforces? People will work for a lot longer. We are lucky that we are living a lot longer, and we can see the pension age going up, but are people who are moving through the workforce being retrained? Are they aware of the changes that will happen? What can we do to make them adaptable?

Dave Moxham: I cannot honestly and with any authority tell members whether that is happening systematically, but I have seen some good examples. I have seen what Fife College offers with respect to a potential apprenticeship and other training that relates to what we hope will be a rise in decommissioning and renewables production in factories. You would need to ask somebody else whether that is happening systematically. However, it is vital to identify that as an issue that we could undoubtedly do better on, however well we are doing now. That is also vital for the community messaging and community development that I am sure Suzy Goodsir is interested in, too.

Stewart Stevenson: In the discussion, we have covered the issue of getting buy-in from individuals, but perhaps we have done that less so with regard to buy-in from sectors. I have jotted down a wee list of counters—things that make it difficult. I ask for comments and suggestions, starting with Suzy Goodsir, who earlier made specific reference to driving acceptance.

John Scott mentioned the rating system. There is a counter to doing good things to a house,

because, if the quality of the house is improved, at the next revaluation it might be moved to a more expensive notch. There is a perverse incentive not to improve houses. When a house is improved for the purpose of climate sustainability, it potentially becomes more valuable and has a longer lifespan, yet mortgage providers do not reflect that in the risk pricing, which is the interest rate that is charged for the mortgage. They should do so.

The cleanest form of energy for heating houses that is readily available is electric heating, but that is the most expensive way to heat a house. That is perverse in terms of the climate change agenda.

Heat transmission, which happens over relatively short distances, is the one area of public utility for which there is no wayleave. The utility supplier does not have an automatic right to deliver heat, whereas telephone, electricity and gas suppliers have wayleave rights—they have to compensate landowners over whose land they go, but they have the right to go over the land. There is nothing similar for heat.

There has been a huge move from diesel cars to petrol. Diesel cars are 50 per cent more efficient in extracting energy from their fuel, albeit that they create particulate contaminations. With regard to this narrow agenda, it is perverse to move back from diesel to petrol.

Finally, there is a good example of behaviour change that might pick up on some of the things that John Ferguson said about plastics. Like others, I have a plastic bag in my hip pocket alongside my wallet. It is not an economic thing—10p is neither here nor there on an MSP's salary, to be blunt. The tiny thing of a charge for bags has genuinely changed behaviour. What opportunities are we missing? The plastic bag is not a tax, but that is a legislative quirk. Should we be more rigorous in tackling the use of plastics in packaging in retail to have the same effect? How do we get buy-in? It is policymakers in Government who are not doing enough.

Suzy Goodsir: The question is wide ranging. I will pick up on a couple of points.

On the opportunities for behaviour change, one of the most challenging areas is transport. We have talked about electric vehicles, and air travel is one of the elephants in the room. There is a big issue around social norms and aspirations. Air travel will become one of the big issues in the context of long-term challenging targets.

I am not sure that the rating system is the right way to introduce incentives for home energy changes. It was included in legislation 10 years ago and no one picked up on it. On house values and energy efficiency changes, when we buy and sell houses today, the houses have an energy performance certificate. Do people look at it? I am not sure that people understand it. A lot of education is still needed.

The key driver for people making energy efficiency changes to their houses is the changes to their bills in the short term. That is the thing to focus on. The key barrier is the capital cost of the measures and the upheaval in the house. Any incentives need to get people over the hump of making the changes in the short term.

The Convener: Did anyone else have points to make on that specific area? Richard Lyle wants to come in briefly.

Richard Lyle (Uddingston and Bellshill) (SNP): I was a councillor, and I think that you will find that the banding of houses does not change until they are sold. I have upgraded my house a number of times, and my banding has not changed in the past 40 years.

Claudia Beamish: My question is initially for Dave Moxham, but I hope that Angus McCrone might comment from a finance perspective and that others will comment from their perspectives.

The Government is creating a just transition commission, but that is not to be legislated for in the bill. I seek your comments on whether legislating would help the commission to carry out its functions better. Would independence from Government help? Will you also comment on the reporting mechanisms and any other aspects that you think are significant to help affected communities and workers?

Dave Moxham: I will briefly explain the thinking. We strongly support the just transition commission, which is a Scottish Government initiative, and we hope that it has reasonable support across the chamber. The purpose is reflected in some of the evidence that I have given already. We think that the commission is a key way in which we can fill or bridge the gap between the idea and the delivery. It needs to engage with key institutions, such as the national investment bank, which I have mentioned, as well as local authorities and enterprise agencies. I hope that I am not giving away any secrets when I say that the Scottish Government's initial proposal is for a two-year commission. However, we see it as the companion piece to achieving our targets right through the process. That does not mean that it should be an unchanging or static body, but that should be the initial commitment. That would embed the principle that, as we look forward to every step that we will take, we need to look at the economic impacts, buy-in and social justice.

The commission should have a fair degree of independence and autonomy from the Scottish Government. That point is not based on mistrust; it is based on our experience of commissions that have had independent or semi-independent

secretariats and that could take advice from a wide range of people, which have performed effectively.

The commission should be in legislation, because that would be a statement of future intent. It should be suitably independent, because that would make it operate more effectively. It should be able to require—as far as any commission can—input and reports from all the key institutions, whether that is the new infrastructure commission, the national investment bank or all the rest of it. The commission will centralise the ideas of decent jobs, community justice, a just transition and proper climate change action and burn those into people's minds, whether that is legislators or, eventually, the consumers who we hope will change their behaviour.

