

Scotland and Climate Change -

Getting it Right

SCOTLAND AND CLIMATE CHANGE - GETTING IT RIGHT

Friday 27 March 2009

Report Prepared by the Scottish Parliament Official Report

CONTENTS

Friday 27 March 2009

| | Col. |
|--|-------------|
| OPENING REMARKS | 1 |
| THE PRESIDING OFFICER (ALEX FERGUSON) PATRICK HARVIE MSP (SCOTTISH PARLIAMENT TRANSPORT, INFRASTRUCTURE AND CLIMATE CHANGE COMMITTEE) | |
| OPENING ADDRESS | 5 |
| DAVID GUGGENHEIM (1PLANET1OCEAN) | |
| THE INTERNATIONAL IMPACT OF CLIMATE CHANGE | 13 |
| IBNU NAJIB (UNIVERSITY OF EDINBURGH CARBON MANAGEMENT MASTERS PROGRAMME) LILIAN RUSHAIGO (UNIVERSITY OF EDINBURGH CARBON MANAGEMENT MASTERS PROGRAMME) KUSHAL GURUNG (UNIVERSITY OF EDINBURGH CARBON MANAGEMENT MASTERS PROGRAMME) SOMANATH NARAYAN (UNIVERSITY OF EDINBURGH CARBON MANAGEMENT MASTERS PROGRAMME) RAHUL BARUA (UNIVERSITY OF EDINBURGH CARBON MANAGEMENT MASTERS PROGRAMME) MIKE PASSWAY (UNIVERSITY OF EDINBURGH CARBON MANAGEMENT MASTERS PROGRAMME) FORHADUL ISLAM (BANGLADESH HIGH COMMISSION) PAUL McALEVEY (EUROPEAN ENVIRONMENT AGENCY) AHMED MOOSA (MALDIVES GOVERNMENT) | |
| CLIMATE CHANGE AND SCOTLAND | 51 |
| THE MINISTER FOR TRANSPORT, INFRASTRUCTURE AND CLIMATE CHANGE (STEWART STEVENSON) SIMON PEPPER (INDEPENDENT CLIMATE CHANGE CONSULTANT) IAN BURTON (METEOROLOGICAL SERVICE OF CANADA) DONALD BROWN (PENN STATE UNIVERSITY) | |
| CONCLUDING REMARKS | 86 |
| PATRICK HARVIE MSP (SCOTTISH PARLIAMENT TRANSPORT, INFRASTRUCTURE AND CLIMATE CHANGE COMMITTEE) | |

Scottish Parliament

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[THE PRESIDING OFFICER *opened the meeting at 10:00*]

Opening Remarks

The Presiding Officer (Alex Fergusson):

Good morning. The noise that you can hear over the sound system has never been heard before. However, today is a day of firsts in many ways.

I warmly welcome you to your Parliament and your debating chamber in Holyrood. It is a great pleasure for me, as Presiding Officer of the Parliament, to be able to welcome you this morning.

As you know, this event has been organised by the Transport, Infrastructure and Climate Change Committee of the Parliament to coincide with Parliament's scrutiny of the Climate Change (Scotland) Bill. I am very much looking forward to this morning's contributions on a subject that, over the past decade, has leapt to the very top of the world's agenda.

As many of you may be aware, the Scottish Parliament is this year marking its 10th anniversary. When the Parliament was established in 1999, it was founded on four key principles: openness, accountability, the sharing of power, and equal opportunities. The Scottish Parliament has taken its commitment to those key principles seriously and has sought to give effect to them through our policies and the actions that flow from those policies. That is why our committees meet in public, as, indeed, does the whole Parliament, and it is why we hold public events such as this one in our debating chamber. Events such as today's allow people from outside the worlds of Parliament and Government to come here and speak directly to MSPs and ministers, and to affect directly the work that gets done here. To put it simply, we feel that politics is just too important to be left to the politicians. We politicians are much the richer when the widest possible participation is enabled, as it is by today's event.

A transcript, of today's proceedings will be produced, which it is intended will form part of the Transport, Infrastructure and Climate Change Committee's final report on the Climate Change (Scotland) Bill. Today's event is also being webcast live on the holyrood.tv website, and archive footage will be available on the site, which

you can access from the Parliament's website, after today's event.

In addition to hearing from several keynote speakers during the course of today, there will be opportunities for everybody to contribute to debates on the issues that are before us. This is your Parliament, and today's event is an excellent opportunity for each of you to have your say on an issue that affects us all. I encourage you to continue to engage with your Parliament long after today's event and well into the future, whether it be through participating in committee events like today's, attending one of the many events in our festival of politics in August, submitting petitions or engaging directly with your elected representatives. I hope that you have an interesting, informative and stimulating day.

I invite Patrick Harvie MSP, who is the convener of the Transport, Infrastructure and Climate Change Committee, to the floor of the chamber.

Patrick Harvie MSP (Scottish Parliament Transport, Infrastructure and Climate Change Committee): I echo the Presiding Officer's welcome. It is a pleasure to be able to spend the day with you, discussing the Climate Change (Scotland) Bill and the global context that it sits in.

Members of the Scottish Parliament do not always have an opportunity to engage with global issues, due to the devolved workload that we focus on, but it is absolutely necessary that we engage with certain issues. The issue of climate change cannot be viewed parochially. We cannot see it as just Scotland's issue—it is the global issue.

The last time that the G8 met in Scotland, in Gleneagles, we had a conference in the chamber, the then Presiding Officer having given us permission to do so. We invited MPs, academics, representatives of non-governmental organisations and others to debate the issues that the G8 would be debating and to send a message about population and development. It was an opportunity for MSPs to hear some of the voices from around the world not at second or third hand but at first hand, here in the chamber, and to arrive at a shared perspective. That event was hugely valuable, both for MSPs and our guests, so as part of our scrutiny of the Climate Change (Scotland) Bill, my colleagues and I thought that it would be worth while arranging a similar event to enable us to try to join the dots between what is happening in Scotland, what is happening in the United Kingdom and what is happening globally. It will be valuable to hear the voices of people who have a perspective on climate change that is different from the ones that we normally hear, as it is based on where they come from in the world and what is happening there, and is equally important. I hope that you will take the opportunity to scrutinise the

Climate Change (Scotland) Bill and what the Scottish Government is doing and put it in the context of those global issues, given that today is only a few months before the Governments will once again meet to find out whether a global deal can be agreed.

The committee has had a chance to get our teeth into the bill during our stage 1 inquiry. We have not yet submitted our stage 1 report, and we have not yet begun the more detailed scrutiny job of stage 2, when we will debate amendments. The engagement that you have with us today has a good chance of influencing the work that we do and of shaping our thinking as we approach that work.

We are in a period of minority Government. In the first eight years of devolution, ministers sat before committees to introduce amendments to bills knowing that, nine times out of 10, the votes were in the bag. That is not the case now. All MSPs in the Parliament have the opportunity to shape the bill and strengthen it if necessary. Many of you might agree that it is necessary to strengthen it, and we would like to hear the detail of your views on that.

I thank you for coming to the Parliament today and I hope that you will participate in a lively and constructive manner throughout the whole day.

The Presiding Officer: I draw the attention of all delegates to the day's programme, a copy of which should be on your desk. I would like to take a few moments to go through the programme with you.

We have divided the day into two sessions, each of which will be preceded by a series of short presentations.

The first session will be on the impact of climate change across the world and action that is required or is being taken to adapt to or mitigate its effects. The presentations will be from the University of Edinburgh carbon management masters programme; Forhadul Islam, who is a political officer with the Bangladesh high commission in London; Paul McAleavey, from the European Environment Agency; Ahmed Moosa, from the Maldives; and Dr Ian Burton, from Canada. The morning's debating and discussion session will be facilitated by Louise Batchelor. We will have a short break around 11.35 and lunch will be around 12.45.

The second session, which will be chaired by Alasdair Morgan, one of my deputies, is on the proposals that are contained in the Climate Change (Scotland) Bill and how they will fit with the international efforts that are discussed during the morning session. There will be presentations from Stewart Stevenson MSP, from the Scottish Government; Simon Pepper, an independent

consultant on climate change; and Professor Donald Brown, from the United States of America. The session will also be facilitated by Louise Batchelor. There will be an opportunity for delegates to ask questions at the end of all the presentations when we move to the debate.

Opening Address

The Presiding Officer: Without any further ado, I invite Dr David Guggenheim to give the opening address. Dr Guggenheim is president of 1planet1ocean, as well as being a consultant in conservation policy and science. Based in Washington DC, he provides services to clients in the non-profit sector, governmental agencies and private industry.

The floor is yours, Dr Guggenheim.

David Guggenheim (1planet1ocean): It is a great honour to be here. I want to take this opportunity to commend the Scottish Parliament and the people of Scotland for their leadership, because it is precisely the sort of leadership that it is going to take to address the global issue that we face. I hope that, in a small way, my presentation can help you better understand what you are doing here and how it helps the rest of the planet, including the special part of the planet that I work for, which is that blue part of the planet—most of the planet; the 74 per cent of the planet that is covered in water, depending on which perspective you look at the earth from.

I want to tell you a few stories through that blue lens. As my colleague Dr Sylvia Earle stated so beautifully and with such a graceful economy of words, “no blue, no green”. If we do not get it right in the oceans, all of our green efforts are for nought.

I thought that I would start by telling you about one of the more bizarre jobs that I have had. You might remember something called biosphere 2 and seven individuals who volunteered, back in the early 1990s, to be locked inside a glass structure, wearing silly-looking uniforms, for two years and to try to survive in that sealed environment from what they could produce and grow. They had a 1 million gallon ocean with a coral reef and they also had a rainforest, a savannah and an area to grow crops.

I was brought in as a consultant, because things started to go wrong. All of a sudden, oxygen levels dropped to what they would be on the top of a 15,000ft mountain peak. It was difficult for people to breathe. Carbon dioxide levels increased to near-toxic levels. Food was scarce. On the screen, you can see a photograph of a younger version of me and, behind me, one of the so-called biospherians. You can see that she is rather thin. We were not permitted to talk about food during our discussions. The point is that, for those people, life ultimately became a hungry and brutal struggle. They survived the two years but, in the end, all of the pollinators died, all of the vertebrates died and the only things that did really

well were the cockroaches and ants—and they were not even supposed to be there.

The lesson is clear: even in an environment that we supposedly controlled all aspects of, things went awry in unexpected ways, and did so extremely quickly. We need to apply that lesson to biosphere 1—the planet earth—and consider some of our actions as being part of an uncontrolled experiment that we really have to take responsibility for.

On Saturday, I was fortunate enough to be at the Explorers Club’s annual dinner in New York, at which the speaker was Edward O Wilson. He told us that half of all species could be extinct by the turn of the century, that a large number of species are disappearing even before we can discover them, and that by far the main cause of that is habitat destruction. He referred to climate change as being a form of habitat destruction.

In no place is the discovery of new species more relevant than in the oceans. Believe it or not, we have explored only around 3 to 5 per cent of our oceans. Every time that I put my head under water—whether it be when I am scuba diving or in a submarine—we find something new, like those black smokers in the Pacific that turned upside down the belief of nearly everyone of my age that photosynthesis was the only way to support life on earth and that nothing could survive without the sun. That is what we thought, but here was a colony doing just fine without the sun, thousands of feet under the water.

