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Pàrlamaid na h-Alba

Official Report

RURAL AFFAIRS, CLIMATE CHANGE AND ENVIRONMENT COMMITTEE

Wednesday 30 October 2013

Session 4

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RURAL AFFAIRS, CLIMATE CHANGE AND ENVIRONMENT COMMITTEE
31st Meeting 2013, Session 4

CONVENER

*Rob Gibson (Caithness, Sutherland and Ross) (SNP)

DEPUTY CONVENER

*Graeme Dey (Angus South) (SNP)

COMMITTEE MEMBERS

*Jayne Baxter (Mid Scotland and Fife) (Lab)
*Claudia Beamish (South Scotland) (Lab)
*Nigel Don (Angus North and Mearns) (SNP)
*Alex Fergusson (Galloway and West Dumfries) (Con)
*Jim Hume (South Scotland) (LD)
*Richard Lyle (Central Scotland) (SNP)
*Angus MacDonald (Falkirk East) (SNP)

*attended

THE FOLLOWING ALSO PARTICIPATED:

Andrew Bauer (NFU Scotland)
Anna Beswick (Climate Ready Clyde)
Paula Charleson (Scottish Environment Protection Agency)
Jim Densham (RSPB Scotland and Scottish Environment LINK)
Dr Andrew Dlugolecki (University of East Anglia)
David Goodhew (Scottish Fire and Rescue)
Gavin Hewitt (Scotch Whisky Association)
Terry Levinthal (National Trust for Scotland)
Lyn Matheson (Soil Association Scotland)
Gordon McGregor (Scotland's 2020 Climate Group and Scottish Power)
Jo O'Hara (Forestry Commission Scotland)
Professor David Paterson (University of St Andrews)
Professor Des Thompson (Scottish Natural Heritage)
Stephen Thomson (Transport Scotland)
Chris Wood-Gee (Sustainable Scotland Network)

CLERK TO THE COMMITTEE

Lynn Tullis

LOCATION

Committee Room 6

Scottish Parliament

Rural Affairs, Climate Change and Environment Committee

Wednesday 30 October 2013

[The Convener *opened the meeting at 10:02*]

Decision on Taking Business in Private

The Convener (Rob Gibson): Welcome to the 31st meeting of the Rural Affairs, Climate Change and Environment Committee this year. Members and the public should turn off their mobile phones, especially if they are noisy ones. Even if they are not, they can affect the sound system, so please turn them off.

Agenda item 1 is to ask the committee to decide whether to consider its report on the Scottish Government's draft budget 2014-15 in private at future meetings. Are we all agreed?

Members *indicated agreement.*

Subordinate Legislation

Town and Country Planning (Marine Fish Farming) (Scotland) Regulations 2013 (SSI 2013/277)

10:03

The Convener: Item 2 is consideration of the Town and Country Planning (Marine Fish Farming) (Scotland) Regulations 2013, which is subject to negative procedure. Members should note that no motion to annul the regulations has been lodged. I refer members to paper 1.

Claudia Beamish (South Scotland) (Lab): I have not lodged a motion to annul, but I want to put down a marker about a concern that has been expressed to me about the transparency of the broader audit and review process.

As I understand it, only the Scottish Environment Protection Agency, Scottish Natural Heritage, Marine Scotland science and the relevant salmon fisheries board are consulted. Consultation can lead to the permission for a fish farm becoming permanent, so my concern is the lack of transparency. I would be keen on the consultation being more public.

I put down that marker, but I have not lodged a motion to annul because the concern does not relate specifically to the regulations.

The Convener: It would be possible for us to write to the relevant minister to ask whether the process is due for review. If the committee agrees, we could do that in order to have a dialogue about the transparency.

Do we agree to make no recommendations on the regulations?

Members *indicated agreement.*

Draft Scottish Climate Change Adaptation Programme

10:05

The Convener: Agenda item 3 is the Scottish Government's draft Scottish climate change adaptation programme. The committee will hold two round-table evidence sessions. The first will concentrate on the natural environment and land use elements of the draft adaptation programme.

I welcome the witnesses, whom I ask to introduce themselves around the table so that everyone knows who everyone is. The sound system is controlled automatically, for those who have not been here before. If you indicate to me that you want to speak, I will let you know when you can speak.

We will start with Jim Densham, who is sitting beyond the official reporters.

Jim Densham (RSPB Scotland and Scottish Environment LINK): Thank you, convener. I am from RSPB Scotland and I am representing Scottish Environment LINK. We have a climate adaptation taskforce that looks at the issues.

Jayne Baxter (Mid Scotland and Fife) (Lab): I am a member of the Scottish Parliament for Mid Scotland and Fife.

Lyn Matheson (Soil Association Scotland): Hello. I am the agricultural development manager for the Soil Association Scotland. I run the future proofing Scotland's farming programme for the Scottish Government and Quality Meat Scotland, which helps farmers to consider climate change and the practical implications for their farms.

Claudia Beamish: I am an MSP for South Scotland and shadow minister for environment and climate change.

Jo O'Hara (Forestry Commission Scotland): Hi. Since Monday, I have been deputy director of Forestry Commission Scotland.

Richard Lyle (Central Scotland) (SNP): I am an MSP for Central Scotland.

Andrew Bauer (NFU Scotland): I am from the NFU Scotland.

Nigel Don (Angus North and Mearns) (SNP): I am the MSP for Angus North and Mearns.

Alex Fergusson (Galloway and West Dumfries) (Con): I am the MSP for Galloway and West Dumfries.

Terry Levinthal (National Trust for Scotland): I am director of conservation services and projects for the National Trust for Scotland.

Jim Hume (South Scotland) (LD): I am an MSP for South Scotland.

Professor Des Thompson (Scottish Natural Heritage): Good morning. I am principal adviser on biodiversity with Scottish Natural Heritage.

Angus MacDonald (Falkirk East) (SNP): I am the MSP for Falkirk East.

Professor David Paterson (University of St Andrews): I am executive director of the marine alliance for science and technology for Scotland.

Graeme Dey (Angus South) (SNP): I am the MSP for Angus South and deputy convener of the committee.

The Convener: As well as being the convener, I am the MSP for Caithness, Sutherland and Ross. I welcome everybody to the round table. We will kick off on issues that are related to biodiversity and land use. I will start the questions and we will see what responses we get.

What impact is climate change likely to have on Scotland's land, and its freshwater and marine environments over the short, medium and long terms?

I do not want any theses, please, but do any of you have any incisive short comments?

Professor Paterson: In the short term, there will be few changes. The problem is that climate change is a long-term problem. The short-term changes that we are likely to see include extensions of species' ranges and an increase in the numbers of invasive species.

We can separate the impacts on estuarine and marine systems into things that we can monitor and help to predict the effects of, such as temperature and ocean acidification, but it is very difficult to envisage an immediate adaptive strategy for those things.

On the other hand, in managing systems, it is important that we integrate our understanding of the land, the estuary and the sea so that the management strategies operate across the borders and not simply within each area.

In that context, supporting local partnerships to protect marine and coastal environments is critical. It is in the regions of interface that we will see the fastest changes.

Professor Thompson: I support Professor Paterson's remarks. We are very lucky to have a growing evidence base in the climate change report card that has been produced for the United Kingdom

We are now seeing in our seas and mountains and on the coast rapid changes such as have never been witnessed before in a similar

timeframe. Given that we are seeing those changes in nature and biodiversity, we really must start to tackle the challenges ahead.

Andrew Bauer: From a farming point of view, the impacts are already here—there are no short, medium and long terms. The growing seasons have changed, and farmers are already adapting what they are growing because extreme weather events are making potentially higher-profit crops more risky to plant.

This year, there has been an increase in the areas where oats are grown, because they have been shown in the past few years to be more resistant to flooding and so on. However, that could flood the market and collapse the price. Farmers are seeing a lot of damage to farm infrastructure, and they are struggling to keep pace with changes. The changes are spoken of as occurring in the medium and long terms, but for farmers they are here and now.

Farmers are concerned about pests and diseases—there are big issues on the west coast with liver fluke affecting cattle, and there are worries that things such as black grass, which has caused huge problems for cropping in England, are moving further north. The impacts are already here, and more are on our doorstep.

Terry Levinthal: I agree with everything that has been said. A number of additional impacts are with us, and those will probably increase in the short to medium terms. I am thinking first of the increase in the number of pathogens—in particular, plant pathogens—that we are starting to see in the system. Everybody will be aware of the Chalara fraxinea outbreak; I think that it was the first time that a COBRA—Cabinet Office briefing room A—committee has ever considered anything like that. We have had incidences of Phytophthora ramorum over the past decade and more; we are seeing increases in such things all the time. Even during routine monitoring of our building stock we have seen an increase in the number of insect species—species that we would, hitherto, not have seen, including the dreaded Guernsey carpet beetle, which is now arriving on our shores, so look out for that.

We will also have to deal with severe weather impacts, which have already been mentioned. The most significant impact, from what we have seen, is the need for a change in the routine management and maintenance practices that we use to prevent damage. We have noticed that the more we can make a stitch in time, the less damage we have, going forward. There needs to be a big change in the psychology and the resourcing to help to manage that, and to help people to put the appropriate measures in place.

The Convener: We will certainly explore that further.

Jim Densham: The members of Scottish Environment LINK have certainly seen that species and habitats are being affected. Des Thompson has shown the committee a document that brings together some of that information, which is really useful.

In summer 2012 I went on sabbatical as part of my RSPB work to visit various RSPB reserves and to find out what some of the issues are. Many of the people who work on those reserves are seeing everyday issues and impacts across many different sites, and they are not necessarily able to disentangle those occurrences from climate change.

I think that, in the future and as the decades go on, such things will become much clearer as climate change impacts. When we talked to people about the issues that we know will come up in the future—such as heavier rainfall, more rainfall in winter rather than summer, more storms, and issues around species movement—their stories came out and they said, “Oh yes, we’ve seen that.” There are examples of things happening now in some of the most special places in Scotland.

Lyn Matheson: I will add to Andrew Bauer’s comments about extreme weather events. We have seen flooding, soil erosion and other such things. From an agricultural point of view, soil is our most valuable resource, so we must consider how we can maintain it in good stead for the future if we are going to grow our own crops.

Also, liver fluke has become a serious problem in the past 18 months. It has become more prevalent with bad winters and so on and it brings stock down. It has great monetary and welfare effects on farming systems.

10:15

Jo O’Hara: I, too, support what everybody else has said. I always say that planting trees is a bit of an act of faith. In forestry, we have to look to the short, medium and long terms because we are looking at periods of 50 years plus. I think that the biggest impact is in people’s loss of certainty and loss of confidence in taking resilient decisions about their land. People need the confidence to not put all their eggs in one basket and to think about their options. The term “resilience” is being used a lot, but we need to get to the next stage and ask what we mean by it. I think that it refers to the resilience both of ecosystems and of the people who make decisions on managing them.

In Scotland, we are probably experiencing Phytophthora ramorum more than Chalara

fraxinea. Phytophthora ramorum is hitting the larch in the south-west now. That is not due only to climate change, but climate change is exacerbating it. We are having to become much more fleet of foot in responding to such things than we have been for a couple of generations. For us, that is one of the biggest impacts.

The Convener: Claudia Beamish has a question.

Claudia Beamish: My question is more about policy issues, convener. Do you want to cover the broader issues first, or should I go ahead and ask my question?

The Convener: Do that.

Claudia Beamish: Thank you.

I have begun to take a particular interest in marine and coastal issues, although that is not to rule out the land. I would be interested to hear from David Paterson—and others who want to comment—about the contribution of coastal communities and how that can help with climate change adaptation. I am also interested in changes in our marine environment. The effects on the feeding grounds for seabirds have been highlighted to the committee, as have effects on the movements of fish populations, which are obviously important for our fishing industry, which has to prepare for that. I am sorry; I raised rather a lot of points there.

Professor Paterson: I will try to respond to them. On coastal communities, support has to be given to the local partnerships that help to manage the systems. There is a modern tendency to try to deal with that in a more holistic manner by bringing in stakeholders and having proper discussions.

In Shetland, which I pick out as an example of the efforts that are going on, stakeholders, policy makers and academics are getting together to decide on a strategy, rather than imposing a strategy. That is critical. The Clyde partnership is another example, and we have the Forth partnership and so on, but there is a lack of strategic support for those partnerships. They have operated on a voluntary basis for quite a long time, and until recently a lot of the coastal managers lived hand to mouth. The formation of the river management boards and so on has made it slightly unclear who is responsible for what and how work can be supported. If I could make a plea, it would be to look at that and give support where it is due.

I am not an expert on fisheries, but I will give the best answer that I can give on that. Fish populations move in response to a number of factors. It can be to do with top-down impacts and the impacts of fisheries themselves, as we have seen, but it can also be to do with their food supply or with temperature and the thresholds for their particular climate space. We must expect variation in the distribution of natural populations. That brings me back to Jim Densham's point about separating climate change from natural variation. In order to do that, we need two things—we need data, and we need to be able to use the data in a reliable manner, which means improving the modelling. The modelling, the material that goes into it and the validation of the models are critical.