Claudia Beamish: Perhaps we can hear from Angus McCrone and others if they want to comment on that.

Angus McCrone: I want to say something on the oil and gas transition. Electric vehicles are coming in the car sector, and electric buses are coming very rapidly—perhaps more rapidly—worldwide. However, those account for only part of oil demand. Cars account for only about 20 per cent of world oil demand. Even on our very aggressive forecasts for electric vehicle uptake, we see only about 7 million barrels of oil per day being taken out by 2040 as a result of electric cars and buses. I do not think that the oil sector is going to die off quickly.

The same is true of gas, which is still going to be an important fuel in the UK and elsewhere for balancing the system. There will be a change in the way that it is used—it will be used less for baseload and more for peak periods. The scenario for oil and gas jobs in the Aberdeen area is not as immediately pressing as some people suggest. Obviously, there are issues involving a slow dwindling of activity, but there have been huge swings before, with oil prices going as low as $10 and as high as $140.

Claudia Beamish: I have a finance question about a just transition commission or, beyond that, simply a just transition. Do you have any suggestions about how finance for the future can be equitable in terms of supporting workers? Can there be any criteria for investment or any expectations set? I know that Mark Carney has highlighted climate change as being a serious imperative. How do these issues connect in relation to companies, finance and research and development? Do you have any comments on that?

Angus McCrone: That is not really my area. Other witnesses might have a better idea about that.

John Ferguson: There is an investment community in Edinburgh, made up of companies such as Baillie Gifford, which is one of the largest fundholders in the world, that have departments that look at the ethical frameworks of investments and have global concordats about what ethical investment is. Within that community, there are growing standards to ensure that those investments are secure. There is a whole area of global investments that are subject to those standards.

If you ask the experts in the global financial community who are concerned about equitable investment and whether they are investing in the right things and not the wrong things, you will find some good indicators of what is good investment and what is not. However, the global financial community is wider and perhaps less well intentioned, sometimes.

The Convener: I am conscious that we do not have much time left, and I apologise to members who might not be able to ask questions. Richard Lyle will ask the next question. If there is any time left after that, we can perhaps have further questions.

Richard Lyle: There have been a lot of comments that I do not have time to go through, but I will say that I come from an area—Lanarkshire—that previously had mining and steel industries. Times have been hard, but we have recovered to a good degree. I wish Aberdeen and Aberdeenshire well. Of course, they keep saying that there is no oil left, but then they come out the next day and say, "We've just found a new field." In any case, we have to prepare and ensure that people who are in excellent jobs up there continue in those jobs and are supported.

Anyway, here is my last question. Has any of you carried out an economic assessment of the costs and benefits of mitigating and adapting to climate change, because that is what we will have to do?

Dave Moxham: The short answer is no, and it would be an enormous undertaking. As I said earlier, in our view, that would be a primary function of a just transition commission, because you cannot consider this issue without considering the employment impacts.

I acknowledge what you say about the area that you represent and the coal industry, but that was not the universal experience of people in the coal industry. At the moment, there are some quite nice examples in Canada and Spain of people going through just transition from coal in a far more positive way, and I would be happy to send the committee links to those examples if you are interested.

You have asked an enormous question. I would be surprised if any analyst were able to tell you that they had done that, but I think that they might be able to suggest ways in which we might approach that in the period ahead.

Richard Lyle: We have heard comments about £13 billion. Does anyone have an idea where that figure comes from?

Dave Moxham: I have seen various figures using various methodologies, but digging into that and doing it in a systematic way is a big job, which I am not qualified to do.

The Convener: John Ferguson wants to answer the main question.

John Ferguson: I do not know whether there was an economic impact assessment for the bill. Obviously, such assessments have to be done for bills.

Under environmental regulation, businesses such as ours have to report their current performance. We look very carefully at the auditing process for that and the cost benefit analysis of, for example, stopping the use of generated power because it costs a lot of money and has a serious impact on the environment through carbon, and making a transition to wind power. We do very detailed cost benefit analysis at a company level, which is driven by regulation. If you can extend the requirement to do that and aggregate the answers, you will get a good idea of what those savings are. It is a very important question.

The Convener: We have one minute left, if anyone wants to come in.

Mark Ruskell: Can Dave Moxham tell me about the relationship between the just transition commission and the UK Committee on Climate Change, which is obviously a statutory adviser? Somebody has to help the Government make a decision about whether a pathway is technically, socially or economically feasible. What do you see as the just transition commission's role in working with the UK CCC on that question?

Dave Moxham: That is a helpful question. We would see that relationship as very important, not least because what a just transition commission needs to consider, when creating the kind of investment environment that we need in order to achieve things, is not limited to powers that rest in this place.

There are a number of issues around what we would describe as the quality of employment, which is what we are looking to guarantee. Going back to Aberdeen, one of the problems for just transition is that it is hard to capture the value of all the opportunities in a place like that, because the way in which employment is regulated discriminates against local labour and is in favour of different models of employment.

For a range of reasons, because powers are held in a different place, it is vital that the just transition commission has a strong relationship with the CCC, although it would obviously not be statutory.

The Convener: I thank all our panellists, both remote and in the room. The evidence session has been hugely interesting. I am sorry that we do not have more time. It is difficult to find time on a Thursday, as committee meetings have to finish earlier on Thursdays.

At our next meeting on 20 November, the committee will continue its consideration of the Climate Change (Emissions Reduction Targets) (Scotland) Bill.

The public part of the meeting is now closed and the committee is moving into private session, so I request that the public gallery be vacated.

11:02

Meeting continued in private until 11:22.

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