In 2007, we took a pair of submarines to Alaska, in an unusual partnership between Greenpeace and the National Oceanic and Atmospheric Administration, to explore the two largest underwater canyons in the Bering Sea, including one that is twice the size of the USA’s Grand Canyon. On what we considered to be just a typical day at the office, we conducted some transects along the bottom and, if we saw anything unusual, we headed off, took some close-up video and maybe collected small samples. On the screen, you can see a little patch of sponges and the manipulator arm dropping a sponge into a basket. That is no big deal, except that human eyes had never seen that sponge before. That is just the first of many more species that we expect to find from that expedition.

10:15

I have been involved in expeditions off south-west Florida to document the deepest coral reef in the continental United States. We pulled up what is shown on the screen, which is about the size of a dinner plate. It looks like a purple blob, until we see the two antennae on the right side. That is a giant and previously undescribed nudibranch. It is

kind of cute. Essentially, a nudibranch is a sea slug. I could go on and on all day with such examples. The point is that we are in a period of discovery in our oceans.

We are also discovering how the oceans work. The screen shows one of my favourite faces—that of a grouper in the Caribbean. We were off the west coast of Tampa, Florida. Each of the craters on the bottom—this is approximately 350ft deep—is about the size of a back yard swimming pool, is filled with fish and has a lot of exposed substrate. We were very curious. What in the world were we seeing and why was it there? Coming into the picture in the background is the explanation—a red grouper. Red groupers dig those holes. They are ecosystem engineers that modify the environment. All the little fish seek the shelter offered by that substrate, then the groupers eat those fish. The groupers are farmers—they are clever. There are other such examples. The screen is showing a tilefish burrow, which is further south. These are large mounds that use the same idea of attracting lots of other animals to the habitat.

The point is that fish are more than just fish—they are an essential part of the environment. I am showing a video in which we return to Alaska. What we see down in the deep parts of the ocean is not at all what we expected, at least when I was growing up, when we thought that the deep ocean was devoid of life. Up in the Bering Sea, our dives went down to about 2,000ft. That area is rich with life that we are just beginning to understand, including corals, which are the oldest living animals on the planet—some are up to 4,000 years old.

If you want to live at the bottom of the Bering Sea, you must deal with a lot of pressure, the dark and the cold, and you must have something to hang on to, because the undersea current is powerful. Even in our submarines, we found negotiating that current challenging. When I filmed the coral that is coming into the frame, my foot was floored on the gas to stay in position against the current. What does an animal do down there? One thing that a fish can do is swim against the current, but that takes a lot of energy. However, a fish that was born flat has got it made, because it can lie on the bottom and let the current wash over it, like the halibut on the video—that is a great strategy. That is what these guys do. In such a high-current environment, the bottom is full of depressions where fish such as the halibut dig themselves in, so all we see is their little eyes peeking above the sediment. That is another example of how ecosystems work. The beauty of such ecosystems is in the detail.

Each little fish-shaped depression that we can see is full of other animals—in this case, shrimp.

For a shrimp, such a situation is ideal—it just gets down into the little hole, out of the current, and food particles start to fall on top of it. It just sits there and eats. That is a great survival strategy.

I wish that I had the time to show you the rest of this video. You can see one of the other things that we found—these unusual rocks. I thought that they were meteorites—they did not look as though they belonged there—but they were covered with life, as they provided something to hang on to. There were corals, sponges and octopuses. So where did those rocks come from? They came from glaciers. They were caught up in icebergs that floated down to the middle of the Bering Sea, melted and dropped the rocks.

Again, something seemingly insignificant such as where a rock falls or where a fish lies constitutes the fabric of ecosystems and shows us how they work. Sometimes, it is those little things that matter the most, and the big things that human beings are doing to affect those little things cause unexpected changes through the reactions of our ecosystems. That happens when we take too many fish from the sea or when global climate change affects where fish can live and how far south the stones that are caught in icebergs drop.

Earlier this month, I spent some time in Barrow, Alaska, which is the northernmost settlement in North America. I heard a lot of stories from locals there about the change in ice that has taken place in that community, which is another dramatic change that I am sure many of you have seen the statistics about. For that community, which survives on whaling, it has been devastating. I heard from an emergency response person who said that half the town ended up floating out to sea on a piece of the ice sheet that broke off. That turned into an interesting rescue operation. On the screen, you can see the record lows there. Ice also provides a substrate for algae to grow on, which is part of the primary production in the food chain in our oceans, so it is very important.

I spend a lot of time studying coral reefs. We hear a lot about them, but why do we care so much about them? There are not that many coral species—maybe 1,000—but it is estimated that a quarter of all marine life forms depend on coral structures for their habitat. We have already lost 20 to 25 per cent of our coral reefs and, the way that things are going, another 25 per cent will be lost in the next 20 years. One of the problems is temperature. It has been stated that corals are already living near their thermal tolerance. They have a thermal tolerance range of only about 1°C—the red line that you can see on the graph is the threshold beyond which they just cannot survive. We are close to reaching that threshold on a global average basis.

Other things are going on besides temperature change, including the fact that so many human beings live in close proximity to those coral reefs. In this video of our expedition to Veracruz, Mexico, about five years ago, everything that you see is dead. The skeletons of the corals are still there, but the corals have died. In a 15-year period, 95 per cent of those corals died. That is another example of how fast things can happen due to temperature change, overfishing and water quality issues.

Those factors are of great concern, but we can now add something new to the list—ocean acidification, which is perhaps the most underpublicised consequence of fossil fuel emissions. The dissolving of carbon dioxide in ocean water creates a more acid environment. Those beautiful cliffs of Dover are made of coccoliths or coccolithophores, which are part of the plankton food chain that secrete calcium carbonate, like so many other marine species, including corals. However, in an acid ocean, it is unlikely that many of those species can survive.

The graph shows a time series that begins in the upper left, where red is good. In the lower right, you can see that there is not much red left. The purple and dark blues are bad. Those very acid areas happen to occur in some of the most productive oceans in the world, including the Southern Ocean, which means that the foundation of the marine food chain is imperilled, and that is critical.

What a great pleasure it was to wake up in the morning and read in the *Washington Post* about the largest marine reserve in the world. That is one of the short-term activities, whether on land or sea, that are relatively easy to do and which buy us time for the future, because they maintain the integrity of all those little relationships that I spoke about earlier.

In January, one of the last Bush Administration acts was, ironically, to announce the largest marine protected area in the world—the size of Spain—in the United States south Pacific territories. Had we had the foresight to protect more areas, the everglades would not now be undergoing the largest environmental restoration in human history, costing about \$11 billion, to put the ecosystem back together. We are all finding that preserving intact such ecosystems buys us time on climate change and is also economical in the long term, because we do not have to pay to restore them. We are finding ourselves engaged in an exercise in triage—sadly, we cannot save everything. In looking at conservation in the oceans today, many folk are trying to figure out what we can save that will endure and eventually repopulate areas downstream. Protected area networks are the latest idea in the science.

I will talk about the United States of America for a moment since that is where I am from. Tragically, in the Reagan years, the environment became a polarising issue in our politics at the highest level. I have not seen that duplicated in any other country. Unfortunately, the spin doctors, including Rush Limbaugh, whom many of you might have heard of, have done nothing but perpetuate many myths, including that climate change is not happening or is not real.

We were really hamstrung to make progress until recently. A few things changed, one of which was that four of the five warmest years since the 1890s all occurred in the early part of this century. We also had some of the most devastating hurricanes, including hurricane Katrina. We had 21 named storms in 2005 that killed thousands—hurricanes Katrina, Wilma and Charlie were among the five most costly hurricanes. We also saw the price of gas go up. Those things, and the uncanny timing of a movie by a former Vice-President of the United States, captured the American imagination and spirit, and made people understand that climate change was real and that we needed to deal with it, but we still had a little way to go.

Our President at the time was clearly impeding progress and not engaging. You can imagine my glee, therefore, when I stood in the Mall on inauguration day and heard Barack Obama say the word “science” during his inauguration speech:

“We will restore science to its rightful place”.

That was the campaign platform of the Obama Administration, which is focused on reducing oil dependence, creating new green jobs and reducing greenhouse emissions by 80 per cent by 2050. That might sound familiar to you. I am pleased to say that I do not see any signs that the Administration is wavering at all. It is only March, but it is a case of so far, so good.

10:30

The budget stimulus package includes projected revenues from cap and trade emissions. There was a stark difference between the Obama platform and the McCain platform, which refused to put any mandatory limits on greenhouse gas emissions. We still do not have a comprehensive greenhouse gas bill in the United States, as a lot of the details have still to be worked out, but the placeholders have made their way into that huge, unprecedented budget.

There has been a reversal of the Bush Administration’s policies that prevented states such as California from asserting their leadership. The state of California wanted to exceed federal standards for automobile emissions, and 12 other states have now joined in—Obama has given

clearance for that to happen by establishing a waiver from the Environmental Protection Agency.

I will wrap up by focusing on where we need to go from here. At the Explorers Club last week, I heard that the commander of the manned mission to Mars is currently in elementary school. We could say the same thing about successful climate change policy. If we do not engage the next generation successfully as we move ahead, our plan—in whatever form—will not succeed.

Some of you know that I have been travelling to all 50 US states—it was my nutty idea, when I turned 50 years old in October—to share with children stories about the oceans and exploration and to try to get them excited about science and the frontiers that await them under water. I have been to places such as Kansas, which is a community in the geographic centre of the country in which half the kids have never seen an ocean. Most recently, as I mentioned, I was up in Barrow in Alaska, where I was one of two people in the classroom—the other being the teacher—who had never eaten whale meat. I got very different perspectives from those kids.

I have noticed that we are losing our perspective on the way that the planet used to be. I do a lot of work in Cuba, and—trust me—the sea turtles that were described in Christopher Columbus's log book as being three to four feet long and in such vast numbers that they covered the sea are not found there any more. In fact, the number of sea turtles in the world today is only 1 per cent of what it was in Christopher Columbus's time—we have pretty much eaten the rest and destroyed their habitat.

The next photograph is of the kids of a fisherman I work with in the Virgin Islands, holding up a picture of the biggest fish that their dad caught that day. I do not know whether those look like big fish to you, but to me they look like something that I would put in an aquarium. The situation in the Virgin Islands is serious: that is what is found at the fish market, and those kids are growing up thinking that those are big fish. That is a phenomenon known as shifting baselines, and it undermines our ability to make policy, because we are losing our reference points. None of us was alive so we cannot remember what the planet used to be like.

There is another problem. The book "Last Child in the Woods" is focused on saving American children from nature deficit disorder. The average American kid—believe it or not—spends less than four minutes outside in nature in unstructured activity, which is dramatically different from when I was a kid. The kids in Juneau, Alaska, spend a lot of time outside, but a teacher in Morrow in Georgia told me that she took some students in high school to the trees at the back of the school to do a

science experiment, and they thanked her—they said that it was the first time that they had ever been to the wilderness. That is the sort of perspective change that we are dealing with.