I accept that I have given you a rubbish answer, but that is because we do not have a brilliant answer. Another answer that is much more pragmatic is that, if the fish move, the fishermen will move. They will not stay and fish for something; they will either change their species or move their distribution. We have seen that with things such as changes in mackerel populations. What can we do about that? We can collect information to help to predict where populations will be and try to impose catch limitations, maximum sustainable yields and targeting gear, within the context of climate change. That is very difficult, but it is what we should aim for. I am sorry if that was a bit rambling.

Professor Thompson: I thank Claudia Beamish for the question. I can provide some data on the coast. Important work is being done on that involving SNH, SEPA, Historic Scotland and Jim Hansom at the University of Glasgow. About 70 per cent of our coastal resource is hard coast and just under 30 per cent is soft coast, much of which is liable to erosion. Recent statistics show that about 18 per cent of the soft coastline is highly susceptible to erosion. Given sea-level rise, we clearly need to target those areas carefully for action. They are in places such as the Uists, Orkney and some of the firths. We need to take a proactive stance. Politically, about 12 of our constituencies have such sensitive areas. We need to try to manage sea-level rise and sediment deposition so that new habitats form and become more resilient to climate change and support important wildlife, rather than wringing our hands and saying that there is nothing that we can do about it, or putting in place hard coastal defences. I recently got the figure that 18 per cent of our coast is highly susceptible to erosion. So we are getting figures from the modelling and from the important long-term monitoring that is being carried out.

Alex Fergusson: For clarification, is the 18 per cent that you referred to 18 per cent of the total coastline or 18 per cent of the 30 per cent?

Professor Thompson: It is 18 per cent of the 30 per cent.

The Convener: Okay. We can get more detail on that if we need it.

Jim Densham: To follow up on Des Thompson's points, as members perhaps know, the RSPB has trialled some managed realignment work in Nigg Bay in the Cromarty Firth and work in the inner Forth. At present, that is small-scale and is looking to let the tide come in and to allow salt marsh to be recreated. However, with our partners, we have a vision for a much bigger area to try to solve some of the problems. In the adaptation programme, we need to think about timescales that are much longer than five years. We need policies on things such as managed realignment and addressing sea-level rise that have a much longer-term vision, then the policies can be put in place and aligned to ensure that we address the issues.

We have common agricultural policy reform and changes in the Scotland rural development programme coming up. Perhaps future iterations of the SRDP need to provide options that can help land managers to turn their land into land that can act as buffer zones for sea-level rise and reduce flooding, as well as providing many other benefits.

The Convener: I could make a couple of comments about the difficulty of futurology, but the arguments are taken on board.

We have a related question from Graeme Dey.

Graeme Dey: Like Alex Fergusson, I seek clarity on an issue. Previously, the committee has been given evidence that, although there are sea-level rise issues, the landmass is still rising as a consequence of the end of the ice age. Is that correct? If so, do the two things balance out?

Professor Thompson: You are absolutely correct that the landmass is rising, but the figures that I have show that the sea-level rise is exceeding the landmass rise by between 1mm and up to 6mm per annum.

The Convener: It is useful to get that on the record.

In general, what role can healthy ecosystems play in increasing Scotland's overall resilience to the impacts of climate change? Are there any further comments on that?

Professor Paterson: One small comment is that the buffer zones between the land and the sea, such as salt marshes, mudflats and sand dune systems, also capture carbon. If we can enhance those areas, we will increase carbon capture, especially during the building phase of the systems. From the data that we have, we see that it takes about eight years before those systems begin to perform in the way in which a natural salt marsh would. Again, we are talking about a long timescale, but it would be highly beneficial in a number of ways to biodiversity management and ecosystem function to retain those systems and restore some of them.

The Convener: I ask Des Thompson about Nigg Bay, where such a process has been going on for some years. What measurements do we have from that?

Professor Thompson: Jim Densham might wish to come in on this. There has been a spectacular improvement in the bird and habitat interests as a result of the management of an area that has been heavily developed in the past. It is absolutely right to say that there are many examples where, if the area is managed well and the other pressures on salt marsh and coastal habitats are reduced, there are great increases in invertebrate diversity and in birds and other wildlife exploiting the areas.

Professor Paterson: The National Environment Research Council has funded work through the biodiversity and ecosystem service sustainability programme, which is supporting this kind of thing. Other regions in Scotland are also involved. SNH has a small funded programme for salt marsh restoration in the Eden estuary, and we have data from that that supports Des Thompson's comments.

The Convener: I was talking about Nigg Bay in Easter Ross, for those of you who come from further south. Before I ask the next question, Jo O'Hara wants to come in.

Jo O'Hara: I just wanted to come back with some tree examples. In natural flood management, we can manage the ecosystem to reduce the rate of run-off to limit downstream flooding. Healthy and functioning ecosystems and buffer areas around water courses, often with trees, can reduce the impact of flooding further downstream. Other examples are trees for shelter for stock and, in urban environments, green infrastructure, which helps with temperature, humidity, and air pollution levels in cities. Those are my three examples.

The Convener: That anticipated the question that I was just about to ask. Does anyone else want to make a comment along those lines just now?

Terry Levinthal: It is a truism that a healthy ecosystem is also a healthy community. The challenge is in defining what a healthy ecosystem is and how you go about achieving it when there is inevitably a whole series of competing demands. To date, we have had no effective or constructive forum for these debates in the long-term discussion.

As an example, I am sure that many members round the table know that we have been seeking to restore a series of habitats and ecosystems on

the Mar Lodge estate. The other pressures and tensions of other economic activity have perhaps rendered that experiment somewhat more difficult than it might otherwise have been.

The Convener: We will be discussing that next week.

Terry Levinthal: Excellent—I look forward to hearing the outcome of that. We need to understand the tensions that underlie a situation so that they can be managed.

Lyn Matheson: From the point of view of healthy ecosystems, and to go back to David Paterson's point about carbon sequestration, we have well reported and documented evidence about organic farming sequestering carbon and about the biodiversity value of organic farming. I also want to add to Jo O'Hara's comments about woodlands. We have done a couple of informative events for farmers on how they can work with fisheries and woodlands to reduce diffuse pollution and flooding further downstream and how everyone can work together holistically, adding value to the community.

The Convener: How can the policies and proposals that are set out in the draft adaptation programme go further to help to build the resilience of the ecosystems that we are talking about?

Jim Densham: I can try to answer that. Scottish Environment LINK is keen to see healthy ecosystems, not just because they are where biodiversity lives and our wildlife exists but because we know that they can provide services to people and society and even boost the economy.

We therefore welcome the fact that, particularly under the natural environment theme, the programme has taken a less sectoral approach to the objectives than the previous iteration of the framework did, particularly in objective N3, which is:

"Sustain and enhance the benefits, goods and services that the natural environment provides."

The view is that, if we get a healthy ecosystem, it can provide the services that are needed to build a resilient Scotland and the resource base that we will all need in the future.

10:30

The Convener: Do you think that the current structure of the adaptation programme, with three main headings and subheadings below that, is a good structure to help us to focus on building resilience into the ecosystem?

Jim Densham: Yes, definitely. The adaptation programme is a good structure to start with. We have worked with the Government to try to help it to understand that and to develop the programme. We welcome its approach, but we would like to see more than just an aim to go for; we would like to see more about how we will get there put into the programme. However, the aim, objectives and outcomes are welcome.

The Convener: Thank you for that.

Andrew Bauer: I want to inject a slightly different note into the debate. I would not disagree with what has just been said, but we must bear a couple of things in mind. First, production will become more challenging. Climate change might bring some production benefits to Scotland, but it is undeniable that, in our most extensive areas, there will be a decline in areas that are fit for production. We must be careful that we do not export our problems to somewhere else in order to ensure that we have what appears on the face of it to be the right set of benefits. We need to maintain productive capacity rather than simply rein it in and export everything overseas.

Secondly, some fairly hard economic decisions will have to be made in agriculture. Natural flood management and tree planting have already been mentioned in that respect. They have their place, but they can also be fantastically expensive. We therefore need to be hard-nosed in the choices that we make. Perhaps flood plain storage is an appropriate solution in some areas, but in others it will wipe out huge amounts of productive capacity. We might wish to re-meander some rivers, but if it costs hundreds of thousands of pounds per kilometre, we might have to question whether that is the right thing to do in all situations.

I would not disagree with anything that has been said in the discussion, but we must balance the need for production with adaptation to climate change.

Professor Thompson: On the Scottish adaptation programme, we have not talked about peatlands, on which there is great work in the flow country. Healthy ecosystems give us clean water and amazing wildlife, but beyond that they can give us benefits from tourism and a revived economy. In that regard, however, a joined-up approach to managing and promoting healthy ecosystems will happen only if there is encouragement for different agencies and the business sector to work together. If there is a plea, it is for people to see the importance of healthy ecosystems being promoted more widely, and active encouragement for different organisations to work together to get the real public benefits of thriving ecosystems.

We can turn the situation on its head with regard to the peatlands and think how awful the landscape would be if we did not have those

healthy ecosystems. Without them, no one would want to go to those areas or live in them and they would produce very little.

The Convener: We will certainly take that into account. I think that Graeme Dey has an apposite question on the issue.

Graeme Dey: I thank Andrew Bauer for providing the opening that I was looking for to ask this question, which relates to climate change and agricultural practice. I seek the views of Andrew Bauer and the rest of the panel on the extent to which agricultural practice might be exacerbating the impact of climate change in terms of flooding. What I am getting at is that I see examples in my constituency, during severe rainfall, of significant run-off on to roads and into properties from fields in which crops have been sown, with no buffering, in a direction that leads towards the roads and properties. Also, where there are significant polytunnel developments, there is the development of severe flooding. Are such agricultural practices exacerbating the problem?

Andrew Bauer: I cannot rule out the possibility that such practices may be having an impact. Contour ploughing is being encouraged, but there is a practical problem. Once you get above a certain gradient, the health and safety risk to the farmer of ploughing across the field is significant, so it is not a particularly attractive option.

If a farmer is cultivating a field with water courses, there are minimum distances that he can cultivate within them. There are also good practice distances beyond those minimum distances, and we would like to think that, when people feel it is appropriate, they will try to follow those good practice distances. However, the economic reality is that people are trying to keep their businesses going in difficult times. That definitely factors into the equation.

I imagine that polytunnels would speed up run-off but, again, the general binding rules on things such as polytunnels dictate minimum cultivation distances close to water courses. Roads could definitely have an impact.

Turning it the other way, I note that, when we have had extreme weather events, we have quite often seen the roads authorities merrily digging trenches that then flood entire fields and wipe out areas of crops. I am not pretending that we are angels, but a lot is being done. Scottish farming, working with SEPA, has been acknowledged as a European exemplar in relation to tackling the problem of diffuse pollution.

On flooding, there is probably a long way to go, but I sense an appetite from our members to do something about it. I also sense a degree of inertia in the public bodies about practical examples on the ground beyond small pilot studies. If the initiatives and the advice were there and were fit for purpose, a lot of farmers would be looking at the possibility of doing something about flooding as a serious economic consideration. They would be asking, "Should I plant that area with a high-value crop that is potentially at risk or should I plant it with a lower-value crop and enter an agreement that the area will be flood plain storage?"

At the moment, however, the knowledge transfer and the financial incentives are just not there. We have been calling for them for as long as I have been in this job, but there seems to be a real timidity about doing something on a scale that will make a real difference.

Lyn Matheson: Last week, I was at a Scotland's Rural University College meeting about nutrient management and innovation, and I believe that on 12 November SEPA, the Government and NFU Scotland, which are working together on mind the gap, will reiterate to farmers the information about distances so that there will not be problems with diffuse pollution and so on.

Mr Dey talked about flooding and soil getting on to the roads and so on. We have to get back to realising that soil is a valuable resource. Yes, it causes problems, but it is the farmer's livelihood that is getting washed on to the road and down a burn and then causing problems for the fisheries guys and becoming a pollutant. We need to look at the agricultural industry as a whole, and also at forestry, because when people fell trees, for example, that has an impact. Soil is a valuable resource and farmers really do not want it going anywhere else—they want it in their fields to grow their crops. It may be a case of needing to reiterate that soil is a valuable asset and that farmers should not leave it as bare ground. Obviously, they have to sow crops and everything like that, but the question is at what point they make it bare ground to sow their crops.

The Convener: We could explore that in a little more detail.

Alex Fergusson: May I make a brief intervention? I have a question for Mr Densham.

The Convener: Please do. We then have a question on forestry, although part of it has been answered.

Alex Fergusson: I just want to clarify something. Sorry, Mr Denham. I do not want to cross-examine you, but—

The Convener: Why not?

Alex Fergusson: Well, maybe I will.

Mr Densham, you said in your introductory remarks that you are representing Scottish Environment LINK as well as RSPB Scotland. I

think that I am right in saying that you pronounced yourself broadly satisfied with the overall structure of the adaptation policy as it is laid out. However, LINK has sent us a briefing that is in some ways quite critical of the adaptation policy. Will you clarify your position on that—with your LINK hat on, perhaps?

Jim Densham: I am trying to represent LINK, which is a forum for many organisations.

We must not be churlish. The Government has made good strides in taking forward the existing framework and developing it. The structure that we see in the introductory part of the adaptation programme is good. We welcome that and we welcome the step away from a sectoral approach with farming here, forestry there and homes and businesses over there. It is starting to become a more integrated package. We would like that to happen more and we want certain other improvements.

I have said that we need to look beyond the five-year programme. That is the minimum. The Climate Change (Scotland) Act 2009 says that we must have a five-year programme of objectives, proposals and policies, but that gives us a strict and short-term look at what we need to do. Either we need something to be part of the programme and to be described in it, or, without that, we need something to say where we are going and how we will meet the aim of having a resilient, adaptable Scotland. That does not quite come across in the draft programme.

We welcome the fact there are many policies and proposals. The Government has gone to each of its departments and asked what in their programmes and policies is about adaptation and will help us to build resilience and what can be tweaked for there to be more of that. If possible, we want more policies and more things that fit into the overall vision—the bigger approach to making Scotland resilient, and a more holistic look at adaptation. There is a bigger debate, which I hope the committee can kick off, that we can take forward. The current programme is the first five-year programme.

Alex Fergusson: That is useful. Thank you.

I would like to ask about forestry.

The Convener: One of the questions has been answered.

Alex Fergusson: Indeed it has, but could I ask about the forestry sector?

The Convener: Yes; of course.

Alex Fergusson: Thank you. I take this opportunity to welcome Jo O'Hara to her position as deputy director of Forestry Commission Scotland. I wish you every success in that post.

Climate change will have a major impact on the temperature that we all live in and the rainfall and wind levels that we all experience—all those types of things are hugely influential on the forestry sector. Will you expand a little bit on what work has been done to identify the likely impact on the forestry sector of climate change, if it continues at the current rate, and how the forestry sector might adapt to those challenges?

Jo O'Hara: Okay; I will do what I can.

Alex Fergusson: I appreciate that after three days in the job that is a bit tough.

Jo O'Hara: I have had some briefing.

The science has been developing as the different Intergovernmental Panel on Climate Change reports have come out, each with different degrees of certainty about what will happen in the future. In the early days we said, "This is what will happen," and we all talked about global warming. Then we said, "Well, actually, some places might be warming but some might be cooling, and it is much more complicated than that." That has been the trajectory. As I said in my opening remarks, all we know is that the future will be different and is likely to be different in a certain direction.

Alex Fergusson is quite right. The three risks that have been identified are wind, pests and diseases and, to some extent, fire, which has not been mentioned yet. Work has been done on that. One of Forest Research's objectives is to be much more spatially explicit. A problem with the models is that they make general statements about Scotland, or about the east or west of Scotland. We need to be a bit tighter than that for individual land managers who are making decisions about what they are going to plant and what silvicultural practice they will use.

Until we have that certainty—and I am a bit sceptical about just how much certainty models can ever give us, because the climatic system is so chaotic—we should not put all our eggs in one basket, as I said earlier. We are trying to encourage people to take a more diverse approach. We are looking at the use of different provenances and species, including species that we have not used very much before in Scotland. All species are being hit. Sitka has survived so far, but we cannot anticipate that it will go on for ever and not be touched by an incoming pest or disease.

We will have to learn to live with uncertainty in forestry and we will have to plan for that. That means that we will have to build in diversity in structure, species, composition and the way that we manage, and that is where the focus of the research is.

Last week, the Queen Elizabeth forest park research forest was opened. That is an example of the use of the public forest estate to explore different approaches. We are talking about something that is new, and forestry takes a long time to change. Using the public forest estate in that way seems to be a sensible focus.

10:45

Alex Fergusson: Thank you very much for that. I absolutely share that view. As someone who lives in Galloway, I know that the visual impact of Phytophthora ramorum is horrendous.

You quite rightly say that new species might have to be brought in that will work better in the climate that we may have ahead of us. Does that not bring with it a danger, in that one of the problems is that, in importing nursery stock, we have brought in disease with it? How do you see us combating the likelihood that we will bring in diseases along with new species?

Jo O'Hara: I do not know what the normal English word for phytosanitary is, but the phytosanitary arrangements for nursery stock—which are to do with hygiene in the management of nursery stock—are a slightly separate issue. If a good plant health management, seed management, nursery stock management and soil management regime is practised, it is possible to get clean, disease-free stock of any species, which can be grown in nurseries locally. I would separate the importation of nursery stock from the introduction of new species, because it is a slightly different issue.

Alex Fergusson: Thank you very much.

The Convener: Before we move on to agriculture and food supply, Jim Hume has a question on forestry.

Jim Hume: A lot of the nursery stock is imported from the low countries and can carry disease, which is why we are seeing such rapid spread of diseases such as ash dieback.

Jo O'Hara mentioned the need for more diversity. When a disease hits a large monoculture block such as we have been in the habit of having in the past—and the habit is still very prevalent across Scotland—it spreads like wildfire. Are we hinting that the Forestry Commission could be stricter about having more diverse species? I know that, to a large extent, we must be commercial, but are you starting to give consideration to intermingling species within blocks of commercial forestry?

Jo O'Hara: I do not think that it is a question of the Forestry Commission becoming strict. It is a case of working with landowners so that they are fully aware of the risks to themselves and to their surroundings going forward. They are investing now in order to get a return. If they plant just one species, that presents a huge risk to that return.

It is important for the profession to develop its ideas about forest design. We know that there are ways of designing forests such that more diversity can be built in without that having a massive impact on the bottom line. The baseline economic assumption cannot involve growing a 100 per cent Sitka spruce monoculture in perfect conditions, as might have been the case previously.

Claudia Beamish: I have a brief supplementary about agroforestry, which Jo O'Hara or Andrew Bauer might be able to answer. How relevant is agroforestry to our discussion about climate change adaptation? It seems to have some good, positive outcomes.

Jo O'Hara: Wearing a different hat, I was a member of the woodland expansion advisory group, which received some excellent evidence about integrating various forms of agriculture and forestry to a greater extent, to the benefit of both sides. Agroforestry—which, in its more technical sense, involves the intense intermingling of crops and trees—is very new in Scotland. Research is under way on it, and it is being discussed in the context of the next SRDP.

We are probably on more comfortable territory with the mingling of stock and trees. There are options for silvopastoral systems that are being looked at. From our perspective, agroforestry is worth considering.

Andrew Bauer: The systems that have been described, as well as riparian planting alongside watercourses, are probably more attractive and perceived as less of a threat to agricultural production by the farmers themselves than large-scale reversion to forestry. There has been a huge amount of debate about woodland expansion and about some of the targets that were set, with farmers feeling that it would lead—in some cases, it has led—almost to the reversion of entire farms to forestry, which has caused a lot of problems. If we can be a little bit smarter and look for pockets of forestry or agroforestry systems, or intermingling the two, we are more likely to get farmers on side and to get greater uptake.

Lyn Matheson: About a fortnight ago, we held two events on agroforestry, as part of my future proofing Scotland's farming programme and our new innovation programme. We brought in someone who is doing that practically on the ground in a silvoarable situation; we also looked at silvopastoral schemes. He is doing that because he was losing soil off the ground. With 27m centres he can still get his big combine up the middle, but he is growing apple trees so he has a crop worth £1,000 a tonne, using both the height

and the ground below. The person who came to speak to us was Stephen Briggs, who has done a Nuffield scholarship on the subject, so we brought him to Glensaugh and to the Falkland estate in Fife. There was good attendance by farmers and others, who were particularly interested, I suppose, because of the possibility of article 22 funding.

The Convener: We may get some details about that from you, because we are going to talk about better climate in a wee while. Without repeating ourselves, we are trying to keep new information flowing.

Moving on to land use and food, Jim Hume has a question.

Jim Hume: Andrew Bauer has already mentioned changes in cropping, perhaps with more oats being grown, and the production benefits that could be associated with that. I would like to explore the panel's views on the benefits, threats and opportunities that climate change presents regarding food supply and agriculture in Scotland.

Andrew Bauer: I am not a climate change scientist and I will not pretend that I have a crystal ball in front of me, but we can foresee the benefits. However, the uncertainty could wipe them all out; you might be okay one year in five, but for the other four years you might be totally wiped out and could suffer significant problems. This year, whether it is due to climate change or not, we had a good summer, but we had a terrible beginning to the year, so yields have been nowhere near where the general public might perceive them to be. There will be benefits, but we cannot gamble on those benefits outweighing the problems that we are going to face.

That is a challenging message for some of our members and for some farmers out there, who think that a warmer climate will give them more options for what they can grow. It is a complex message to communicate to farmers, just as it is a complex message to communicate to the general public. I am not betting my house on everything being sorted out and on the benefits outweighing the negatives that we have to deal with.

Professor Paterson: Is the committee including aquaculture in its questions on food security?

The Convener: We can, and probably should; we can come back to aquaculture in a minute after we discuss other issues to do with land use.

Lyn Matheson: As Andrew Bauer said, people are dealing with land use issues now, and we are trying to get messages across about variety choice and taking a holistic approach. We use the James Hutton Institute's information in our events, just to show how land will change and how to view those changes holistically. Yes, there may be better summers, but we must look at the whole broad approach. Farmers may have to change what they grow and when they grow it, and research will be involved in bringing to the fore new varieties that have a shorter growing season. We are making people aware that they might have to change now, by looking at the type of stock that they have, for instance.

Andrew Bauer: Another thing to bear in mind is that farming is increasingly operating—in some sectors this has been the case for a long time—in a global market for fertiliser, feed and so on. There might be a benefit, but any saving that the farmer might make or any increased yield that they might gain could easily be wiped out by an increase in fertiliser or feed prices or a lack of availability of those products. Such volatility and uncertainty are real challenges.

The Convener: Does Jim Hume have a follow-up question?

Jim Hume: No, that is fine. Unless—

The Convener: We will come back to aquaculture shortly, but we will deal with the land stuff first. Graeme Dey has some questions.

Graeme Dey: I will perhaps mix the two, convener. What needs to be done to build resilience into our agriculture and aquaculture-related food systems? What should we do in a practical sense to tackle the impact of climate change?

Andrew Bauer: In your constituency, there is quite a lot of intensive agriculture, with arable, soft fruit, vegetables and so on. Work by the James Hutton Institute indicates that, with a warming climate, areas such as Angus and Fife, where there are short coastal rivers, will be more prone to drought. Via the controlled activities regulations and so on, we need to take costs and restrictions out of farmers doing more offline storage and winter storage of water, taking it and building it into reservoirs. However, tax breaks and better regulation in that area are needed, so that what is potentially a £200,000 or £300,000 investment is suddenly within their reach. That approach means that farmers can take the water during the winter when there is less of a problem. We were in discussions with SEPA this summer and we probably came within a week of restrictions being put on irrigation in certain parts of the country. The impacts are here already. Some of the powers are devolved and some are reserved, but we need to be thinking collectively about such issues.

Knowledge transfer and things such as Lyn Matheson's programme and the farming for a better climate programme are absolutely essential. The SRDP will also play an important role. We need to talk to farmers about the matter in a

practical way. There has been a lot of discussion about projections, modelling, uncertainty and so on. I am not taking anything away from those things but, to be blunt, farmers are not particularly interested in them. They want to know what they need to do to retain their farms in good condition, to continue to produce food and to help their neighbours and their local community. We need to give them a practical steer now, by making decisions, putting in place incentives and facilitating things so that it is easier for them to make the changes, because right now the process is too complicated and there is too much noise, and a lot of them are just shutting themselves off.

Lyn Matheson: I thank Andrew Bauer very much for saying that we are absolutely necessary. That is nice to know.

Farmers will always adapt to what they need to do but, as Andrew Bauer says, we need to give them the knowledge to do so. As he says, our programme—the future proofing programme—and the SRUC's programme are doing that practically, on the ground, which is where it has to be done. The SRDP will nudge farmers in that direction, but I know from the past five years that I have been doing this work that it is the on-the-ground stuff that needs to happen to enable farmers to see what other people are doing and what is achievable.

Professor Paterson: It is tough to put this into a couple of succinct sentences, but I will try. The aquaculture industry is increasingly important in Scotland. We have an environment that potentially allows the development of that industry. The challenges that the industry faces—sea lice, amoebic gill disease, harmful algal blooms, escapes and so on—will be exacerbated by climate change. All those things need to be looked at together. A joined-up approach is required to promote the aquaculture industry and maintain the welfare of the species. In terms of policy and legislation, it is quite difficult to establish new areas for aquaculture. Perhaps that could be looked at.

Protection, welfare and the move away from pharmaceutical controls towards things such as natural controls—wrasse controls of sea lice and so on—could be promoted. Engineering and the technology could be developed to help move aquaculture offshore where there are fewer impacts, because of higher current flows and so on. That is mentioned a little bit in the policy but it does not seem to me to be joined up over the whole impact-economy-production cycle. It seems a little bit piecemeal. However, if we look at the figures, we can see that aquaculture is becoming more important than, or is at least balanced with, capture fisheries. Scotland has huge potential to develop along those lines, so I would not want to lose sight of aquaculture in Scotland as a critical sector to support and follow.

11:00

The Convener: Indeed.

Terry Levinthal: I will come back to a point that I have raised already. To put it simply, it will be easier to react to an impact to than to resource its prevention. The critical message that I would give is about how the climate change adaptation strategy can help to resource mitigation. We have mentioned programmes such as the SRDP and CAP reform in that context. If we wish to use those programmes to help, they must be made much more user friendly and adaptable, because trying to use those sources of funds to do positive things is a bureaucratic nightmare.