I am afraid to say that with that lack of visitation comes fear. People are deathly afraid of nature. They are especially afraid of the oceans, and in particular of sharks. I loved what a fourth-grade teacher in Florida told me fear was—she said that it was simply an acronym for "false evidence appearing real", but it is a significant obstacle. I have noted excessive hand washing among kids. Once they come into contact with nature, they feel unsanitary and immediately wash their hands or use wipes. We are in an age in which we are losing our perspective.

I have come to realise that the picture on the screen is many kids' view of what a scientist is. My job has been to show them that, unlike the man in the picture, being a scientist can be very cool, and to give them an idea of some of the technology that they can look forward to, for example cities under the sea. I show them pictures of the inauguration on the Mall, which I watched with 2 million of my closest friends. I was moved by the fact that kids were involved. People who were too young to vote were paying attention. The fact that young people were involved in the election is really inspirational to me. I ask young people to put notes in bottles that I will take back to the Obama Administration so that it can hear their words. The fourth grader from Alaska who is on the screen wrote, "Dear Obama, we have crabs and whales. Can we keep them?" There is something in the way that a kid writes.

I am deeply grateful and honoured to be here. Despite the difficulties ahead, there is great hope. When it comes to engaging the next generation, the good news is that even the kids who have never seen the ocean love it and really care about the environment. It is up to us to ensure that we continue that work with them. [*Applause.*]

The Presiding Officer: Dr Guggenheim, it is we who should thank you, because I am quite sure that if you inspire those children across America in the same way that you have inspired us, we can expect great things from the next generation. Thank you very much indeed.

The International Impact of Climate Change

The Presiding Officer: We will now move into the first debating session which, as I mentioned earlier, is on the impact of climate change and the action that is required or is being taken to mitigate its effects. Shortly, representatives of the University of Edinburgh's carbon management masters programme will make the first presentation. The carbon management masters programme is a landmark collaboration between the school of geosciences and the school of business and economics at the University of Edinburgh. We have with us today lecturer and programme director Dr Dave Reay, who has drawn together six students from the programme: Lilian Rushaigo from Tanzania, Somanath Narayan from India, Kushal Gurung from Nepal, Rahul Barua from the United States of America, Mike Passway from the United Kingdom, and Ibnu Najib from Indonesia. Lady and gentlemen, you are most welcome to join us.

Ibnu Najib (University of Edinburgh Carbon Management Masters Programme): Good morning, representatives of the Scottish Parliament, ladies and gentlemen. I would like to take you around the world with stories from our home countries that will illustrate two main messages. The first message is that climate change is having an impact now; its impact is not decades or centuries away. The second is that global co-operation and justice are imperatives in answering the challenges of climate change.

I will begin by saying a little about myself. My name is Ibnu Najib. I come from an archipelago of more than 17,000 islands—Indonesia. We have not been able to count successfully the exact number of our islands, but our small islands are disappearing. Although our islands make up only 1 per cent of the world's land surface, one tenth of the world's plant species are in Indonesia and, after Brazil and Congo, our rainforest is the third largest in the world.

Unfortunately, despite the important role that our forest plays as the world's lung, it is endangered. Natural causes and market demand—national and international—have halved our forest in less than 60 years. The rush to seemingly quick and miraculous fixes such as biofuel has further degraded our forest. I am happy that the world, including developed nations, has started a discussion to reverse the flawed logic of the market that allows trees to be worth more economically dead than alive. However, I am worried by the fact that most schemes stand firm on carbon trading and utilise most of the financial engineering that has led to the current disastrous financial crisis. As there is discussion here, too,

about inviting business schemes into forest management, I would like to call more attention to the social justice aspect of the issue.

Lilian Rushaigo (University of Edinburgh Carbon Management Masters Programme): I am Lilian Rushaigo from Tanzania, east Africa, where many climate change impacts are already apparent. Local communities have noticed changes in rainfall patterns and unexpected and serious droughts, sometimes in regions that are heavily dependent on rain-fed agriculture. Diseases such as malaria that are common at lower altitudes and in warmer areas are affecting populations in regions that were previously uninhabitable by mosquitoes. Rises in sea level in coastal areas of Kenya and Tanzania such as Kunduchi and Diani Beach are eroding most of the coasts. Some family homes, fish markets and beachfront hotels have literally been swept away.

One of the most obvious impacts of climate change in the region is the receding glaciers of mountains such as Kilimanjaro in Tanzania and Rwenzori in Uganda. That development has had adverse effects on the surrounding ecosystems, with reduced run-off leaving local communities and wildlife to fight for the remaining resources.

All the impacts that I have described are affecting people who are heavily dependent on the environment for their livelihoods and are reducing people's chances of survival. Capacity building and investment in adaptation efforts are crucial in the region and in Africa in general.

Kushal Gurung (University of Edinburgh Carbon Management Masters Programme): Namaste. I am Kushal Gurung from Nepal, the land of mighty mountains that, sadly, may not remain snow capped for ever. Our glaciers are melting rapidly because of climate change. That has led to the formation of unstable glacier lakes, 20 of which may contribute to significant flooding. So far, only one lake has been contained to a safe level, but the risk has still not been completely eliminated, due to a lack of funding—and there are 19 still to go.

The Himalayas also contain the headwaters of many rivers that run to countries such as China and India. Glacial retreat may dry up those rivers, endangering the source of drinking water for almost one fifth of the world's total population. Furthermore, Nepal relies largely on rainwater for agriculture, and lately the monsoon has become less predictable. That has made poor farmers even more vulnerable. Our resources are not adequate to enable us to monitor and predict climate change impacts; that makes it difficult for us to gear up for adaptation efforts.

It is an irony that Nepal, whose carbon footprint is 10 times smaller than that of the UK, should

suffer in the way that I have described. For us, the Climate Change (Scotland) Bill represents action to correct that inequity. However, the bill could be strengthened by the inclusion of measures to support developing countries in adapting to climate change.

Somanath Narayan (University of Edinburgh Carbon Management Masters Programme): I am Somanath Narayan from Bengaluru, India. As an Indian citizen, I feel privileged to witness what is arguably the making of history. If strengthened, the Climate Change (Scotland) Bill could lead the world in moving towards a low-carbon economy. How the Scottish Parliament decides to pave that new road is of particular interest to India. My country and its people are acutely aware of the risks of climate change. India has a 7,500km coastline that is densely populated and vulnerable to flooding and rising sea levels. Predicted future climate change impacts include a fall in agricultural productivity and melting glaciers, affecting vital water resources.

My country understands that climate change is a global challenge that can be met only when each country takes appropriate and equitable steps in the right direction. India is a developing nation that aspires to bring electricity to 600 million people who are currently living without it, to eradicate poverty and to provide social and economic security by creating a sustainable growth trend. As such, our path to tackling climate change is bound to be different and more strenuous than yours here in Scotland. However, I am sure that Scotland, as a developed country, will lead the process by endorsing a strong, successful climate action plan from which others can learn. Thank you for listening.

10:45

Rahul Barua (University of Edinburgh Carbon Management Masters Programme): I am Rahul Barua and I am from the United States. As each of us here today works toward climate solutions, I tend to agree with my country's new Secretary of Energy, Dr Stephen Chu, that the American public has not yet

"gripped in its gut what could happen."

A few citizens may have heard of Kivalina, Alaska, a village that has recently filed suit against ExxonMobil in the face of rising sea levels, and Californians have been warned of the potential loss of all agriculture, but the link to America's unchecked emissions and overconsumptive lifestyle has rarely been propagated.

I am proud that we now have an Administration that understands the severity of the challenge and the urgent need for action, but we are new to this. The scope of the Climate Change (Scotland) Bill

exceeds its national boundaries and is a powerful opportunity to help to determine the pace, sincerity and level of commitment on climate change from all developed nations.

Mike Passway (University of Edinburgh Carbon Management Masters Programme): Good morning. My name is Mike Passway and, as you can probably guess, I am Scottish. As Scotland is a country with warm-hearted people but a cool climate, many Scots welcome the prospect of global warming—after all, a rise of a couple of degrees centigrade is welcome, particularly on a nippy morning like today.

However, the bigger picture is far from benign and we have already seen very damaging effects of climate change in Scotland and elsewhere in the United Kingdom. For example, several severe landslides have occurred in the Highlands and it has been worked out that it would be too expensive to try to mitigate the effect of those landslides as the cost would run into billions of pounds. Coastal erosion is another major problem. For example, the rising North Sea could completely inundate the Old course at St Andrews, the home of golf, giving a whole new spin to the expression "water hazard".

Landslides, floods and other horrific aspects of climate change have occurred regularly around the UK in recent years. My colleagues have highlighted the international significance of the Climate Change (Scotland) Bill, but it clearly has great meaning for all of us in the UK. In the pivotal year of 2050, I hope to be a sprightly 89-year-old, but I also hope that my nine lovely nieces and nephews, who will then be about the age that I am now, will be even more involved in the fight against climate change.

Ladies and gentlemen, we face a global and complex challenge but, with brave hearts, focused minds and strong international co-operation, we can overcome it.

Ibnu Najib: Members of the Scottish Parliament, ladies and gentlemen, the story that we have told describes the urgent need for strong action and commitment now because the impact of climate change is happening right now all around the world, including in Scotland, as Mike Passway told us. Our story also calls for action that can protect the silent voice of future generations. After all, how old will you be in 2050? We might not all be here, but my children and your grandchildren will be.

Our story also calls for more global co-operation. My country and Somanath Narayan's country, for example, will benefit massively from Scotland's expertise in renewables. As Lilian Rusaigo and Kushal Gurung illustrated previously, many developing nations such as ours need more support if we are to improve our adaptation

capability before time runs out. Our story also calls for us to revisit the current flawed logic that has allowed the market too often to commodify conscience and escape responsibility while marginalizing parts of our global community.

Strong, just, and immediate global action is our message. As Rahul Barua said previously, the Climate Change (Scotland) Bill can exceed its national boundaries because it will invite a higher level of commitment from America and other developed nations. We are grateful for the opportunity to be here and we sincerely hope that our messages will be incorporated into what can truly be the strongest climate change bill in the world.

The Presiding Officer: I thank you all very much indeed on behalf of everyone here for showing such a wonderful commitment to this subject and for a stark reminder of why we are all here today.

Our next speaker is Forhadul Islam, who is currently political counsellor at the Bangladesh High Commission in London, where he works to maintain and strengthen Bangladesh's bilateral relations with the United Kingdom and Ireland. He is also assigned to work with the Commonwealth and with the International Maritime Organization. Mr Islam, the floor is yours.

Forhadul Islam (Bangladesh High Commission): Honourable Presiding Officer, learned speakers, distinguished ladies and gentlemen—a very good morning to you all. I am honoured to be here among people who are so expert in climate science, whereas I am no expert at all. As requested by the Scottish Parliament, I will read out a brief paper on the impacts of global climate change and the response of Bangladesh from the political point of view.

The changing cycle of nature—longer droughts, anomalous rain patterns, the melting of glaciers—tells us that all nations, rich or poor, will be affected to a greater or lesser extent in the coming years. None can escape the effects of climate change.