Jim Densham: I agree with what has been said, especially Andrew Bauer's comments. We need the bigger conversation to help us all to understand where we are going and determine how the incentives and the advice that we all need should be arranged.

The draft adaptation programme is quite poor on some of the agriculture policies. For example, N3-1 says:

"Implement the EU reform of the Common Agricultural Policy",

with not much more detail to it. Just implementing CAP reform does not necessarily produce a more resilient Scotland. We need to have a much better understanding of what that means. Are we talking about greening or the SRDP? Which elements of the SRDP need to be altered and changed? Do we need a bigger discussion about sustainable food systems for the future?

We need to start discussing such questions now and we need to get consensus on them; we do not want farmers to go out of business because we did not think about some of the risks that will arise in the future.

The Convener: As a point of interest, the cabinet secretary made it plain that the greening arrangements in the CAP did not meet the climate change targets that he hoped they would. I guess that the draft programme was written in the context of the Government wanting to ensure that the greening in the CAP would be effective. However, we take your point on board and will ask him about that.

Claudia Beamish: My point follows on from Jim Densham's remarks and is about the future resilience and sustainability of our food systems.

Nourish Scotland, which is a new charity, has concerns—as, indeed, do I—about how we ensure that we have a resilient food production process.

In my view—this is just my view, and I wonder what the witnesses think—it should be local and there should, possibly, be shorter supply chains so that resilience is built in. How can we, as policy makers, support those things?

I have a particular concern about the people at the other end of the process. Andrew Bauer said that he wanted to help communities as well, and there is an issue with communities in urban areas also having access to food. It is a climate change issue to a degree, and it is really a social justice issue as well. Do the witnesses have any comments?

Andrew Bauer: I turn again to the idea of diversity. In some circumstances, local food chains are absolutely appropriate—we would be happy to be part of that process. In other industries, the commodities that are produced in Scotland are part of a global supply chain. That is not at all where we want to go.

The question is how we achieve what you suggest. The supermarkets are major players and are not going to go away. We should not want them to go away; we should want them to perform better. I have had conversations with Nourish Scotland, which clearly has some strongly held views about what it would like.

Whether an individual farmer wants to engage in a local food chain is for them to decide. Some farmers sell products through farmers markets. That is not the most efficient way to do it, but they will have decided to diversify in that area. That works for some, but not for others. Others feed in to a processing supply chain and have no interest in local food chains.

If the Government decides that local supply chains is where it wants to go, public procurement and so on will need to get behind that. Farmers will then have certainty that, if they supply into the local chain, there will be demand, the systems will be able to handle what they produce and they will make a reasonable return on the products. They will not do that out of charity.

The Convener: We know that.

Lyn Matheson: On local, unprocessed and organic products, we have the food for life programme, which the Government supports and which has come on leaps and bounds in the past 18 months. We have new funding for it. The programme looks at schools and all aspects of catering. Every time I come into the office, I hear figures on how many meals come under that banner in East Ayrshire and the Highlands and Islands, for example, which is fantastic. That approach is building. Obviously, we also have contact with edible Edinburgh, which came through food for life.

The Convener: This is eating into our time, but it is very useful to have those comments on the record.

Professor Thompson: I am particularly struck by what Andrew Bauer and Jo O'Hara said in relation to the rapidity of changes that we face in diseases, pathogens, globalisation, public attitudes and perceptions. We must ensure that we support the research community to provide us with the answers.

Knowledge exchange has been mentioned. We are incredibly fortunate in having the SRUC and the James Hutton Institute, which have world-leading research capabilities. However, unless we have a step change in recognising that rapid, risky things are now being thrown at our environment, and unless we have the science and innovative techniques in place to try to combat them, we will simply be folding our arms as those changes happen. We must ensure that we have those connections between the science and the land users and land managers.

The Convener: That leads to our last question in this session.

Graeme Dey: I have a quick question that will get quick answers. Is the practical experience from initiatives such as farming for a better climate and future proofing Scotland's farming sufficiently reflected in the draft adaptation programme?

Andrew Bauer: Farming for a better climate deserves greater prominence, and we think that it deserves greater resources. It will not only help Scottish farming to adapt to climate change but potentially give us something that can develop as brand Scotland in international markets. The Irish have done things very successfully through the origin green programme. We should look to them and learn lessons.

Investment in knowledge transfer is good, and farming for a better climate does not yet have the resources that it really needs. As I said when I last came before the committee, the investment per farmer in Scotland in respect of knowledge transfer and climate change is very low. As with the general public, it takes time for those messages to get across to farmers, but the difference is that they have a large asset of land into which they put inputs and from which they create outputs, so their individual potential to make a positive impact on mitigation and adaptation is much greater than that of the average man or woman in the street. We need to acknowledge that and put resources in.

Jim Densham: As we know, mitigation is still a popular topic, and we understand that that is reflected in farming for a better climate. Obviously, we also recognise that more resources and more dissemination to the public and farmers are

needed to say that this is about adaptation, too—it is about how we adapt. We know that adaptation will happen; we just need to ensure that it happens in the right way so that there are not negative impacts on many aspects of the countryside.

The Convener: Can you say briefly what those negative impacts are?

Jim Densham: For example, climate projections show that land availability or suitability for agriculture may move up the hill, if you see what I mean. We must ensure that such land is not simply ploughed up or used without considering, for example, the many existing benefits for biodiversity.

Lyn Matheson: I will reiterate where we are on future proofing Scotland's farming. I can see what it has achieved. We had a climate change programme before future proofing Scotland's farming, which we are now two thirds of the way through—the funding comes to an end next August. As we proceed, we evaluate six months on, and we have chapter and verse from farmers on what they have done and the impact on their business. We recently visited a farm where the farmer had told us that he had attended one of our events, which changed what he did on his farm. We went to see what he had changed on his farm, and took 20 or 30 farmers along. The programme is having an impact on what is happening on the ground. If we can resource it as well, that would be even better.

Professor Paterson: I appreciated Des Thompson's comments. This applies to everything that we have said. There is a wealth of information in Scotland, and Scotland is small enough that we can co-ordinate across the different areas perhaps better than some larger countries can. I make a plea to you to look at all the information that is available. I did not see in the policy links to the higher education sector, which might be used to draw in some of the evidence that you need without spending a lot more money.

The Convener: We have had a good look at the natural environment and its capacity for adaptation, which will provide members of the committee with quite a lot to think about to sharpen up the final adaptation policy. I thank our witnesses for their evidence, which will give us food for thought. They can expect it to be reflected in our report.

If the witnesses wish to stay and watch the next session, they are, of course, very welcome to do so.

We will take a short break to change witnesses.

11:11

Meeting suspended.

11:19

On resuming—

The Convener: In our second round-table evidence session on the draft Scottish climate change adaptation programme, we will focus on the infrastructure and the society aspects of the programme. I welcome our new panel members and ask that they introduce themselves briefly.

Paula Charleson (Scottish Environment Protection Agency): Good morning. I am head of environmental strategy for the Scottish Environment Protection Agency. Part of my role is to drive the strategic direction, including helping Scotland to combat climate change.

Jayne Baxter: Good morning. I am an MSP for Mid Scotland and Fife.

David Goodhew (Scottish Fire and Rescue): Good morning. I am the director of operations for the Scottish Fire and Rescue Service.

Claudia Beamish: Good morning. I am an MSP for South Scotland and shadow minister for the environment and climate change.

Dr Andrew Dlugolecki (University of East Anglia): For 27 years, I worked for General Accident Insurance, which is now part of Aviva. I recently served on the Royal Society of Edinburgh's inquiry into climate change. I was also a member of the adaptation sub-committee of the UK Committee on Climate Change for the first three years of its existence.

Richard Lyle: Good morning. I am an MSP for Central Scotland.

Anna Beswick (Climate Ready Clyde): Good morning. I am the programme manager for the climate ready Clyde project and the adaptation Scotland programme.

Nigel Don: I am the MSP for Angus North and Mearns.

Chris Wood-Gee (Sustainable Scotland Network): I am the sustainable development team leader for Dumfries and Galloway Council. I am here to represent the sustainable Scotland network, in which I am one of the climate change portfolio holders.

Alex Fergusson: I am still the MSP for Galloway and West Dumfries.

Stephen Thomson (Transport Scotland): I am the head of environment and sustainability at Transport Scotland.

Jim Hume: I am an MSP for South Scotland.

Gavin Hewitt (Scotch Whisky Association): In addition to my role at the Scotch Whisky Association, I am the sustainability champion for Scotland Food and Drink.

Angus MacDonald: I am the MSP for Falkirk East.

Gordon McGregor (Scotland's 2020 Climate Group and Scottish Power): I am here to represent Scotland's 2020 climate group, which is a group of organisations from different sectors that are trying to meet the Scottish climate targets for, surprisingly, 2020.

Graeme Dey: I am the MSP for Angus South and the committee's deputy convener.

The Convener: I am the MSP for Caithness, Sutherland and Ross.

We will look first at emergency responses and co-ordination and kick off with flood issues, on which Dick Lyle has a question.

Richard Lyle: In 2008, the Scottish Government renamed its fire and civil contingencies division Scottish resilience. Changes in climate, such as an increase in the number and severity of extreme weather events, are set to have a significant impact on the emergency services. What has been learned from the experience of the emergency responses to recent major flooding events?

The Convener: Panel members should indicate to me when they want to respond, and I will call them in turn. We shall start with a transport perspective.

Stephen Thomson: Flooding is arguably the greatest risk that Scotland faces, at least from a transport perspective. Transport is an intrinsic part of the emergency services and all the sectors that are covered in the adaptation programme. Although we do not make explicit reference to individual sectors in the transport element of the adaptation programme, we are very aware that, were the transport corridors to go down or not operate fully, services such as fire and rescue would suffer.

Paula Charleson: As the committee will know, one of SEPA's roles is to administer the flood warning scheme, which we do with partners that include local authorities, the emergency services and the Met Office. We have a role in improving that scheme, so that more and earlier information is available to allow us and the emergency services to respond earlier to predicted flooding events.

Gordon McGregor: From the perspective of the energy industry, flooding has become more prevalent over a number of years as an issue and a risk. Three issues are important in our sector. First, when new infrastructure is designed and built, flooding considerations should be part of the design. Secondly, greater effort is being made to flood proof existing assets to the best of their abilities—work is going on in the regulated sector and on some other assets. Thirdly, there is a greater monitoring of, and responsiveness to, flooding issues right across the industry.

David Goodhew: Certainly, the fire service and other emergency services have learned a significant amount from flooding events. We have learned to work with partner agencies in response to predictions and flood warnings, including by forward deploying elements of equipment and personnel where an event is planned. The Scottish Government has purchased and supplied various equipment throughout Scotland for dealing with large floods, so the fire service's assets have increased considerably over the past decade predominantly due to Scottish Government funding. The amount of training and joint training has also increased, so the category 1 responders, cat 2 responders and voluntary agencies are able to work together to establish a sensible solution to deal with any problem as and where it occurs. That work is on-going.

Following the amalgamation of fire and police services into the Scottish Fire and Rescue Service and the single police force, we are reviewing assets to ensure that the assets that are in place are aligned with the risks. We look at SEPA flood plans to ensure that we have the right resource in the right place at the right time. That is also on-going. The amalgamation of the emergency services has invigorated that and allowed us to take another look at the issue to ensure that we are correct.

Richard Lyle: I welcome those comments, including the compliments to the Scottish Government for providing more money.

My second question is basically on the point that has just been made. What other emergency responses should be anticipated as a result of climate change? How advanced is our planning and preparedness for those?

I also have a question for SEPA. Do you agree that most councils do not empty gullies often enough? In a street where the drains have not been opened for a number of years, you can see the silt built up around them. Some councils do not have the assets that the Scottish Fire and Rescue Service has referred to. Councils do not have enough gully emptying lorries. Indeed, some councils have only one lorry to cover what may be a vast area.

Paula Charleson: I cannot comment on how many lorries the local authorities have—sorry, I do

not have that information—but let me make a more general comment about flood management.

The Flood Risk Management (Scotland) Act 2009 has fundamentally changed how we address flooding and flood risk. We now have a plan-led approach that is sustainable and risk based, so we should be able to look at where the biggest risks are. Having published the national flood risk assessment a couple of years ago, SEPA is about to publish the new flood risk hazard and risk maps, which will identify where the biggest risks are expected and what their impacts will be. In 2015, we will go on to develop the risk management strategies, following which there will be local authority flood risk plans. At that point—indeed, this is happening already—we will start to identify where the biggest risks are within each local area and what actions need to be taken.

We have a planned, risk-based approach, whereby we put the money where the biggest challenge is. It might be that one local authority should have 16 gully-emptying lorries, whereas another should have only one—that depends on the infrastructural impact and the risks to communities and homes and so on.

The Convener: I will allow Graeme Dey to comment on that answer before I bring in Andrew Dlugolecki.

Graeme Dey: I will back up Richard Lyle on that point. If we are not properly utilising the existing infrastructure to minimise flooding incidents, which may be small-scale flooding incidents in urban settings, is that not a pretty poor starting point?

11:30

Paula Charleson: That is a fair point. My understanding is that the risk management strategies will include easy win-wins that could be achieved using the infrastructure that is already in place, so we are not necessarily talking about major flood defence developments. The risk management strategies will include actions that can be taken locally to alleviate the impacts of flooding.

Dr Dlugolecki: Regarding the previous question, I want to make a couple of points about the role of insurance in dealing with emergencies. In the Royal Society of Edinburgh inquiry, we found that the purchase of flooding insurance by the poor was going in the reverse direction from what the Scottish Government intended. The Government wants more people to be protected by insurance, but we found that the poor are spending their money on other things and are not protected. In every event, small businesses come out very badly because they tend not to have insurance cover for things such as interruptions. That is one feature of the whole climate ready framework, in that it does not seem to reach the parts that other beers do not reach either. For example, the 2020 initiative is all about big business, but a lot more attention needs to be given to small businesses.

A final point that I want to make, without being too controversial, is that there are big changes coming along on flood insurance. If Scotland becomes independent, that will have major implications, as the new set-up is dependent on the UK Government taking a position behind the insurers to enable flood insurance to continue. If Scotland becomes independent, that scheme will not be available, so the Scottish Government will need to look at that. That will be quite an issue, as it is always proportionally much more expensive for a smaller country to provide insurance because the risks cannot be spread over such a big area.

The Convener: It is noticeable that the UK Government is hedging its bets in making only a five-year plan for the flood re scheme. We might leave to another committee those questions about what might be sustainable, but your points are well taken.

Jayne Baxter: I have a brief question. I could not agree more that, where there are repeated incidents of flooding, householders and small shops—this is a particular issue in parts of my constituency—just cannot get insurance because the premiums are so high. However, a driving factor behind that is that drains and culverts are collapsing all over the place. What role should investment from Scottish Water play in making improvements, so that we stop repeated incidents of flooding in the same parts of streets and in the same premises? No one will rent those premises and businesses are vacating town centres because of such floods. That may be due to climate change, but it is more because the drains have collapsed. Is there a role for Scottish Water? Where does Scottish Water fit into all this?

The Convener: Alex Fergusson is indicating that he wants to speak. Do you want to be a spokesperson for Scottish Water, or would you rather wait?

Alex Fergusson: I was just trying to catch your eye for a supplementary question.

The Convener: Indeed. We do not actually have anyone here from Scottish Water.

Paula Charleson: I guess that I can say a little.

Obviously, SEPA works very closely with Scottish Water and has done so as part of the new phase of the quality and standards investment programme, which will apply over the next several years. We have also worked closely with Scottish Water on some research projects about climate change that aim to understand the potential

impacts on Scottish Water infrastructure. Quite a lot of recommendations have been made about the need for more monitoring of vulnerable areas, such as vulnerable water resource zones, so I think that Scottish Water is doing quite a lot of work on that. The committee may want to go back to Scottish Water for a written response, but I reckon that Scottish Water recognises the issue that has been raised. We work with Scottish Water on sewerage flows, which might need to be improved in areas where there has been flooding.

The Convener: I hope that that is helpful.

Jayne Baxter: Yes, that is helpful, convener.

The Convener: Good. We will bear those points in mind.

Alex Fergusson: I have just a small point to make; I do not know whether anybody will want to comment on it. Those of us who still get a perverse pleasure from canvassing and leafleting as part of our duties cannot help but notice that, over the past 10 years, there has been a huge rise in urban surroundings in examples of what I call the concrete garden. I cannot help but feel that that must have some implication for drainage, flooding and the sort of issues that Dick Lyle was talking about. Has any work been done to measure the impact of that? Does anybody have any ideas on how it might be mitigated? I will not pursue the matter if it is not a measurable thing.

Chris Wood-Gee: There has been work done on that. I am not sure where it is, but I have read various bits about that in the past, particularly with regard to bigger urban settlements such as London, where the problem is made worse by increased areas for parking and so on. It is therefore a live issue. I know that SEPA was doing work through its sustainable urban drainage system programme to encourage people to use more sustainable drainage measures, including things that will allow the water to infiltrate into the system and hold it for a bit.

You are right that there is an issue, but I am not sure where you would pick up data on it.

Stephen Thomson: I will take that point a bit further, but not with regard to gardens being designed using concrete. Car parks are now being used as artificial ponds in that sustainable urban drainage systems are incorporated into their construction. We are certainly finding in the built environment the opportunity to use new car parks to hold and manage water in a more practical way. Having concrete in urban spaces does not necessarily mean that it will lead to flooding.

Anna Beswick: I am not aware of any specific research in Scotland to quantify the amount of permeable surfaces that are made impermeable every year. However, I back up what Chris Wood-Gee said about research elsewhere. It is a huge issue in London, where every year an area equivalent in size to Hyde park is paved over with impermeable surfaces. I would imagine that there is the same trend to an extent in urban areas of Scotland.

That flags up the important challenge that we need to build more resilient cities and take a multifaceted approach to urban spaces. Having permeable surfaces is an action that makes an important contribution to reducing overall flood risk. It is sometimes difficult to quantify the exact nature of such contributions, but there is nonetheless an important principle that needs to be supported to allow it to happen in reality, which is how we can reverse the trend and ensure that permeable surfaces are implemented.

The Convener: Paula Charleson will speak on this point, and then Graeme Dey will ask a supplementary question on transport.

Paula Charleson: I, too, cannot put my finger on the data, but it is an issue for sure. SEPA has been working with local authorities and planning authorities on planning guidance to try to improve SUDS uptake in developments. It is quite hard when an individual decides to put tarmac in their drive, but there are ways of encouraging it otherwise. We must work with public and private business developments to encourage better sustainable urban drainage. There is a good example in the work that is being done for the Commonwealth games. The centre in Scotstoun, where the swimming events will take place, has a permeable car park as part of its urban drainage system.

The Convener: Good. Thanks for that example.

Graeme Dey: I am interested in what Stephen Thomson said about new-build car parks. Is there any statutory requirement for people who provide a car park to do what he described? If there is not, should we consider having something along those lines?

Stephen Thomson: I am not sure whether there are statutory requirements, but I know that we must follow set standards for the infrastructure that we build in the transport sector. In our case, the standards are in the “Design Manual for Roads and Bridges”, which state clearly what we must do to manage water in sustainable urban drainage systems. I think that it is fair to say that buildings and infrastructure will have set standards that must be followed that will take account of drainage design and incorporate the management of water.

Claudia Beamish: I have a question on a flood management issue that is referred to in the adaptation plan. It is about the study of the impact of water flows on the sewerage network. Can SEPA or anyone else comment on that?

Obviously, in flood situations it is deplorable if sewerage systems flood. Are the systems resilient enough in that regard? I hate to mention money, but is more money and research required?

The Convener: Nobody wants to answer that question—yes, somebody does.

Paula Charleson: SEPA will answer it. As I intimated previously, some of the work that we have been doing with Scottish Water includes looking at the impact of water flows on the sewerage network, which is referred to in the adaptation plan. The sewerage flows will be part of the flood strategy and, ultimately, of local flood plans. I think that investment will probably be required in certain areas.

The Convener: Can we stick with the insurance business just now? Angus MacDonald wants to develop a point on that.

Angus MacDonald: I am interested in Dr Dlugolecki's comments on insurance. As the panel will be aware, the issue of flood insurance has received considerable coverage in the Scottish media and in the Parliament, including in a debate just before the summer recess. The Minister for Environment and Climate Change, Paul Wheelhouse, has actively engaged with the UK Government and the Association of British Insurers to develop a memorandum of understanding to cover the interim period until flood re has been implemented. In addition, Richard Benyon, who recently departed from his UK ministerial role, reported that the insurance industry has committed to continue to make flood insurance available to areas at high risk of flooding.

The issue has already been touched on by Dr Dlugolecki, but I am keen to hear the panel's views on the extent to which householders and businesses in Scotland in flood risk areas are likely to face challenges in securing adequate insurance cover in the coming years.

Dr Dlugolecki: I am not speaking on behalf of insurers, but I have followed the issue very closely. There is no doubt that those people will face more difficulty because insurers now feel that they must price the risk according to the situation of the building. In the past, there was far more of a view that they could cross-subsidise. The reason for the change is that a lot of new competitors have come into the market that feel that they can just pick off the properties that are not liable to flood insurance and undermine insurers such as General Accident, Aviva and Royal Sun Alliance, which have large numbers of people who are prone to flood risk. The insurers that have the flood risks now feel that they must respond to that challenge and start to price the good risks more cheaply, which means that prices for the other risks must go up.

There is no doubt that there will be a challenge for some people in Scotland in that respect, although the change will be gradual. However, as I said, if Scotland becomes independent, it will become a very significant issue. If the flood re solution materialises, Scotland might have a challenge in developing an alternative because of the scale of Scotland compared with the UK: 5 million versus 65 million. It is quite a different proposition to put up a reinsurance company for that smaller scale.

As I said previously, the greatest pressure will be on the poor and on small businesses. There are possible solutions for the poor because insurers are willing to give cover if a housing association is willing to work with them. The problem is that social housing has tended to move from the public sector to the private sector, and the latter has not been so interested in working with insurers to set up schemes to give cover with rent. That is the most effective way of doing it, because the insurance is included with the rent; it is very cheap and there is no selection against the insurer. The insurers are fairly relaxed about that kind of arrangement. However, the managements of social housing associations do not seem to be so interested in pushing that.

Flood insurance is also an issue for small businesses. There is not enough attention to that sector in the climate ready framework. The sector does not understand climate change or what it can do about it.

The insurance market is increasingly moving towards people picking up a phone or doing it on the internet. People are not getting quality advice about what to do. More resource needs to be pushed along that avenue, whether through the medium of trade associations or via chambers of commerce, although they do not seem to be part of the strategy at the moment. However, that might be one approach.

11:45

Angus MacDonald: I am intrigued by your comment regarding cross-subsidy. When doing research for a speech that I made in a debate in Parliament prior to the summer recess, I read a statement by Rob Edwards of the *Sunday Herald* that Scots were subsidising insurance in England, so it clearly works both ways.

Dr Dlugolecki: That might perhaps be true for Scots as a whole, although I have not seen the figures, so I would not really like to comment. England has been much less good at managing flood risk than Scotland, so all credit should go to Scotland and the Scottish Government. We have

had good rules in place for much longer than England now. The problem has not got worse as fast as it has in England.

You heard earlier about the coastal regions of Scotland where there are severe problems from sea-level rise as well as rain. There are certainly parts of Scotland, including the north-east, which insurers are a bit nervous about.

The Convener: Is it not the case that the huge amount of building on flood plains in England is a significant contributory factor to the question of what insurance will cost? SEPA agrees.

Dr Dlugolecki: Building on flood plains is risky but, if there are very good defences, as in London, it is viable and justifiable. Personally I would recommend against it, but sometimes there is no alternative—there is no other land—so such places have to be developed and protected.

The Convener: We will go on to discuss the built environment in a minute, but we will first return to climate change. In addition to flooding, what other emergency situations should be anticipated in Scotland as a result of climate change? How advanced is our planning and preparedness for them?

David Goodhew: This has come as a surprise to some emergency services over the past decade or so. When we considered global warming initially, we were under the impression that it was going to get hotter or colder, and that floods or wildfires would therefore be the problem. We started to push resources—certainly in the fire service—into flooding-related assets. However, we have instead found an extreme variation in events, including changes from hot to cold—freezing and so on.

The emergency services have to respond to all of it. We must not only respond to the particular incident that has been caused by the event, be it a wildfire, a large amount of snow or ice, or flooding; we also have to deal with business as usual. We are still expected to go to everyday, business-as-usual house fires, to deal with people trapped in cars following collisions and so on—even if there is 3 feet of snow on the ground. We have therefore had to push resources over a number of years now, certainly for category 1 responders.

When we look at purchasing vehicles, our vehicle replacement strategy lasts from 12 to 15 years. A short-term strategy would bring benefits for only five years. When we purchase vehicles now, we look for four-by-fours, differential locks on rear axles and so on, to ensure that fire appliances can still get to incidents should there be flooding, snow and so on. It can even be a matter of rerouting exhaust pipes. We ensure that exhaust pipes are above 18 inches—I think it is—so that our fire appliances can drive through 18 inches of water. All those things must be taken into account.

When we look at strategic planning for the future, we should note that, even this week, wildfire units are now going on the run at various fire stations throughout Scotland. We are just coming into November, and we are already thinking about wildfires, not just for next year but for the next decade. We are increasing the number of specialist assets across Scotland—cat 1 responders—for the Scottish Fire and Rescue Service and the Police Service of Scotland in anticipation of extreme events. That work will probably continue over the next five or six years. We are trying to future proof assets for the next two decades.

Chris Wood-Gee: Local authorities—and Transport Scotland as well, to a greater or lesser extent—have been affected by other issues such as subsidence and road slippage, which have had quite a big impact in south-west Scotland on some of the roads running across the uplands. Certainly, the Rest and Be Thankful always seems to be in the news with another landslip and another closure. The increased intensity of rainfall has had quite a major impact on the soil cohesion and, given the way that some roads are built, I think that maintaining connectivity between settlements and avoiding massive detours and so on will be an increasing problem for the future.

Stephen Thomson: I endorse that. We are facing three principal risks in Scotland just now. The first one is flooding, which has been mentioned. The second one is landslides, and we have had a landslide very recently—just this month, in fact—at the Rest and Be Thankful. The third one is high winds, and it was either last year or the year before that we had particularly high winds in the winter in Scotland.