In Bangladesh, the climatic situation is evolving fast. Due to this, climate change is viewed as a national security issue in Bangladesh. With carbon emissions of only 145kg per capita—as against the 21 tonnes of carbon released by the average American citizen—Bangladesh is a victim of climate change. Bangladesh seeks strong political commitment and the support of the international community to assist in implementing and achieving a long-term strategy to combat the challenges of climate change. We hope to see climate justice prevail through future global legal instruments.

The longer it takes us to start building a climate-resilient society and economy, the greater our country's vulnerability will be and the more expensive it will be to remediate the impacts. We need to act now. Unabated growth in carbon emissions and the resultant temperature rise will mean coastal inundation, recurrent floods and cyclones and millions of environmental refugees. Building up the necessary resilience is urgently required, as delayed action will increase risk and cause phenomenal damage and loss. The international community—in particular, our development partners—have obligations to support and finance our right to climate-resilient development. Urgent action to reduce global greenhouse gas emissions is the only chance to slow global warming to prevent Bangladesh and many other vulnerable coastal and littoral countries from facing a catastrophic future.

Bangladesh is ranked as one of the most vulnerable countries in the Intergovernmental Panel on Climate Change's recently published fourth assessment report. In the section on "Observed climate trends, variability and extreme events", the report notes that average temperature in Bangladesh has registered

"An increasing trend of about 1°C in May and 0.5°C in November during the 14 year period from 1985 to 1998".

The report says that

"Annual mean rainfall exhibits increasing trends"

and there have been

"Decadal rain anomalies above long term averages since 1960s"

and

"Serious and recurrent floods ... during 2002, 2003 and 2004".

It also says that

"Salt water from the Bay of Bengal is reported to have penetrated 100 km or more inland along tributary channels during the dry season"

and

"The precipitation decline and droughts ... have resulted in the drying up of wetlands and severe degradation of ecosystems."

In facing climate change impacts, there is political will in Bangladesh. The Government of Bangladesh recognises the vulnerability of the country, its people and overall development efforts due to the adverse affects of global warming and climate change. As one of the leaders of the less developed countries, Bangladesh has been actively engaged in the international response to climate change, with a view to ensuring that its concerns are addressed in any global framework to respond to climate change. As a demonstration of our spirit and will to commit to the collective force in combating global warming, Bangladesh

ratified the climate convention in 1994 and the Kyoto protocol in 2001.

I will now talk about some of the recent significant interventions. On 2 February 2009, the newly elected Government of Prime Minister Sheikh Hasina set up two committees—the climate change strategy and action plan committee and the climate change fund management committee—to ensure that people get the maximum benefits of the sum of around 3 billion taka that is allocated in the budget for implementing mitigation and adaptation plans in the current fiscal year.

Previously, the Government set up a secretariat on climate change under the Ministry of Environment and Forests to monitor activities to combat climate change and to deal with the climate change fund. The Government of Bangladesh has initiated a number of agricultural programmes to help to manage climate-related impacts. For example, crop diversification has helped to develop drought and salinity-resistant rice varieties. Other programmes, such as the agri-forestry programmes, the programmes on the production and use of biogas and the organic fertiliser programmes are most related to climate change mitigation.

In April 2007, at the United Nations Security Council, Bangladesh supported the United Kingdom position that climate change is an emerging concern for security. At the high-level UN event in September 2007, the former chief adviser of the caretaker Government of Bangladesh made a statement urging the global community to ensure the rights of vulnerable people. At the Bali conference in 2007, during the climate change negotiations, Bangladesh was instrumental in creating the necessary pressure to build momentum among countries that were reluctant.

At the regional level, Bangladesh devoted considerable energy to reflect its climate change concerns with regard to development. That has led to the South Asian Association for Regional Co-operation declaration on climate change. Bangladesh has legal instruments, policies, plans and programmes and is implementing strategies, approaches and principles to start its journey towards a climate-resilient Bangladesh. The overall goal is to increase the country's resilience to climate change in order to reduce the adverse effects of climate change on various economic sectors and to minimise human suffering.

Bangladesh is a small land with a huge population, where human activities are huge. Therefore, addressing climate change involves huge resources, in terms of capacity and funding.

The Bangladeshi Government is vigilant in tracking the challenges of climate change and is taking due preparation to build the resilience of the country. Bangladesh has already considerably invested in infrastructure development to reduce risks and increase the capacity for adaptation over time. The success of Bangladesh's relief and rehabilitation work in combating calamities such as floods and cyclones is acclaimed by the international community. The mechanism that we follow inspired the imagination of others who are in similar situations. A compliancy approach to climate risk management and adaptation has recently been taken.

However, it is not possible to address everything at one time. As such, it is necessary to adopt an overarching strategy that will address the immediate concerns. That approach involves targeting specific locations, communities, sectors and areas of special importance that can lead the way in addressing similar concerns in other parts, sectors, communities, ecosystems and so on. Bangladesh has designed a climate-resilient development framework and has accordingly prepared tools, mechanisms, partners and processes. This is the time to develop appropriate strategies, select priorities, targets, pilots and assessments for further replication in the future.

11:00

The Presiding Officer: Thank you for that interesting talk, Mr Islam. I thank all of our speakers for setting such a vivid backdrop to the debate that will now take place.

Our first discussion session will give you an opportunity to discuss any of the points that have been raised or, indeed, any points that you wish to raise. Before we begin, I will quickly cover some housekeeping rules.

I encourage everyone to participate as fully as possible. If you wish to speak please raise your hand. Once you have been invited to speak, you should stand up and wait for the red light on the microphone to go on—it will be switched on for you; you do not have to do anything to it. It would be helpful if you could give your name and that of the organisation that you represent. In order to allow as much participation as possible, I ask you to restrict your contributions to about two minutes.

I have great pleasure in handing over to Louise Batchelor, who will manage the debate for us. Louise is a journalist and well-known broadcaster who has long specialised in energy and environment issues. She has worked as a presenter and reporter on many television programmes, including "Reporting Scotland" and "Newsnight" in London, and we welcome her to the Scottish Parliament today.

Louise Batchelor (Facilitator): Thank you, Presiding Officer.

I too welcome everyone who has come together for this quite extraordinary gathering. Present today are members of Holyrood's Transport, Infrastructure and Climate Change Committee, some of whom represent areas that are heavily dependent on the oil industry but find themselves working on potentially world-leading legislation. We also have with us people from countries with some of the heaviest carbon footprints and with some of the lightest. Also present are people from various walks of life in Scotland: people from communities and NGOs who are working hard to find ways of reversing or mitigating the effects of climate change and of being less dependent on fossil fuels.

Throughout today's debates, I will try to keep our eyes on the bigger picture. There will be a lot of nitty-gritty to consider, but we must remind ourselves constantly that climate change is already happening and that we are already seeing the effects of it, here and—more so—abroad. We must remind ourselves of the urgency of today's proceedings.

We have heard about the impact on the oceans, the interconnectedness of all life and the fact that something that happens in Alaska can affect something that happens on the ocean floor. We have heard about the vulnerability of Bangladesh and from the University of Edinburgh carbon management programme about the various threats and impacts of climate change.

I do not know how many people here have seen the new film on climate change, "The Age of Stupid", which has been showing in Edinburgh this week. I saw it on Wednesday, but it does not matter whether you have seen it because the title says it all. It asks a simple question: why are we all so cheerfully participating in our own destruction? What is wrong with us? Why do we not get it, even though we keep on talking about it? I would say that I am one of the guilty parties in that regard. We still keep flying, for example, and one of the messages of the film is that we should not. However, if we did not fly, we would not have gatherings such as this one, which might mean that we were unable to make the progress that we need to make.

That is all that I am going to say, because I want to hear your reactions to the speakers that we have heard from so far. Lots of themes have arisen. Why is there not more of a sense of urgency? What more could we in Scotland and the developed world do to help the developing world? What support, advice and resources can we make available? We heard a call from Nepal for more support, and we should bear it in mind that we have 10 times its carbon footprint. What is the role

of carbon trading, and what will be the impact of the global recession? It is over to you. Who is going to start?

John Riley (Scottish Action on Climate Change): I am from Scottish Action on Climate Change and Carbon Neutral Biggar.

First, I would be interested to hear Mr Guggenheim's view of Jim Hansen's suggestion that we need a target of 350 parts per million of CO₂ in the atmosphere. We are at 387ppm at present, and the figure is going off the scale. Does Mr Guggenheim believe that we should aim for a target of 350ppm if we are to avoid a 2°C increase in temperature? If so, it has been suggested that an 80 per cent reduction by 2050 is simply not enough. We would need a position of zero carbon by 2030, which is quite different from the scenario that is suggested in the Climate Change (Scotland) Bill.

Secondly, how are we going to achieve the reduction? By persuasion or economic growth? I do not think so. We have to introduce international carbon rationing in the form of contraction and convergence in order to help the developing countries to work towards equal per capita carbon entitlements. If they do not use their entitlements, they can sell them to the western world and generate an income, which will help them to develop. We will not achieve zero carbon by 2028 unless we move towards international carbon rationing—and unless we do so extremely quickly.

If people do not understand contraction and convergence, I have brought a copy of a CD for everybody at the event. It was produced by Scottish musicians who believe passionately that we have to introduce international carbon rationing and who have written a song about it. There is also a voiceover which explains what contraction and convergence is. Please take a CD away with you.

Louise Batchelor: There were a lot of detailed points there, but basically they come down to whether we are being ambitious enough. Are we going to achieve enough?

David Guggenheim: John Riley asked enough questions to keep us busy for the rest of the day, but the central question was whether our target is the right one. On that point, there is good news and bad news. Through my lens of blue, the good news with regard to marine life is that our targets are adequate to address some of the most critical issues but, when it comes to ocean acidification, the problem is not temperature but the dissolution of carbon dioxide in sea water to create a more acidic environment. I heard Dr Nancy Knowlton of the Scripps Institution of Oceanography speak last weekend, and she said that we will require additional sequestration tactics and

technologies—and perhaps some techniques that have not even been invented yet—to begin the active removal of carbon dioxide from the atmosphere, the point being that carbon dioxide has a residence time of at least a century in our atmosphere. The level might already be beyond the breaking point for some species of marine life in the oceans.

That is the short answer to what I expect will be a longer discussion.

Louise Batchelor: Yes—that is a big topic. Does anyone else want to comment?

Ibnu Najib: I would like to comment on contraction and convergence in relation to carbon rationing. Coming from a developing country, I agree with contraction and convergence, but I have some reservations in that carbon rationing should address the supply side more than the demand side. As people from developing countries, we have seen in the various international negotiations that, when it comes to limitations on countries, the stronger countries always have an excuse and find ways to navigate away from the limitations.

I agree with carbon rationing, but it should be aimed more at the supply side of corporations in the public domain. We know about them, but I am afraid that, when we target the demand side, the market mechanism and the rationing will go in the same direction as the injustice that has been happening and we, in the developing countries, will be the ones who suffer more again.

Louise Batchelor: So what can be done to cut down on the supply side? Does anyone want to speak specifically on that?

Justin Kenrick (Pedal Portobello Transition Town and Holyrood 350): The issue on the supply side is not about trying to cap people's carbon emissions through their flying or whatever they do at ground level—that is not going to happen. It is about putting in the price at the top so that, for example, Exxon has to pay a huge amount to be allowed to put oil into the economy.