Those are the three emergencies that we probably want to focus on, at least from a transport perspective. What are we doing about them? The biggest asset that we have just now is the new traffic control centre at the Queensferry crossing, which has the capability to take in the emergency responders, the Met Office and the operating companies. That is probably the strongest asset that we can use to maintain our other assets.

Gavin Hewitt: Connectivity is extremely important for our industry. I emphasise that preparations are being made, but the closure of roads due to snow or ice means that we cannot transport most of the product that we make up and down the country. The ability to transport our product is vital for our success.

The Convener: I will just make a point, before Anna Beswick comes in, about having maps

available for industry that show the roads and rail routes that are affected by flooding as well as the likely closures because of snow and so on.

Clearly, it is very welcome that the whisky industry is using more rail transport from Elgin. We welcome ever less road use at that point. However, it is important that the public has a better knowledge of what areas are most likely to be affected. They may know about their local area but, when they are travelling, they need a much wider knowledge than that.

Stephen Thomson: I agree with that. There are two forms of communication, using the traditional media and then social media. We have learned—certainly since 2010—that we need to invest in our website, which we have done. We have invested in internet radio through Traffic Scotland. As I mentioned, we have set up the new traffic control centre.

There is also perhaps the route of using more modern forms of communication such as Twitter to get instant access to the general public because they want to know at the point in time what the risks are. We can tie that in to our existing infrastructure such as vehicle messaging systems and to the new traffic systems that have been set up around the Forth replacement crossing for variable speed messaging, for example. We are aware that we need to be communicating live with people on those networks.

Anna Beswick: I want to raise the issue of heatwave planning. There is a national heatwave plan for England. The catalyst for the production of that plan was a massive heatwave that hit Europe in 2003, which resulted in about 50,000 excess deaths, including about 4,000 in the south of England. That provided a catalyst for heatwave planning for England.

We have not had such a trigger event here in Scotland and sometimes it is hard to imagine such an event happening—I fully acknowledge that—but we are living in a time when we are seeing and suffering from climate extremes. Heatwave planning is already a proposal within the adaptation programme and we need to consider seriously the timing of the development of work to better understand what risks we might face—what risks there might be to health and wellbeing. That includes risks such as cardiovascular illnesses and respiratory disease, perhaps in cities where there is air pollution.

The issue will not go away. As obscure as it might sometimes seem, we need to consider the possible seriousness of the implications of a heatwave in Scotland for people's health and wellbeing. Because we are not used to such events, our tolerance and comfort thresholds are much lower than those of people elsewhere. Recent research in Glasgow suggests that comfort levels may be around 18°C. We had temperatures in excess of 30°C in the centre of Glasgow this summer, and I am sure that that was the case in other locations as well. The issue should be on our minds.

Gordon McGregor: A big component of other countries' adaptation plans—I am thinking also of the UK adaptation plan—is supply chain risk for business. We might be able to get the country working from day to day but, if the airports and other international connections are not organised, the telecoms infrastructure is not working and some other adaptation events are occurring elsewhere, it impacts the supply chain risk for companies in Scotland. That is a major concern. The plan that we are developing in Scotland could go a wee bit further on that.

The Convener: That is useful.

Jim Hume: We have already heard from David Goodhew about the planning that the Scottish Fire and Rescue Service has to do regarding climate change and the effects that it could have on its emergency services. I would be interested in hearing from witnesses whether the other critical services such as the national health service and the Scottish Ambulance Service are taking potential climate change changes into account and incorporating them into their plans for the future.

David Goodhew: I can speak a bit on behalf of the Ambulance Service. In Scotland, there are now a number of voluntary organisations that offer specialist attributes and resources, possibly at charge or at cost. In recent years, the Scottish Ambulance Service has been investing in its fleet to ensure that it has a greater four-by-four capability. It has also considered partnerships with some of the voluntary agencies that can offer the same type of resource and asset.

Rather than have vehicles that are, in effect, redundant all year waiting for flooding or snow, the Ambulance Service goes into partnership with an agency that has specialist resources and brings them in as and when they are needed. That seems to work very effectively in parts of Scotland—certainly in and around the cities and some urban areas.

Chris Wood-Gee: As part of research, I spoke to our resilience team. The interesting point was that we are now looking at a much more regional approach, which partly reflects the changes to the police and the fire and rescue service. We are working with our neighbouring authorities, and I suspect that that is the same in much of Scotland.

There is a move to consider climate change as a risk and resilience issue with which we need to deal, and we are starting to adapt to that much more regionally. On a more pragmatic level, it is

interesting to see the use of, for instance, local mountain rescue teams to provide four-by-four accessibility to augment the existing health service ambulance services.

There must have been an exercise going on in my local area at the weekend. I drove past it. The ambulance service and the police were there. Everybody is working together on risk and resilience. It is starting to happen.

The Convener: Farmers are also working with local councils to clear roads in rural areas. That is another regional activity.

Paula Charleson: I have a point related to what Anna Beswick said about the temperature increases, which are another effect that we might experience.

In the SEPA response to the climate adaptation programme, we raised the point that there was not much mention of the heat island effect. That is the effect that we get in urban areas, in which the buildings heat up, emit heat and create a heat island.

There is an opportunity to take the multiple benefits approach to addressing issues of climate change. We could put in green infrastructure that can cool down the area because of the nature of the plants. It could also address air quality issues that might get worse and be an issue for the health service. We could also put in some green infrastructure that could also help with flood attenuation. It is a brilliant example of the multiple benefits approach, and how to address the potential heat island issues that might come up.

12:00

The Convener: We move from the heat to the cold.

Graeme Dey: Jim Hume talked about emergency services. For me, the emergency services include the organisations and individuals who are responsible for restoring power supplies during severe weather. We do not have to look too far back in time to the incident on Arran, which was extremely serious for a sustained period of time. Resources had to be deployed from all over Scotland and people had to work round the clock to get the power back on. What contingencies are planned for those sorts of incidents, particularly given the fact that we might see more of them and they might be more severe in the future? Where does that issue sit in the grand scheme of things?

Gordon McGregor: That is a great question. SSE and Scottish Power had to deal with the situation on Arran, not ourselves, but the industry does co-operate on these issues. In 2008, the industry asked the Met Office to look at various scenarios of how weather will change over the next decades. At that stage, it was looking at the effects that temperature, water scarcity and flooding, as we have just discussed, could have on power stations. The power industry has a whole range of things to take into account.

On the grid side, the 2008 Met Office study also forecast more stormy weather and higher temperatures, and at that stage the industry got together to look at how it could better prepare for a future in which severe weather incidents will be more prevalent, as you suggest. I can put before the committee a report that we did in 2011 that sets out some of the issues that we are managing in this area and which some of the other companies in the industry are also looking at. The report goes through the whole gamut of adaptation issues and how the industry is responding to events.

I go back to the point that I made earlier about the three components that we look at on a daily basis. We look at how the industry can monitor what is happening with the weather and its impact on net assets, and how we can manage our operational activities to minimise any disruption—that is one thing. The second component is about making our assets more resilient, and strengthening and reinforcing them where we can, particularly in areas that have had frequent storms and suchlike. The third area is building resilience into the design process when we are designing new infrastructure so that a stress test is already factored in for the future.

Graeme Dey: It is welcome to hear that the industry is being proactive rather than sitting back and waiting for Government funding. It is encouraging to hear that.

The Convener: We need to sum up on this section. We need to see specific points in the adaptation programme that relate to contingency planning, so if you think that we should be emphasising some specific points, we can use them to sum up this session. We have covered a wide range of different aspects. What should we say to the ministers when we make our report?

David Goodhew: For me, we have to concentrate on partnership working. We have now started to notice a fundamental difference in the way in which responders deal with any event, whether it be extreme weather or otherwise. No one agency can deal with everything any more. In the past, we put things into pigeonholes and said, “It’s their problem.”

Extreme weather is not anybody’s problem; it is everybody’s problem. If we do not take a unified approach with real joined-up working and partnership working, with the testing and training that links in to the strategic co-ordinating group arrangements and the report on proposals and

policies later this year, and if we do not link the problem into those forums and present a united front, we will fail in future. For me, it is a question of partnership, partnership and partnership.

Paula Charleson: I absolutely agree with that. The other point that I wanted to make was about data sharing; I think that we should do that as much as we can. Obviously, schemes are already in place, but it is incumbent on SEPA and other organisations to share the information that helps us plan, to avoid some of the events that we are talking about.

The Convener: We move on to the built environment, with a question from Nigel Don. I am trying to signal to him in semaphore. Hello there.

Nigel Don: Yes, there is still life down at this end of the table. Actually, Gordon McGregor was just discussing the power industry's concern about its assets and the location of those assets. I am also conscious that we have already heard about flooding, and we expect good maps from SEPA imminently. However, there is a general question about how well we are able to quantify the risks due to climate change on a geographical basis—in other words, in specific locations. To what extent can we put those general issues on maps?

The Convener: Right, who is going to be the map maker? You see, I am old-fashioned; instant information for people is important, but if you want to invest to deal with choke points, they need to be mapped. We now have well-organised flood maps, but I think that Nigel Don is talking about other kinds of maps.

Nigel Don: Allow me to put some flesh on the bones and tease out the question. If I were to ask the power engineers, they would be able to draw me a map of every power line and the wattage or amperage or whatever it is that goes along it. They could show me the system and we would know where the choke points were. Equally, I am sure that we will pretty soon get a map showing the choke points for natural flows of water through flood plains and for rivers.

Perhaps Transport Scotland could tell us whether there is a map that shows the risk of every major road in Scotland in the context of flooding, high winds and the risk of landslip. If there is not one, perhaps there should be. Is there a set of maps of likely highest winds that could tell us something about damage to property, goods, cattle or whatever? To what extent do we know at a general level where the risks are?

Stephen Thomson: I shall answer that question in two parts. First, we have maps in our geographic information system, but I do not think that they are complete. We are beginning that journey. There are two actions in the adaptation programme—B1-9 and B2-11—that specifically touch on the need for more data built into a GIS, particularly in relation to high winds and flooding, so Nigel Don's point is well made.

The second part of my answer is about the sharing of GIS-based information, whether in shapefiles or other forms of files, not just among Scottish Government agencies but across Scotland, to help build up what seem to be quite separate geographic information systems within individual organisations, so that we all have the same information. That has to be key.

Anna Beswick: The creation of maps to map vulnerability is relatively easy with the right data sets, but we need to consider not only the spatial impacts but the impacts across systems, which are much harder to understand. We could identify the impact of a landslide on a highly vulnerable part of the road network, but it will have cross-cutting and cascading impact across a wider area, which cannot be captured by a spatial map. We should consider not only spatial mapping of vulnerability but a more systems-based approach to looking at how impacts on the power network affect transport infrastructure, which affects business continuity.

I think that it is extremely important that we develop a detailed understanding of that. That is one of the things that we hope to progress through the climate ready Clyde project, but it will require a lot of work, investment, and time and energy on the part of partner organisations to make that happen. That reiterates the need for partnerships to understand where shared risks to systems exist, as well as to address location-specific risks.

Paula Charleson: I just wanted to mention the project that we have on Scotland's environment web, which many of the committee will be familiar with. It is a European Union-funded, Government-supported project that we are leading with many partners. The aim is to have a one-stop shop for information on all sorts of things. After the project finishes in three years, we hope that it will continue to be a fantastic place to see and to have ready to hand the information that Nigel Don is talking about. Data sets can be displayed on map-type formats for whatever use is appropriate. Part of the project is about overcoming some of the difficulties to do with one set of data not talking to another set. We are overcoming such issues through the project.

Gordon McGregor: I think that the reason for the hesitation in responding to the initial question was that there are numerous things that one could map. We have already talked about the risk to our industry of high winds and flooding, but there are other risks, such as the risk to do with vegetation management. Trees and other plants that grow around power lines need to be cropped to maintain the higher integrity of the system. Where

should we draw the line when it comes to maps, if that is not a pun?

The answer to Mr Don's question lies in what Paula Charleson said earlier. It relates to how people will share data—how private companies such as Scottish Power will share data with emergency services and how SEPA will share data with others. That is a much wider area, but it is a fruitful one for the development of the adaptation framework.

Nigel Don: It is, indeed. I am grateful for those comments. You are probably right, in the sense that much of this is about lines.

One of the other issues is trees that grow next to railway lines and roads, which I do not think that there is anyone here to speak about. When they get blown over, everything stops. It is possible to look at such trees and say, "If there is a high wind, it will get blown over." A decision can be made to cut down a tree before that happens. Such decisions are difficult to make, but the consequences of not making them are not impossible to predict.

Can anyone give us any clues on adaptations to existing buildings? Most of our buildings will be around for a very long time. Are there examples of adaptations to major buildings that reflect an understanding of climate change and what might happen?

Gavin Hewitt: I will give just one example. As a result of the very heavy—and very odd—climate conditions up in the north-east of Scotland two years ago, we found that our maturation warehouses, which are fundamental to the industry, needed to be reassessed, because a number of roofs fell in. We have taken on board the adaptation message that we must redesign some of our maturation warehouses to ensure that they are capable of coping with particular forms of ice formation, whereby snow builds up and ice cannot come off the roof. That is a highly specific example of a lesson that we can happily learn for the future.

We are, of course, an industry that has learned many lessons over the past 500 years. We have adapted beautifully, but we must continue to adapt.

The Convener: Just in case people did not know, Mr Hewitt was talking about the bonds where the whisky matures.

Gavin Hewitt: Thank you, Rob.

Paula Charleson: I think that there are such examples. Unfortunately, we do not have with us Historic Scotland, which would be able to give us more examples. Green roofs have been put on to existing buildings; I know that Historic Scotland has tried that. Such roofs can have added benefits—they can attenuate water and can have a cooling effect.

12:15

Graeme Dey: To what extent has new build or infrastructure that is located in areas of high or even moderate flood risk been built to high levels of climate resilience? I am thinking, for example, of the impact on drainage. When developments are sanctioned, are developers being required to take account of conditions, say, 10, 20 or 30 years hence? Moreover, when permission has been given for new build, to what extent is it supervised to ensure that no slight changes are made that might have a negative climate change impact on neighbouring properties?

Chris Wood-Gee: Under the local development plan process, developers are required by SEPA or others to address water run-off in new developments. For example, I know of new housing being built in Dumfries that has flood attenuation pumps and a series of run-off pumps runs the length of the revised M74. Increasingly, that is becoming a critical part of any development and design process; indeed, planning consent will not be given until it has been sorted out. If you have your building control right, all that should be there and working.

Graeme Dey: It is great that that is happening, but is it being done on the basis of our current knowledge of the likely usage of such measures or are we anticipating usage 30 years from now? How is that being built around?

Chris Wood-Gee: It is a bit of a moveable feast. Ten years ago, I was involved in what would now be described as flood mitigation. At that time, we did not call what was happening climate change, because it was slightly different. The situation is evolving but as data improves people are starting to recognise that flood return periods are probably increasing and that what used to be a one-in-200-year occurrence is now one in 100. That is likely to get worse; a lot more rainfall is certainly being mapped in the south-west. The fact that we have usually been up to field capacity for the whole summer—with the exception of this one—makes things really difficult because we do not get the build-up in fields that allows levels to be reduced. Evidence is developing but we need to capture and begin to build on it. As I said, it is a moveable feast but people are beginning to recognise what is happening and I think that it will be built into each iteration of the development plan.

Dr Dlugolecki: I did not manage to catch your eye, convener, when you were talking about mapping, and I wanted to make several points about that.

One of the important lessons that insurers, who spend a lot of time mapping risks, have learned is never to trust one model. It is great to say, "Let's all use the same model" but as insurers have found to their great cost—and financial pain—one model is not good enough and different views are needed to allow decisions to be made in fuller awareness of the uncertainty that exists. For example, I am concerned about the amount of planning that is done in the UK on the basis of what the Met Office says. There is an easily accessible study that shows that, when compared with 12 or 13 other models around the world—after all, you have to model the whole world in order to do your own bit—the Met Office view of the UK's climate is wetter and warmer than everyone else thinks it will be. That one example shows that if you base your view on only one model there is a strong chance that you will miss something.

Someone said earlier that it is easy to model vulnerability. I suggest that we focus on exposure rather than vulnerability because, as insurers have once again found, once an event reaches a certain size all sorts of ancillary problems such as pollution, lack of tradesmen and unavailability of materials kick in and the costs go through the roof.

I fully agree with the comment about taking a systems-based rather than map-based approach. For example, when I read a PricewaterhouseCoopers study of the UK and its international sensitivity to climate change, I realised that it said nothing about Scotland's sensitivity to the international implications. For that, you would need a separate study that might include maps but which would set out more of a systems diagram.

My final point on mapping relates to an issue that is not very explicit in the current climate-ready framework: sea trade. Although the framework mentions the opening up of the Arctic Ocean and so on, I do not think that it contains any real investigation of the implications for Scotland. More trade might well come into Scotland, but I envisage an enormous increase in the volume of ships from Asia trying to crowd into the North Sea to get to Amsterdam and Antwerp instead of coming round via the English Channel. How are we getting ready for what I think would be my number 1 unexpected emergency? Insurers spend a lot of time thinking about the worst that could possibly happen and then add on 10 per cent. In that respect, the thing to look for would be the accident in the North Sea because in about 30 years' time that area will be completely different from what it is today.

The Convener: I recall from previous discussions on climate change a whole range of suggestions on this matter, such as the establishment of entrepôts in Orkney and other places in the north of Scotland to reduce the number of large vessels sailing in narrow seas. However, I take your point and think that you have highlighted a very good example.

Paula Charleson: Returning to Graeme Dey's question about buildings, the committee will know that the Scottish Government has just consulted on its national planning framework and Scottish planning policies, which again has created an opportunity to influence things at plan level and ensure that mitigation and adaptation are taken into account, and SEPA has worked closely with a set of key planning agencies to ensure that planning policy reflects all that. I can highlight some very good examples of that work; I think that I have already mentioned the Tay plan, which is an award-winning strategic development plan in which climate change mitigation and adaptation have been embedded.

SEPA has been involved recently in workshops in which the need for more training, specifically on adaptation, has been identified. The approach that is being taken is for the long term or the lifetime of the development in question, and an interesting point was made about ensuring that the same thing also happens through the whole chain of the process.

Chris Wood-Gee: We have talked about new and other sorts of buildings, but there is an issue with very much older buildings and I do not think that we have quite got our act together with regard to insulation treatments and so on. I know that Historic Scotland has carried out work on the matter and we are going to undertake some research on a couple of buildings in the south-west. However, although at the moment we have things such as the green deal that might or might not have an impact on people's outputs, we have no prescriptions that work for buildings that were built pre-1919 and research is required in that area. I realise that this touches on mitigation as well as adaptation, but until we get those buildings to work effectively with breathable walls, the use of traditional mortars and so on and until we build up the skills base to do that work not only in the building industry but in the specification industry—by which I mean architecture and so on—we will have problems. The embodied energy in those buildings is really important and we need to keep that, their character and so on in the landscape. There is certainly a gap in that respect.

The Convener: I want to sum up this section—so if you have anything to say about it, please do so before we move on to several other issues; time is pressing—by asking how well the current draft adaptation plan addresses issues with regard to the resilience of Scotland's infrastructure, given the threats that are posed by climate change. You

do not necessarily have to go into great detail—you could just say, "Could do better" or whatever—but we need to get some feel and evidence from you about what you think should, for example, be emphasised more in the draft plan.

Paula Charleson: I reiterate that the plan could be strengthened by setting out how the planning process might be used to embed adaptation.

Gordon McGregor: A lot of different companies in different sectors have published a number of adaptation reports for the UK. I am fairly familiar with the power sector reports, but reports have also been produced in the water and other sectors and I do not think that those reports, which will be revised and updated over the next couple of years, have been adequately referenced in the plan. It is a simple matter of ensuring that the very important issues that have been raised in them at a UK level are also brought into our thinking in Scotland.

Anna Beswick: I think that the built environment section of the programme is strong. The good progress that has been made on new builds is really positive. That Scotland has been successful in minimising increased flood risk, as Andrew Dlugolecki described, is excellent.

Our big challenge is retrofitting the existing urban environment, including the kind of green and blue infrastructure to which Paula Charleson referred. We need to think about how we can support the delivery of that. We know that it is needed and will have multiple benefits, but how are we supporting its implementation?

The Convener: Fine. Let us move on to transport, on which Jayne Baxter has a question.

Jayne Baxter: What work is Transport Scotland doing to anticipate the impacts of climate change on Scotland's transport infrastructure across the different transport modes?

Stephen Thomson: The adaptation programme has been written for not just roads but all the modes for which we are responsible. That includes railways and we have had input from aviation and the ports, harbours and ferries. We have also had input from a member of the Society of Chief Officers of Transportation in Scotland, which comprises the chief transport officers for local authorities. The intention in the authoring of the draft adaptation programme has been to cover all modes, rather than just the traditional modes of road and rail. That is what I would say as a starter for 10.

Jayne Baxter: That has to be good.

Stephen Thomson: It is fair to say that this is not a new topic for us. We have been consciously working on adaptation for about the past eight years. We started the—let me get the wording right—Scottish roads network climate change study eight years ago, and it is on-going. That document is evolving and is being interwoven into the draft adaptation programme.

Adaptation is a new word, but it is not a new topic in our approach to the management of transport infrastructure in Scotland.

Jayne Baxter: What challenge does the uncertainty that is attached to future climate change projections pose to building in consideration of climate adaptation into large infrastructure projects that are designed to operate for decades, and how should Scotland's approach to adaptation address that? That question is broader than transport; it is about infrastructure projects in general.

Stephen Thomson: That is a very good question. The first part of that follows on from what Anna Beswick said. New infrastructure is being designed to be climate proof as we speak. Designers and civil engineers are incorporating consideration of future climate into new builds. Anna made the point that the real challenge lies in retrofitting existing assets, whether they are buildings or transport. Money has to be spent on existing assets, rather than embedding adaptation principles into new builds—that is already happening.

Jayne Baxter: I see that in my constituency.

The Convener: There are no further questions on that topic. Alex Fergusson has questions on businesses and the economy.

Alex Fergusson: I want to highlight an aspect of the UK Committee on Climate Change's report on how well Scotland has been preparing for climate change by putting a question to the business representatives on the panel. In that report, the Committee on Climate Change identified that some of Scotland's key economic growth sectors, such as leisure, energy and food and drink, were particularly vulnerable to climate change impacts. Indeed, in oral evidence to our committee, David Thompson of the Committee on Climate Change said:

"I do not see, in how the objectives have been set out, how issues around resilience of businesses and supply chains are dealt with."—[*Official Report*, *Rural Affairs, Climate Change and Environment Committee*, 9 October 2013; c 2768.]

Supply chains have been mentioned by Gordon McGregor and the importance of connectivity was highlighted by Gavin Hewitt. Does anyone have any views on particular challenges that businesses in Scotland face as a result of the impact of climate change?

12:30

Gavin Hewitt: I am happy to comment on that. We in the Scotch whisky industry have been looking at all our processes with regard to climate change challenges and adaptation for a long time, but you would expect that of us. In effect, the entire process—from cereals and water through to getting our product out through the ports—affects almost every aspect of Scottish life. There are communities that depend on us, and the connectivity of roads, rail and the ports is essential. We do not use air, because it is usually rather too expensive to do so for heavy bottles.

In a sense, we have been working with the UK climate impact programme and the Scottish equivalent for some years now. One of the programme's reports identifies Scotch whisky as one of the sectors that has been looking at the subject. We are trying to bring together all our members—and a few people who are not members—to look at the challenges that they face collectively and individually as companies, and to ensure that, in their future business risk planning, they consider the issues that we have identified across the whole spectrum of the business operation.

One of our biggest challenges relates to something that would perhaps have been more appropriate for the first session today: the need to develop a variety of barley that is resilient to climate change. We have very particular requirements, and we have been paying for a lot of research by the Scottish Crop Research Institute and Heriot-Watt University. Again, however, that is an area in which Scotland is missing out. We need to build up a centre of excellence for cereal development, adaptation and resilience. That is missing at present; various people are doing the research, but not enough attention has been given centrally to the issue. We are, above all, a country that relies on our cereals for many other economic activities. We would put the emphasis on barley initially, and also on wheat, which we use in our grain distilleries. That is an area in which we need to do more.

In every single aspect of the Scotch whisky industry's process we are, from the association through our members to the companies, trying to look at the whole process of adaptation and ask what the risks are, what we need to do, what we can do collectively and what companies need to do individually to assess those risks and build them into their own programming.

Alex Fergusson: I have a follow-up question specifically for the whisky industry; it is on a pet subject of mine, but is very relevant to the debate. It concerns the use of draff as an animal feedstuff, which is very important in my part of Scotland. In the south-west, there is increasing angst—if I can put it in that way—that the whisky industry is following the lead given by its political masters on using draff and burning it as an energy producer.

If that trend grows, the consequence will be that the food chain is extended to the point at which that protein has to be imported because there is no real substitute for it in this country. How, as a sector, do you balance that type of equation? In carrying out one action to try to mitigate some climate change aspects, you are increasing the poorer aspects of climate change in other directions.

Gavin Hewitt: It is something that we balance very carefully. There are some important facts and figures. First, Scotch whisky production is growing, and we are producing more draff every time we increase our production capacity. Secondly, there is a very large surplus of draff—or animal feed—in hard form that is made available in Scotland, and we actually have to export most of our animal feed in dry form.

We are very conscious of the issue in the south-west—it has also been raised as a concern in the north-east—but we are satisfied with the work that we have done with the Scottish Government, which suggests that there is no real shortage of draff for the husbandry industry and for animals. We are conscious that we need to balance our use of draff for bioenergy in our bio boilers, but we need to ensure that the cows and other animals in Scotland are well fed with a high-protein product.

Alex Fergusson: If the animals are well fed and the people are well watered, in some respects, I do not think that I can ask for much more than that.

The Convener: That was a very good question.

Gordon McGregor: Andrew Dlugolecki mentioned the PWC study that was undertaken in around 2010 for the Department for International Development—I think in preparation for the Copenhagen conference. It asked what impacts there could be on businesses because of changes in climate and the need for adaptation. The study was quite comprehensive and it provided quite a good checklist. It touched on markets and supply security, costs, issues that we discussed earlier about infrastructure and, in turn, the impact of that on communities. The study is a good aide-mémoire for anyone working on the subject in Scotland.