Basically, climate change is happening because carbon is being taken out of the ground, put through the economy and released into the atmosphere. The process is that simple. To stop that, we must prevent carbon from coming out of the ground, and I think that, on the supply side, we have to consider placing a huge price on putting carbon into the economy. We need Government legislation on that. The bill is absolutely fantastic, but even more fantastic has been the climate challenge fund, which has supported communities throughout Scotland as they have started to find ways of making a living and making life work without having to release so much carbon.

It has been superb to focus on what is happening in other countries, but we also need to consider how we can solve the issues on the ground here and make our lives better at the same time. The Fife diet is a great example of that. I do not know whether everyone has heard of it, but the idea is for people in Fife to eat only local produce, to avoid the carbon emissions from getting stuff from South Africa or wherever. In the beginning, it was seen as just Mike Small and a bunch of crazy mavericks doing something on the edge, but a couple of weeks ago Roseanna Cunningham was at the launch as it was scaled up to a regional level across the whole of Fife, with everybody involved.

Such initiatives are about tackling climate change in a way that makes our lives better. Part of that is about addressing the supply side, ensuring that the financial cost of destroying the planet is too high for us here.

Louise Batchelor: Can I just throw something back at you? If we make fuel prohibitively expensive, what will we do about fuel poverty?

Justin Kenrick: That is very simple. In a cap and dividend system—you can Google the phrase—such as Peter Barnes has created in the States, Exxon and the other oil and coal companies would pay money into a trust fund, which would be divided equally between the population of the UK or of Scotland. Someone who was poor would get a wodge of £300 every month to help them to meet their fuel bills. Someone who was rich would get the same amount, but they would be paying a vast amount more because they would still be flying off to the Seychelles, running their two cars or whatever else. That would address fuel poverty immediately by redistributing the money that the companies pay, and the cap would be brought down slowly over time. If you Google it, you will find the scheme.

Louise Batchelor: Okay. Thank you very much.

Donald Brown will speak later, but he wants to say something in this part of the debate. He is from Penn State University, in the United States, and has previously been on a US delegation to United Nations climate negotiations. Donald, can you make fossil fuel prohibitively expensive? Can you tackle the supply side? How would that go down domestically in the States? As a rider to that, will America bring something meaningful to the table at the end of the year?

Donald Brown (Penn State University): There are competing theories about how we can address the supply and demand sides in relation to carbon emissions, but I am an agnostic about whether that can be done through caps alone or through taxation mechanisms.

The world is experimenting greatly with various methods of reducing carbon emissions, and I am happy to report that some US states have been extraordinary leaders in that over the past eight or nine years. Most people know about the Bush Administration, but they do not know that California and the western states have committed to significant reductions in greenhouse gas emissions or that the north-eastern states have capped carbon emissions in their electricity sector.

A great deal is being done at state and municipal level in the US, on climate change, that is not widely known about. Obama has indicated that he will bring a meaningful position to Copenhagen. The details are being worked out as we speak, so it is a little premature to say exactly what that position will consist of.

Louise Batchelor: I have heard that commentators in the States are saying that Obama will not be able to find anything that is acceptable to Americans by the time the UN talks start in December. Are you more optimistic?

11:15

Donald Brown: The real question is whether we will have domestic legislation in place before he comes to Copenhagen. It will be a fairly close call whether he can pull it off, and people are worried about whether he can come to Copenhagen with legislation in hand. Some forces are starting to organise against his doing that so we shall see.

Louise Batchelor: That is very interesting. We look forward to hearing from Donald Brown later.

To take us in a slightly different direction is Christine Wood from Tullis Russell.

Christine Wood (Tullis Russell Papermakers): I work for a paper-making company in Fife. We will announce very soon that we will build a biomass plant on our site and, although we are proud of the efforts that we are making, we can always do more. One idea that I heard about recently was to pay developing countries to keep the rainforests as they are and not fell them for palm-oil production or paper making by irresponsible companies. What do people on the panel think? It seems like an elegant solution to me, but there seem to be a lot of adverse comments about it.

Dave Reay (University of Edinburgh): Land use more generally—but including forestry—has been one of the big misses in international policy so far. Fossil fuel emissions get the headlines because they are major ones, but about 20 per cent of our greenhouse gas emissions from human activity comes from land use change, most of which is through deforestation. We need something much better than what we have to

protect forests and soils from degradation. That will be one of the key tests of whether Copenhagen succeeds in mitigating climate change.

Louise Batchelor: I am not sure that you immediately addressed Christine Wood's question, but it was interesting. I would to hear from Indonesia again.

Ibnu Najib: The mechanism referred to in Christine Wood's question is called the reduced emission from deforestation and forest degradation programme in the United Nations. There are two important points to consider here. The first is the power of market solutions, and the second is lack of attention to the justice problem, which is actually the same point.

I was at the Poznań negotiations last year. The discussion about the effort to make trees economically worth more alive than dead is dominated by business interests. The International Emissions Trading Association is the biggest non-governmental organisation in the discussion. Indigenous people have been shouting outside the conference room and asking for more attention. Everyone has been saying ahead of Copenhagen that we are running out of time and we have to do something about the forests, but the something that is being discussed is mostly about financial engineering. If you want give people the money to maintain forests for 100 years, where will the money come from and how do we give them it continuously?

The discussion has been about how to provide money for 100 years, but there are alternatives, such as the proposal from Brazil that developed countries have a specific fund that would be located in the developing countries. The solution exists and the market is not the only answer, which is good for our country.

Attention should also be given to where the money will go. Will it go to the Government or the people? If the money is given to the Government, the countries who donate from the fund should ask the Government how it will give the money to the people. That important question needs to be addressed.

Louise Batchelor: At that point, the negotiators start to file the problem under "Too difficult" and things break down. We will hear from the European Union shortly, but there is a suggestion that some EU countries, such as Poland, are saying that it will be too expensive for them to contribute to such funds.

Duncan McLaren (Friends of the Earth Scotland): I will add to what our friend from Indonesia was saying.

There are, of course, good reasons to avoid deforestation, and developing countries almost certainly need financial aid to help them to do that, but there are two big downsides. First, as Ibnu Najib set out clearly, many processes are being undertaken in ways that exclude indigenous peoples and forest dwellers from the lands that they have treated, or that should be treated, as theirs. Excluding people and turning their forest into a carbon sink is not a sustainable way of proceeding.

Secondly, far too often, avoiding deforestation is proposed as a way of allowing developing countries to choose not to cut their emissions but to pay for reductions in emissions elsewhere. I refer to the process of carbon trading and carbon indulgences that allows rich countries to buy reductions in emissions in poor countries, with social problems attached, instead of making them domestically.

The point that I am making is part of a bigger case that states that we in the rich and developed world need to make available to poor countries substantial funding, technology and new social models—different ways of doing things that do not rely on continued economic growth—so that they can build climate-resilient economies and societies. We need to do all of that in addition to making urgent and severe cuts in our domestic emissions.

Louise Batchelor: How would you make such funding available other than through carbon credits? How would you ensure that the money got to the indigenous people who are dependent on the forests?

Duncan McLaren: I am not an expert on the latter question, and probably not even on the first. However, it is possible to establish funds that are not tied to the creation of carbon credits. There is no logical reason for Indonesia to have to give us carbon credits if we pay it to protect forests.

Louise Batchelor: So we should simply tax people and hand over the money.

Duncan McLaren: The world has committed itself to increasing development aid, but so far we have failed to do so. We have committed ourselves to meeting the millennium development goals. It is clear that funding is needed in addition to what has been pledged. We must take it from other sources and not use it simply for reductions in carbon emissions. That is the red herring in the debate.

David Guggenheim: Some of points that I wanted to make were made far more eloquently than I could have made them. For a marine biologist, I have spent an uncanny amount of time on the forestry issue. Back in the early 1990s, when US electric utilities were examining ways of

offsetting carbon emissions, I authored a report on behalf of the Electric Power Research Institute on the suitability of Siberian forests for that purpose.

One issue that keeps coming back in relation to forestry projects is monitoring, measurement and the threshold of proof that a project has resulted in net sequestration or a net carbon benefit—in other words, establishing that something would not have happened without the project. That is tricky when dealing with something that is as difficult to measure as a forest. I could point folks to a body of knowledge in the area, including a report by the Keystone Center in Colorado from the early 1990s, which involved broad participation but focused on measurement issues.

I agree that it is important that projects should benefit local people. We have seen some poor models of ecotourism—the promise of dollars and pounds coming into a region to support it, only for that money to go to a resort that imports its labour force and so on. We must ensure that projects are not an empty promise of support.

Louise Batchelor: The debate is starting to engender in me a feeling that there are all sorts of possible solutions to the problems, but every single one has many problems attached to it. I hoped that that would not happen quite so early in the day.

We are talking about forests, so who better to hear from than a representative of the Royal Botanic Gardens in Edinburgh?

Stephen Blackmore (Royal Botanic Gardens Edinburgh): I will bring some of the discussions back home to Scotland in a moment, but I have a point about forests first. As David Reay emphasised, the quick win for us is to protect and expand the world's forests. That provides benefits of continued water supply, carbon sequestration, biodiversity and many other associated gains.

The millennium forest for Scotland project, in which I had no hand, was truly inspired. The project was partly at community level, and similar forestry projects around the world happen at several levels. There is a big debate about carbon trading, but simple and practical projects are taking place in many countries, including Scotland. That action needs greater support and a greater urgency behind it.

It is fundamentally important that we do not forget the role of nature in reducing carbon dioxide emissions—David Guggenheim mentioned that in relation to the oceans, and forests have a role on land—but there is also a technological component. In Scotland, we have special opportunities to be way ahead on alternative energy production and, in particular, carbon sequestration or capture. We have perhaps lost some of the opportunity to exploit the North Sea oil fields for that, or some of

the energy to do so. I sincerely hope that one result of the Climate Change (Scotland) Bill will be a commitment to our being pioneers in carbon capture. We should look to nature and natural solutions, but also to engineering and technological solutions.

Robin Harper MSP: Mention was made earlier of Dr Nancy Knowlton of the Scripps Institution of Oceanography, who has said that we need active removal of carbon from the atmosphere. Sequestration is not active removal, although it is a step on the way. It is pumping underground stuff that otherwise would go into the atmosphere.

Many of the answers that we have heard have been to do with prevention. The only active removal that occurs to me is the use of wood in building. There are huge opportunities to replace carbon-intensive building materials, such as brick, concrete and steel, with wood. At Acharacle in the north of Scotland, a school is being built entirely of massive wood—it will become iconic when it is opened in a couple of weeks. We need to develop the technology, but the opportunity exists now to start using wood.

That is happening in Switzerland and Austria—Brettstapel is the name that has been given to the process there—and we should move to that system throughout the world. The wood in the Parliament building will still be here in 100 years, so it has locked up carbon for the next 100 years. A small school can lock in up to a million kilos of carbon dioxide equivalent permanently, or until the school has to be replaced. We must do the figures on that.

We have a huge opportunity to be much more imaginative about how we use our wood in Scotland. I am not completely against biomass, but using wood for building is a much better answer than burning it, putting the carbon back into the atmosphere and then capturing that carbon again in wood.