Another useful source of good examples for business is the United Nations framework convention's private sector initiatives website, which lists what a lot of different companies and countries are doing to mitigate any risks around climate change and the need for adaptation. It is well worth a look and some leading international

companies are involved in the venture in addition to some small businesses and communities.

In so far as ethics are concerned, those sorts of issues affect companies in Scotland but it is hard to speak generally on the matter. There is no substitute for going into the different sectors and the individual companies to establish how well or otherwise they are prepared for changes in the climate. The adaptation framework for the Scottish Government could help to explore which sectors are well covered and which are not. I tend to think that some sectors in the big infrastructure area around transport and energy are pretty well aware of these topics, but I suspect that other sectors are not as aware, although the issues could have a big impact on them down the line.

There could be a role for organisations such as CBI Scotland or other trade bodies to work with the Scottish Government to spread such knowledge. I note that that was not mentioned in the framework, so perhaps there is something to be done there.

Andrew Dlugolecki mentioned small business, which is a critical area for adaptation. The issue affects not only big companies but every single private entity in our economy.

Stephen Thomson: From the transport sector's point of view, we have included a line—objective B3-8—in the draft adaptation programme, in which we encourage transport operators to share information and encourage us to share information with them—in particular businesses in the public and private sectors.

Beyond the transport sector, I raise the issue of whether businesses have the right resources and the right skills to understand the risk that they face from adaptation. The word "mitigation" probably resonates with a lot of businesses, but I am not yet convinced that the word "adaptation" is taken as seriously by businesses at the coalface. To finish off that point, in Scotland we already have a resource in the Adaptation Scotland programme, which explains in the clearest and simplest language what the risks are from adaptation. Transport Scotland has certainly tapped into that resource over the years that the Adaptation Scotland programme has existed. One of the biggest risks that we face is whether the story of adaptation is understood by businesses both large and small.

Anna Beswick: It has been good to hear from the Scotch whisky industry, because it is an excellent example of an industry sector that has understood and taken cognisance of the risks that climate change poses and has developed a proactive approach to responding to them. It would be excellent to see that model being applied across other industry sectors in Scotland.

It comes back to partnership working. Adaptation Scotland has worked in partnership with the 2020 group to do pilot business adaptation planning with a number of infrastructure providers and business sectors. Working through that process has enabled those businesses to identify, in their language and their terms, the sorts of risks that they face as a result of climate change and the actions that they may wish to take to address those risks. It takes capacity and time to develop the sort of partnership working and projects that allow the evidence to emerge.

In the Adaptation Scotland programme, we have generic resources and advice available for businesses, which is of value and which needs to be in place as a basic set of information. We are continually trying to improve accessibility and the way in which the information is made available. Ultimately, there need to be partnerships, investments, projects and initiatives that allow us to gain a better understanding. That should be done in other industry sectors in a similar way to how it has been done in the Scottish whisky industry with regard to the key risks.

Right at the beginning of this conversation, a point was raised about climate change impacts affecting businesses' confidence in locating and operating in individual areas. That issue is prevalent internationally. Leading competing commercial business centres such as London, Rotterdam and Copenhagen are marketing themselves as climate-ready places because they want to ensure that investors have the confidence to invest and locate in those places in future. In Scotland, we should be positioning ourselves as a resilient and safe place for business to invest. That can happen only with the realisation of the adaptation planning process, which will require partnership working.

Dr Dlugolecki: I again underline the point about small and medium-sized enterprises. That is a critical area, although it does not really feature in the framework at the moment. Another very important group—although it is overlooked almost all the time—is the professions. There is nothing about engaging the professions and that should be considered. I have struggled for years to get the insurance profession more actively involved in and aware of climate change. There is still a lot of scepticism, even among insurers, that climate change is real and that it is caused by people. People in professions such as the law, health, construction and finance are advising businesses and individuals. It is not just a matter of taking a code and saying that we must build in a certain way; it is a question of getting people to think laterally about what they are doing, because the world in 30 or 40 years' time will not be what they are experiencing today. People in those

professions are giving advice to people who will be affected.

Renewable energy is likely to be a very big sector in the Scottish economy. There is not a lot about that as an issue in itself. Although the renewables sector is seen as a great mitigation tool, it is very vulnerable to the weather—its resource is nature, whether it is water, wind or the sun—and a lot more attention needs to be given to that. However, there is no Scottish insurance sector any more. There are some life and pensions companies, but there are no general insurance companies—they are all in London or are owned overseas. If Scotland wants its renewable energy sector to be up and running and dealing with the risks caused by the weather and the lack of resource or overavailability of resource, perhaps the Edinburgh centre for carbon innovation or someone else should be developing a project to address that issue.

Finally, I repeat my comment about the marine sector. There have been a lot of words about fishing, but the whole issue of the marine sector, particularly trade, will be much bigger in future.

Chris Wood-Gee: This is just a wee point—I suppose that it is pushing Adaptation Scotland. When we started dealing with mitigation, we worked heavily with the Carbon Trust, which works with both the public and private sectors. We really ought to ensure that Adaptation Scotland, as a resource, has the bodies to help deliver for both the public and private sectors. It is doing a really good job, but it has only a limited number of people. We probably need to front-load our development at this stage. Adaptation is an interesting subject, and there are some short-term cycles to consider, but it is the generational impacts that will be really difficult to deal with, particularly given that the political cycle is relatively short. There are things that we will have to do over the next 20, 40, or 100 years. We need to get them in place and we might need to front-load the development of understanding. Adaptation Scotland is probably very well placed to help to do that.

12:45

Stephen Thomson: I have a short point to follow on from what Andrew Dlugolecki said about professions. Transport Scotland is currently recruiting engineers, who require to be chartered. If someone is to become chartered, they have to have an MSc. I wonder if there is a route within the MSc courses in Scotland to introduce the concept of adaptation, whether it be for engineers, for emergency planning or healthcare—it does not really matter. I wonder if one lecture in MSc courses in Scotland between now and this time next year could introduce the concept of adaptation. If we started doing that, we would introduce tens of thousands of people to the concept of adaptation in the coming years.

Why am I saying that? I am doing a lecture at Heriot-Watt University tomorrow because a lecturer has gone out of their way to find an industry professional to come and talk to the MSc students about sustainability and adaptation, so fair play to Heriot-Watt. That is an easy way of getting the concept into the professions.

The Convener: That is a valuable connection of two things.

Claudia Beamish will lead on a final subject that affects an awful lot of people, which is social justice and adaptation.

Claudia Beamish: It has been a long session but this is a very important aspect of adaptation. It has, I suggest, threaded through our discussions today. We have heard about green infrastructure and air quality. We have heard about insurance, which the Joseph Rowntree Foundation says should be a social good, at least in some respects. We have also heard about buildings, and their relationship to fuel poverty. One of the sections in the draft climate change adaptation programme is about the home energy efficiency programme for Scotland and how that relates.

If the witnesses will bear with me, I will highlight that the UKCCC report noted that 7 per cent of Scotland's population lives in remote rural areas, and approximately 100,000 people live on inhabited islands. Those remote areas are particularly vulnerable to disruption to transport, energy and water services. Do the panel members have any comments on that?

The Joseph Rowntree Foundation has also stressed its disappointment that the

"Adaptation policy has focused on personal factors (such as health and age) and environmental features (such as flood prevention)".

The JRF says that the policy

"also needs to address social factors (such as income inequalities, the existence of social networks and the social characteristics of neighbourhoods)."

Glasgow is highlighted. We have heard quite a lot about partnership working in relation to all sorts of issues, so could members of the panel highlight specifically what they would like to see in relation to social justice?

As Paul Wheelhouse, Minister for Environment and Climate Change, stressed in a recent letter to us, climate justice is not just an issue for the developing world. We do not want to see a divided society here. Could the panel members comment on that?

The Convener: I think that you have answered your question.

Dr Dlugolecki: I have already said that insurance for the poor is an issue, and we seem to be going backwards rather than forwards on that. I think that I am right in saying that the Royal Society of Edinburgh's report made the point that, in some circumstances, it is acknowledged that people who are on lower incomes have the right to own a pet, which will then consume food, so their income has to be enough to be able to feed the pet.

Similarly, I argue that insurance is a social good and that people's income should allow them enough for a modest insurance premium. That is not allowed for at the moment, so people on lower incomes cannot afford to buy insurance. I am not saying that insurers should be making an exorbitant profit. If people on lower incomes do not have enough money to buy insurance—if a notional amount is not allowed for it—forget it. People might decide to spend the money on two pets rather than on insurance, but that is their concern. Their income should at least allow them to budget to buy insurance.

The Convener: We have noted that point. Does anyone else wish to respond?

Chris Wood-Gee: When we were looking at the consultation, the issue of water supplies, particularly in remote rural areas, was raised. We probably have thousands of properties that take water off the hill. Irrespective of whether there is an increase or decrease in rainfall, there is an issue with bugs, such as cryptosporidium, in water. That matter needs to be addressed; it was not addressed as overtly as it could have been.

I have a best practice example on social justice and housing. Our local housing association has fitted air-source heat pumps to around 1.5 per cent of our housing stock. I think that the average savings for individuals, assuming that the pumps are managed correctly, are around £400 to £500 a year. It has been a fantastic success story. Things can be done—such measures need to be mixed with insulation treatment for houses, for example—that impact positively on people's houses and get to the root of our fuel poverty problems. There is 42 per cent fuel poverty in our area, so we desperately need to get on top of that issue.

Anna Beswick: I want to share experiences that relate specifically to supporting remote communities. A few years ago, I worked in partnership with the Highland Council to pilot community-based adaptation planning in Gairloch. It was very interesting to learn more about how the community perceived its vulnerability to climate change—issues around the breakdown and disruption to infrastructure came through—and how a change in the natural environment affected cultural values. It also highlighted how the community's existing strength and resilience was dependent on critical services, including shops and a local network of facilities. The breakdown of those facilities for any number of reasons could compromise the resilience of such communities generally, but particularly when one thinks about the additional issues that they must face as a result of climate change.

Community adaptation planning is important because the impact of climate change is so localised. There is no one-size-fits-all solution, but finding a solution takes time and capacity, to enable the expertise to come in to help and communicate the issues in a way that is accessible for those communities. I do not know that that necessarily provides any answers; rather, it provides a sense of the issues.

My second point relates to delivering social justice as part of the transformation of communities, perhaps in more urban areas, and around the issue of how to ensure that climate change is addressed alongside health and wellbeing and reducing health inequalities. We need to take opportunities to mainstream, so that building resilience to future climate change impacts can be supported as a part of holistic community development, and not as a stand-alone issue. It is not appropriate in every context for us to expect individual communities to prioritise adapting to climate change when they face such a wide range of other challenges. Instead, the programme needs to be made accessible, as part of overarching processes to support transformation. That again requires resourcing in a way that is accessible for communities.

Gavin Hewitt: Economic activity in remote communities or on the islands is essential. If businesses operate there, they will help to deliver the required connectivity. I have two examples. First, a huge amount of whisky distilling takes place in Islay. We were not initially getting sufficient ferries to deliver our goods or to take our stuff off the island. The very fact that business is driving the agenda for the number of ferry crossings from the mainland to Islay is critical and helps the community on that island. Second, new distilleries are being built on Barra and Uist. Those will also create a business demand. Once the community and the business demand work together, a strong argument is made for some of the social justice measures that were mentioned.

The Convener: That was a rather good, upbeat note to end this long, detailed and wide-ranging session. I thank our witnesses very much for their contributions, which will be taken into account. It is getting closer to their lunch than it is to ours,

because the committee still has another item to deal with. I ask the panel to leave the room fairly quickly, but we will follow up any points with them, if there is a need to do so.

12:55

Meeting suspended.

12:56

On resuming—

Petition

Flood Insurance Problems (PE1441)

The Convener: PE1441, by David Crichton, is on flood insurance problems. The petition calls on the Scottish Parliament to urge the Scottish Government to represent Scottish interests in the discussions between the Department for Environment, Food and Rural Affairs and the UK insurance industry. I refer members to paper RACCE/S4/13/31/4 on the petition and invite them to comment.

Richard Lyle: I agree with the recommendation in paper 4 to close the petition on the ground that we are satisfied that the Scottish Government has ensured that Scotland's interests have been represented. In doing so, we could monitor the progress of the new scheme, flood re, as part of our overall consideration of climate change matters.

Graeme Dey: I agree. In addition, we could ask the Minister for Environment and Climate Change to keep us updated on any developments.

The Convener: We need to monitor carefully the UK Government's five-year flood re scheme. In our discussions on the climate change adaptation programme, we are talking about long-term planning and how that is to be afforded, so I agree that it is important that we get the minister to keep us up to date on the topic.

Do members agree to close the petition and to write to the petitioner and the minister to tell them our views?

Members *indicated agreement.*

The Convener: Our next meeting takes place next week. We will have an evidence session on climate change adaptation and behaviour with the minister. We will also consider two negative Scottish statutory instruments and our draft budget report to the Finance Committee. We look forward to that. I thank members for their prolonged attention.

Meeting closed at 12:58.

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