Louise Batchelor: I would love to believe that that is the solution, but I am not convinced.

Robin Harper: It is part of the solution.

Louise Batchelor: Okay—it is part of the solution. I will go back to Stephen Blackmore on that. Is it not the case that we consume far more than we can grow and that we can never grow enough to keep up in terms of building materials, biomass and carbon absorption in our forests?

11:30

Stephen Blackmore: The simple answer is that we could do so. To pick up from where Robin Harper left off, there are no single or simple solutions but a multiplicity of solutions. That is why I suggested that there are strong natural

components involving the use of biology and nature to capture carbon in the soils. Fundamentally, the question whether we can continue to feed and improve the quality of life of people around the world comes down to the need to tackle human population levels as well as to produce more food. We can certainly do the latter if we improve our agricultural and land management techniques. We can achieve most of the biological solutions for our planet, but it will depend on willpower and investment in resources. Again, as I said earlier, much can be done at the local and community domestic scale. Changes are not always made through huge international efforts: they can be done locally, too.

Louise Batchelor: Thank you for that optimistic note.

Stephen Benn (Royal Society of Chemistry): We greatly welcome today's event and are glad to take part in it. I echo the view that a range of solutions is what will make a difference. We first need international leadership, which we hope the Copenhagen meeting will provide, but lifestyle changes will also be required. There is enormous potential in the reduction of energy demand through greater energy conservation, especially for heat loss through buildings, which is considerable.

We will clearly have to decarbonise transport in a variety of ways, such as through highly efficient biofuels, lightweight materials, hybrid and electric vehicles and battery technology. There will have to be further work on the potential use of hydrogen as a fuel, and we must make as much effort as possible to get electricity generation from a variety of renewable sources.

The CCS technology will be crucial. As was said earlier, there is tremendous potential in Scotland, and some of us in the Royal Society of Chemistry regret that it has not been exploited as quickly as it could have. We would not want it to be developed elsewhere when there is clearly good potential here.

Finally, but by no means least, the development of investment in people and skills is necessary to deliver all that progress here in Scotland as well as in the rest of the UK.

Louise Batchelor: May I come back to you on a couple of points? We already hear that biofuels, which are believed to be one way forward, are laying waste to the rainforests of Indonesia—that seems to be a major problem. Further, how would you produce the hydrogen? Which would be the most viable energy resource for doing that?

Stephen Benn: Briefly, there are good biofuels and bad ones. It is important in a debate such as this that people understand that distinction.

Louise Batchelor: And which are the good biofuels?

Stephen Benn: That is a good point. My colleague Hannah Taylor knows more detail—and she has just whispered to me that the good ones are second generation biofuels. However, the main point is that there are differences between biofuels and there is no reason why we should lay waste to rainforests to develop a more efficient biofuel.

Louise Batchelor: Okay. We will maybe hear about hydrogen later on. We probably have time for one or two more questions.

Adrian Loening (Carbon Trade Ltd): I am from Scottish Action on Climate Change and, professionally, from Carbon Trade Ltd here in Scotland. I have some complex comments to make, but I will try to keep them short.

Louise Batchelor: I will keep you short.

Adrian Loening: The first one is that, in Copenhagen in December, we must find a better way of carbon trading. I spend most of my professional life on methane capture projects with specific climate benefits that are potentially unlike biofuels and forestry projects, but it is immensely complex and difficult to organise those markets. I am a bit at odds with people here who are in favour of carbon capture and storage. I think that we should rename that enhanced oil recovery, and I agree with Justin Kenrick that carbon needs to stay in the ground.

Finally, it has been a reasonably nice, sunny day here in Scotland, but I am sat in my seat being blinded by electric lights.

Louise Batchelor: Shall we try to switch them off and see what happens? Thank you very much for being succinct. We will have another quick point of view.

Matthew Crighton (Unison Scotland): I will try to be quick, but I am sorry if we cannot discuss my point. We are looking at a couple of crises across the world, one of which is the climate, but the obvious one is the economy. The G20 meeting will shortly take place, and Governments are putting millions and trillions of dollars and pounds into banks, which fund company developments. Why cannot we put those two areas together by putting a condition on all that Government money that any investment that is touched by public money must lead to a reduction in carbon emissions from developments and that any growth must be green? We need to make that point loud and clear now because discussions are going on about the re-regulation of the world economy—rather disconnectedly, it seems to me—at the same time as the Copenhagen discussion about climate change.

Louise Batchelor: That is an extremely good point on which to end this first discussion session, and it perhaps tees us up for one of the next debates. Thank you all very much for the fantastic contributions so far. I hand back now to the Presiding Officer.

The Presiding Officer: Thank you, Louise. I am learning lessons in how to conduct debates, so thank you for providing such a good example of how to do so—it has been very interesting.

As Louise Batchelor indicated, that brings us to the end of our first session. Perhaps I can just answer the question about the lights. As I indicated at the beginning, the event is being webcast and will be available to others who want to access it through archive footage. If we do not have the lights on, we will all be sitting in complete darkness as far as that footage is concerned. That is the main reason for the lights being on.

We will now have a short comfort break, and I urge people to use it for the purpose suggested rather than to explore the building. It will be a short break of 10 minutes, and we will restart promptly.

11:37

Meeting suspended.

11:50

On resuming—

The Presiding Officer: If you would like to take your seats, we will get under way again. It was brought to my attention during the interval that one or two people at the back of the chamber are having a little difficulty hearing. I advise you all that if you lift up the lid of the black console on your desk, it acts as a loudspeaker. That might help people who could not pick up what was said through the sound system.

Welcome back. I trust that everyone is feeling more comfortable after the comfort break. I am pleased to invite Paul McAleavey, who is a European Union civil servant who has been seconded to the European Environment Agency in Copenhagen, to give us our next presentation. He is responsible for the political communications department. Like all our speakers, we are delighted to have him here. *[Interruption.]*

Paul McAleavey (European Environment Agency): That little pause was good—it allowed me to enjoy the moment even more. As a Scot who campaigned for this Parliament many years ago, it is with huge pride that I stand here. I am grateful that the sound problem gave me a little extra time to absorb the moment.

As the Presiding Officer said, I speak as a civil servant of the European Union. I have been asked

to provide this morning's session with a European policy perspective. The organisation that I work for, the European Environment Agency, is based in Copenhagen. It is an information agency rather than a regulatory agency, which was set up by the European Community in 1994 to ensure that the EU and its citizens have the information and the analysis that are required to make the changes that our environment needs or, in the words of this event, to provide the information that will help the EU and its member states to "get it right".

Our geographical scope is broad. We have 32 member countries—the 27 members of the EU, plus Iceland, Norway, Switzerland, Turkey and Liechtenstein. Our remit is similarly broad. We are required to support sustainable development and help achieve significant and measurable improvement in Europe's environment through the provision of—these are four important adjectives—timely, targeted, relevant and reliable information. If people have a chance to look at some of the publications that I have left on the agency's stand outside the chamber, they will see that we do not just write documents for decision makers; we have a mission to popularise information for the broader public. I will use some metaphors to explain the scale of what we are talking about.

In the short time that is available, I will highlight just some of the work that the agency does in Copenhagen and how it might be relevant to the work that is being done in Scotland.

On climate change, the agency plays a specific role as part of the European effort. Basically, our experts co-ordinate a massive accountancy job by collecting, verifying and analysing data on greenhouse gas emissions from all over Europe. The data are then used to produce two key annual reports that feed into the Kyoto process. This year, the numbers and the analysis are particularly significant in the context of the 15th conference of the parties—COP15—negotiations that will take place in Copenhagen in December. With the first commitment period under the Kyoto protocol in effect running out in 2012, COP15 will be expected to produce an ambitious successor. Some 15,000 or so delegates will descend on the city in December so, as someone who spends his working days in Copenhagen, I warn anyone who plans to come over to do their Christmas shopping this year that hotel space is very limited.

The first report that we produce each year is the inventory of greenhouse gas emissions, which is published in early summer. Basically, that report counts gases to give an overall picture of emissions across Europe. We send the report to our European Commission colleagues, who officially submit it to the United Nations Framework Convention on Climate Change. Because the data are first verified at national level, the data in the

report are always subject to a delay of one and a half years. Our latest report, which was released in June 2008 but is based on data from 2006, shows that emissions from the EU 15—meaning the 15 member states that were members of the European Union before the 2004 enlargement—were basically 3 per cent below the base year. In 2006, EU 15 emissions were 3 per cent below the base year, whereas the target is for them to be 8 per cent below.

What does that mean for people—like me—who are not climate scientists? Given that the concept of counting gas is quite abstract, we have made efforts to simplify and popularise the report by explaining the cuts in terms of the number of days of the year. Basically, the EU 15 Kyoto target of achieving an 8 per cent reduction in emissions from their 1990 levels means that we need to cut 29 days-worth of emissions every year for each of the five years between 2008 and 2012. The latest data from the agency show that we have cut 10 days-worth of emissions between 1990 and 2006. In simple terms, we still need to cut a further 19 days of emissions just to reach the Kyoto target of an 8 per cent cut. By analogy, the Climate Change (Scotland) Bill's target of achieving an 80 per cent reduction in emissions by 2050 means, as I understand it, that Scotland will need to cut 290 days-worth of emissions by 2050.

The other main report on mitigation that we produce each year is the greenhouse gas trends and projections report, which is published in the autumn. Whereas our spring report looks back at what has happened, our autumn report looks at the likelihood that member states and the community will achieve the Kyoto commitments. Basically, our greenhouse gas trends and projections report allowed the European Commission to produce this month the graph—labelled "1. Climate change - Greenhouse gas emissions"—that can be seen on the screen. The graph shows that the EU 15's performance remains mixed, but the EU 15 as a whole should meet the Kyoto commitments if the member states speed up implementation of planned measures.

If we consider the issue at national level, we see that France, Greece, Sweden and the United Kingdom reached their Kyoto target in 2006. We then have a middle batch of countries—Austria, Belgium, Finland, Germany, Ireland, Luxembourg, the Netherlands and Portugal—that project that they will achieve their Kyoto targets. However, our projections for Italy, Spain and Denmark—yes, including Denmark—indicate that those states will not reach their Kyoto emission reduction goals. As one can imagine, that takes us into some interesting discussions every autumn with our host Government in Denmark.

The graph looks ahead beyond Kyoto to 2020 because, in December last year in advance of COP15, the European Union agreed a climate and energy package called 20/20/20 by 2020. That package commits the EU to reduce greenhouse gas emissions by 20 per cent by 2020; to increase the share of energy from renewable source by 20 per cent by 2020; and to improve energy efficiency by 20 per cent by 2020. The slide shows graphically—I refer to the red dot labelled “EU-27 target”—what a 20 per cent reduction would look like by 2020.

However, what do such targets mean to non-experts? How do we communicate the 2020 target to people who are not climate scientists? We have explained that reaching the 2020 target is the equivalent to removing the emissions from all transport in Europe. Imagine the emissions from every truck, bus, car, train, boat and aeroplane disappearing—that is the equivalent of a 20 per cent cut by 2020. The target is ambitious but, as we have heard this morning, it needs to be—the challenge is serious.

12:00

I was aware that you would not be able to pick up the detail of the next slide—that is not a problem, because copies of the report from which it is drawn are available outside. Even if all emissions stopped today, climate change would continue for a long time, due to the historical build-up of greenhouse gases in the atmosphere. The third report that I want to highlight is our climate impacts report, which is based on 40 indicators and shows climate impacts that are already evident in Europe. My intention in showing you the slide was to highlight the diversity of climate impacts in Europe. This morning we heard people speak eloquently about the impacts that are evident outside Europe, but there are already impacts in Europe.

The Mediterranean region—the yellow area on the map—will experience less precipitation, lower river flow, more forest fires, increased water demand, a high risk of desertification and a risk of more biodiversity loss. In the central and eastern European region—marked in green on the slide—there will be more temperature extremes, less summer precipitation, more floods and more forest fires. Here, in the north-western part of Europe, with our maritime climate, we can expect more winter precipitation, higher river flows, a higher risk of coastal flooding and the northern movement of freshwater species. We do a lot of work on Natura 2000 designated areas. Now that we have an almost complete designation of Natura 2000 sites in Europe, the climate has changed the ballpark. It has taken 20 years to achieve the designation of

most sites, but we will need to revise the map because of the impact of climate change.

I wanted to use my time to give you a glimpse of some of the European perspectives that provide part of the context for your deliberations on the Climate Change (Scotland) Bill. You can find the reports that I have mentioned on our website, and I have left some copies outside the chamber to be picked up today.

To finish, I would like to draw your attention to work that the agency is doing in relation to energy and on the subject of co-benefits. We are about to launch a new report that maps out the potential of wind energy in Europe. Early indications suggest that the potential of wind energy corresponds to about 2.5 times the gross electricity generation of the EU 27 by 2020, even taking into account social, environmental and economic constraints such as Natura 2000. A key message for the agency is that renewable energy comes in small, even micro, packages. Because energy from the sun, winds, waves and tides is diffuse in nature, it is far better suited to a decentralised generating system.

Tackling climate change has huge co-benefits. I will explain what we mean by that. The effort that is required for us to meet the 2020 targets will also cut air pollution in Europe. For example, improving energy efficiency and increasing renewable energy will reduce fossil fuel consumption, which is a key source of air pollution. Such positive side effects are referred to as co-benefits. We have estimated that achieving the 20/20/20 by 2020 package would cut by £8.5 billion every year the cost of meeting the EU legal air pollution requirements. The savings to European health services could be as much as six times that figure—in other words, a €50 billion benefit to our health services, as a co-benefit from climate change action. There is a lot at stake. Thank you for your attention. [*Applause.*]

The Presiding Officer: Thank you very much for that very stark presentation.

I welcome Ahmed Moosa, who is a Maldives special envoy for science and technology and is currently looking into President Mohamed Nasheed’s recently announced initiative for the islands to go carbon neutral in the next 10 years.

Mr Moosa, the floor is yours.

Ahmed Moosa (Maldives Government): Thank you very much, Presiding Officer.

Honourable members, ladies and gentlemen, it is a great honour for me to be able to participate in this very big event and in an important and timely debate. I thank the organisers and the Scottish Parliament for giving us this tremendous opportunity to contribute.

Climate change is the biggest challenge facing mankind today. The Maldives is a group of small—or, as you say in Scotland, wee—coral islands in the middle of the Indian Ocean. Journalists often use terms such as blue skies, crystal clear warm water, white coral sand, paradise and a sparkling image of perfection to describe the islands, which are one of the world's most exotic holiday destinations. However, according to other reports, the Maldives is a paradise that is soon to be lost. Climate change is threatening to wipe away this natural wonder.

Global warming has never been a myth. We can witness its effects across the globe. For example, in the early 1990s, when I studied at the University of Glasgow, we had snow throughout the winter months. Now, as most people know, it hardly ever snows in Glasgow. The summers are warmer than ever here in Scotland and throughout Europe.

In the Maldives, several islands have been severely affected. Coastal and beach erosion, frequent flooding and fresh water shortages have all been attributed to climate change; the El Niño of 1997 caused severe coral bleaching not only in our reefs but in several other similar habitats around the world; and there have been a number of extreme weather events, including the recent floods in the United Kingdom and an increased incidence of severe hurricanes.

Honourable members, ladies and gentlemen, the Maldives might be a very small country but we have our own language, culture and traditions. We have been living in a relatively pristine environment for well over 3,000 years. If sea levels rise as predicted, then we lose everything. Climate change is a real threat to our existence.

The world must come together to save not only the Maldives but our whole planet from peril. There is absolutely no doubt that the leaders of the industrial nations have the biggest role to play in this greatest of human endeavours. In that respect, we in the Maldives are most encouraged by the Scottish Parliament's initiatives to pass new measures to challenge this important issue. This is a historic opportunity for Scotland to lead the world and lay down strong measures to combat climate change. Scotland is my second home and I am very proud of what it is doing.

The new democratic government of the Maldives is committed to tackling the threats of climate change. Earlier this month, President Mohamed Nasheed announced the aim for the Maldives to be the first carbon neutral country through investing in renewable energy and decarbonising our economy. In addition, we are inviting researchers and scientists to come to the Maldives and set up research hubs and outposts. Indeed, we have already started to sign agreements with European universities.

A UN study published in January offered evidence that global warming undermines a number of basic rights such as food, water, shelter, health, life and self-determination. The Maldives has since successfully lobbied the UN Human Rights Council to adopt a resolution to hold a panel discussion on the relationship between human rights and climate change. The Maldives-led resolution secured the support of 88 co-sponsors, including 15 members of the Alliance of Small Island States and key allies such as India, Sri Lanka and, this week, the UK, for a panel debate to be held in Geneva this July and before December's conference in Copenhagen.

We call on the world to come together in a spirit of solidarity to tackle climate change in Copenhagen later this year.

I will present some facts and figures about the impact of climate change in the Maldives. According to estimates, the country has a population of fewer than 400,000 people. We have around 1,200 islands, of which roughly 200 are inhabited. The Maldivian islands cover 298km², and more than 99 per cent of the country is sea.

The main industries are tourism and fisheries, and our gross domestic product per capita is approximately \$3,000. The capital island, Malé, is the smallest capital in the world: it is about 2km² and has a population of around 120,000—the majority of the Maldivian islands have fewer than 2,000 inhabitants. Malé is the industrial and financial hub of the country; it is protected by a sea wall that was donated by the people of Japan and which was one of the key reasons why Malé was spared in the recent tsunami.

The critical issue for the Maldives is that it is a very flat country. The average elevation is less than 1.5m above sea level—flooding is now reported in many of the islands, coastal and beach erosion is commonplace and shortage of fresh water is a major issue. The Maldives contributes less than 0.001 per cent to greenhouse gas emissions worldwide, but the country will be the biggest victim of global warming if IPCC projections prove to be correct.

The next slide shows coral bleaching as a result of rising temperatures following the events of El Niño in 1997—we saw bleaching in many areas throughout the country. In the next photograph you can see houses on the islands that have been destroyed by flooding. The next picture shows the erosion of the beach—normally the beach flows nicely into the sea, but in this case all the sand is gone.

Our strategy is to lobby for a debate to take place before Copenhagen. We need help from the international community to develop the capacity of our people and transfer the technology to the

Maldives. As a relatively poor country, we need funding and financial assistance from the developed world.

The President of the Maldives announced this week that we will try to go carbon neutral within the next 10 years, and some of our resorts are already attempting that. There is an on-going focus on driving forward the international commitments. We have a national adaptation programme of action to try to protect the islands as much as we can, and we will introduce renewable energy to the Maldives, which will be one of my biggest tasks. We are seeking to co-operate with international research organisations and, as I mentioned earlier, we want the Maldives to be a research hub for scientists.

Climate change is a real threat to the very existence of our country. The Maldives needs international support to combat it, and we will continue to campaign to get a strong commitment from the international community in Copenhagen. We want to lead by example as much as we can by going carbon neutral within the next 10 years.

Thank you very much—we believe that, together, we can save this world.

The Presiding Officer: Thank you, Mr Moosa. I have spent many a long hour—as I am sure many others have—looking at pictures of those beautiful islands in holiday brochures, and I imagine that researchers will be queuing up to accept Mr Moosa's invitation to create a research hub there.

Our final speaker, Dr Ian Burton, has unfortunately been delayed by a travel hitch. We will not lose his expertise, because we will hear from him this afternoon. We will go straight to the debate that would have followed his presentation—it will take the same form as the earlier debate, and will be expertly convened by Louise Batchelor.

12:15

Louise Batchelor: Thank you, Presiding Officer. We have two fantastic presentations to kick off our next debate, which will last approximately half an hour. I have loads of questions to ask, but I should not indulge myself; it is really back to you.

I am conscious that there are quite a few young people here this afternoon. We are joined by people from the Scottish Youth Parliament, the Children's Parliament and Inverkeithing High School. I hope that you feel that you can participate—we would very much like to hear from you, especially as there was so much focus earlier on getting the message across to the younger generation. I suspect that, in many cases, it is the

younger generation that needs to get the message across to us, but that is another matter.

I will throw out a few themes to explore. The first is the urgency with which action must be taken. We have just seen from the situation in the Maldives that climate change is already happening and that the situation is critical already. Are things happening fast enough to address it? The second issue is the new democracy in the Maldives. Is democracy the right model for tackling climate change? In this morning's edition of *The Scotsman*, Dr Richard Dixon asks whether democracy is too weak a mechanism. It is difficult to persuade people in democracies to vote against their short-term gains—those are my words, not Dr Dixon's. The third issue is carbon trading, which we talked about earlier. There is a whole issue about how the developed world can help the developing world.

Right—enough of me. We will hear first from Dr Dixon, as I have name-checked him.

Richard Dixon (WWF Scotland): Thanks for the mention.

Urgency is a key issue. That is brought home to us when we think about the first achievement of the Climate Change (Scotland) Bill, which is the setting of a target to reduce carbon emissions by at least 80 per cent by 2050. We can argue about whether the figure should be higher, but the target that is set in the bill is for a reduction of at least 80 per cent, so it could be more than that. Nevertheless, 2050 is so far away that we need a much clearer indication—which I hope that we will get from the minister this afternoon—that the Government is serious and that something is going to happen soon.

We have heard from all the international speakers so far that the Climate Change (Scotland) Bill is important in the process leading up to Copenhagen. What we need is early action. If we were back in the 1960s thinking of what would happen 42 years ahead, we might think that England would often win the world cup and—yes—that big cities would have trams. We would also think that computers would be huge things that took up whole floors of buildings but had nothing to do with us in our daily lives. Similarly, 2050 is so far away that, whatever we think about, we will get it absolutely wrong. The next 10 to 20 years is the timeframe in which we can put the right measures in place.

Alternatively, we can do the wrong things. If we build new coal-fired power stations that are around for 50 years, we will set ourselves on the road to disaster. If we make the decisions about investment in research now, and if we set the right early targets, we will set an example that the world needs. We are not just saying that we aspire to

meet a target in 2050; we are saying that we are serious about the task and that we will set ourselves on the right course not just from 2020—which is what the bill does, sort of—but from next year, when the bill comes into force, with tough action being taken in each year. Most of us in the NGOs are calling for a reduction target of 3 per cent a year, which is also what the SNP manifesto called for. Such a target would send the message that, straight away—right from the first year—we are going to do something pretty tough to move things along.

Louise Batchelor: Thank you very much. As we have hinted, there will be more forensic examination of the bill this afternoon.

On the issue of urgent action, I ask Paul McAleavey whether there is a sense of urgency in Europe. You have come up with some fantastic ways of describing what must be done, such as the number of days' worth of emissions that we have to cut per year. Are you getting a sense of urgency in Copenhagen?

Paul McAleavey: There is, indeed, a sense of urgency in the European Union—is my microphone switched on?

Louise Batchelor: It is switched on, but it is that one over there. Sorry—they are conspiring against you today.

Paul McAleavey: I am not used to sitting in the First Minister's chair.

There is a sense of urgency in the European Union. The discussions are on-going—we all follow them in the newspapers. Difficulties have been experienced over the past couple of weeks in getting some countries—Poland has been mentioned in particular—to sign up to financing for adaptation measures. However, those problems have been the exception rather than the rule.

The European Union has had a high level of engagement. I spoke about the 20, 20, 20 by 2020 target. The European Union has said that, if other developed countries sign up, we will move the target to 30 per cent by 2020. There is a sense of urgency, although the precise final negotiating position for Copenhagen has been put back a little bit, until June. As delegates will probably know, the Prime Ministers will meet again in June to consider issues such as financing. I am sure that there will be lots of opinions in the chamber on whether the level of urgency is high enough.

Rob Gibson MSP (Scottish Parliament Transport, Infrastructure and Climate Change Committee): I am a Scottish National Party MSP for the Highlands and Islands and a member of the committee that is considering the Climate Change (Scotland) Bill. Louise Batchelor asked whether democracy can deliver. In Scotland, we are

grappling with the idea that if we can engage people through the development of renewable energy systems—particularly in marine energy—that can take the lead in Europe, we can create jobs and people will understand the imperative of being involved in the climate change revolution. The paradox is that, although we want to do those things locally, we have so much that we can export. Therefore, we would buy into the European model of a supergrid.

I have a question for the panel. We are talking about building targets on the basis of statistics that take 18 months to appear. Can we find any way in which to achieve speedier analysis of the data and, if so, will that be shared around the world? Do people agree that accountants will have to learn to have a carbon balance sheet, as well as a monetary one?

Louise Batchelor: That is one for Paul McAleavey. Can the EU do the analysis and science any faster?

Paul McAleavey: The reason why it takes 18 months in the European Union is simply because some of the emissions data are based on formulas. For example, some of the data need to be calculated using estimates from agriculture. The member states have to verify those estimates before they pass them to the European level, otherwise they might not believe what we said back to them. A faster mechanism is available through the market. The emission trading scheme that has been established sends much quicker signals on emissions and the carbon price. We report on official data 18 months behind, but the market and some of the market institutions that deal with carbon trading make estimates that are, I would say, slightly less reliable but based on more recent market data. There might be scope for considering the way in which those two processes operate together.

Louise Batchelor: We keep being told that there are 100 months to save the world or before the tipping point happens. It would be good if we could all see on our computers or wherever a big screen showing us our emissions increasing, for example. I do not know whether that will ever happen, but it is not beyond the wit of humankind to come up with such a system. That is a rhetorical point.

Ahmed Moosa: I want to say something about how democracy can play a part. After I was appointed to my job on 11 March, I quickly asked the ministries to give me some of the reports that had been done on renewable energy and the adaptation that we need for the Maldives. I have a big pile of those reports, which, combined, cost a couple of million dollars. They were funded by the United Nations Development Programme, NGOs and even Governments and were produced over

the past 15 or 20 years, but no action had been taken on them. Maldivians have just removed a dictatorship after 30 years, during which there was no education on recycling or renewable energy. We are having to introduce that in the Maldives. The regime that was in place was not concerned about that. It was making noises—the Maldives hosted the first small island conference on sea level rises back in 1987, for example—but it was not doing enough.

Louise Batchelor: So a green benign dictatorship is not necessarily the answer.

Ahmed Moosa: Indeed.

Sagan Turner (Inverkeithing High School Energy Group): I would like to go back to the point about our being the next generation. My school, which is an eco-school, is doing particularly well. At the same time, however, many people in our school do not understand climate change. I have a friend who tells me that climate change does not exist. That makes me think that the children of parents who do not believe in climate change will not find out about it.

Admittedly, I watch a bit too much TV. I see the adverts about 2020, and the one with the recycled paper bag, which is pretty cool. However, not enough information is going out to the next generation to make them aware of the situation. Even in my school, which does very well and which has a large eco-school committee, there are still not enough people who are aware of what is happening. Thinking about the rest of the country, how are we going to get the next generation more aware of the situation and how they can contribute?

Louise Batchelor: Thank you—that was a superb contribution. At the same time that people hear about the campaigns and see the information about climate change, they also see adverts for cars and every electrical good under the sun. It is a real problem.

Liam Beattie (Scottish Youth Parliament): I would like to touch on the point that has just been made. Consulting young people is hugely important. By 2050, young people who are in primary schools today will be in this chamber, and I hope that they will be debating the positives that came out of the Climate Change (Scotland) Bill, if it gets passed. I dread to think that, in 2050, they will be picking up the pieces left by the previous generation, if we do not take action now and if the bill does not get passed.

I consulted my eco-schools group yesterday. For those who do not know, such groups are environmental committees. The eco-schools initiative is a Scottish initiative—I am not sure whether it is UK-wide. Of the very few people who were on the group, none knew about the Climate

Change (Scotland) Bill. This world-leading bill is not well known among young people—or older people.

We need to raise awareness of global warming, whether through education or adverts, and we need to change people's perceptions about climate change, including the idea that it is not happening or that it is not our responsibility but the Government's responsibility. Everything possible that can be done needs to be done now.

Louise Batchelor: How many of your friends or contemporaries believe that climate change is happening and believe in the need for urgent action?

Liam Beattie: Young people especially are a bit more sceptical about climate change. They see it as something that is not our responsibility. Changing attitudes will take a while, but once they have changed, we will reap the benefits because of what can get done.

Alex Hill (Met Office): I will pick up on the points that have just been made. Those two kids are absolutely spot on. I talk to lots of groups and individuals, and our difficulty is not necessarily that the Climate Change (Scotland) Bill might not be successful—I think that it will be; it is an incredible piece of legislation. The biggest problem is persuading people, and the vast majority of people do not do enough and do not care enough. Our biggest problem is educating young people and adults—everyone who is involved in either generating or using energy. The problem includes our general lifestyle.

We need to start with a huge education programme and, frankly, we have failed to do that. As scientists, we have failed to do that—instead, we bicker about whether the level of CO₂ is going to be 550ppm or 525ppm, for example. We do not get across the fundamental science and the fundamental differences that climate change will make to the way in which we live our lives on this planet over the next century. We must start with that point.

As scientists, we must stop bickering about numbers and about whether doing this or that will help. We need to get across the basic message to as many people as is humanly possible. We need to become organised. To be frank, people of my generation need to apologise to people of later generations, because we started the mess. It is unfortunate that future generations will feel the impact, which they will have to do something about.

12:30

Louise Batchelor: I could not agree more—except for the point about education in schools. In

the schools that I have visited, the subject is on the curriculum and is being taught. However, people of our generation still drive our kids to school and back—my kids are a bit older than that now. Children are being told about climate change, but they see no adaptation as a result of it.

Stephen Blackmore: I agree with everything that has been said, especially by the school representatives, about the need for education. I will add an emphasis to that. Some people are in denial about climate change, but those who are aware of it include many people who think that we can do nothing. It is fundamentally important to convey the fact that our intelligent species knows many of the answers. We know what to do and what steps to take about climate change—it can be tackled—but I am afraid that I do not hear that being said often enough.

The danger is that the communications that we put out tend simply to frighten and alienate people. We need to make them aware of the problems and, alongside that, we need to provide the many solutions, some of which we have heard about today. The message of problem plus solution can motivate action.

Debbie Walker (Scottish Transport Studies Group): I am an atmospheric chemist—I am in the scientists' camp. We talk a lot about the barriers to taking action and perhaps about democracy being one of those barriers. As a scientist, I am filled with horror that we are still debating the numbers and how readily and quickly we will be able to quantify the carbon saving of an action and see its impact on the inventory. To be frank, as a scientist, I do not really care. We know that introducing technologies that reduce our dependence on intensive and finite fossil fuel use is good not just from a carbon perspective, but for the economy and sustainability. Why are we focusing on the numbers game and debating whether the target should be 350ppm or 450ppm? We heard Paul McAleavey talk about cross-benefits. Such actions have multiple benefits—they are not just about carbon. Surely they make sense, so what are the barriers to taking action? We have talked about urgency. Yes—the need to set policy and targets is urgent, but the need to take action is far more urgent.

Louise Batchelor: I said at the beginning that I wanted to keep the debate on the big picture; Debbie Walker has done that beautifully for me.

John Riley: The big problem is that we see economic growth as more important than longer-term survival. That is crazy.

Alex Hill talked about education. We rely on TV for a substantial part of what we learn. I will put Louise Batchelor on the spot: how can we liaise

with the media and particularly with TV companies on how they can assist us? Can we bring the media to forums such as today's conference and ask how they can help us?

Louise Batchelor: The answer is that you must shout more loudly. People are shouting very loudly about the current financial recession, about what is or is not in their bank accounts and about what capitalism has done to them. Many people in the chamber believe in everything that we are saying but, believe it or not, the messages are not getting out loudly beyond this room. As I said, people are far more concerned about short-term interests. They are far more worried about what is happening to their money. I blame no one for that; I, too, am concerned. However, that is the message that is being heard loudly in newsrooms.

The only way that you will change that is by constantly logging on to the stories on the websites, not just of the BBC, which I have now left, but of all the other media organisations. Every time stories appear, put in your comments, write to those organisations and phone them, otherwise they ain't going to get it because they hear a much louder noise coming from all sorts of other self-interest groups.

John Riley *indicated disagreement.*

Louise Batchelor: You are shaking your head—okay.

Daniel Leary (Natural Environment Research Council): I appreciate that I am running slightly counter to the more optimistic turn that the debate has taken. We have heard a lot about the challenges that are faced in meeting carbon budgets. We have also heard that tackling the situation that we are in will involve multiple methods and multiple approaches. On the back of that, I thought that it might be appropriate to mention geoengineering, which is probably best defined as environmental interventions that are designed to treat the symptoms of climate change rather than its causes, which is what carbon budgeting is all about. An example of geoengineering is iron fertilisation of the oceans to sequester carbon. Some geoengineering ideas are somewhat whacky, such as the one that involves sending mirrors into outer space to reflect the sun's rays away from earth. If at all possible, I would be interested to get the panel's views on whether we are at the stage at which use of such methods is necessary. Even if we are not, might it be a good idea at least to research such approaches?

Louise Batchelor: Are those not quite dangerous red herrings? I throw that point back to the panel. David Guggenheim takes a highly global view. What do you think about iron fertilisation of the oceans?

David Guggenheim: I am a few steps behind—I just wanted to talk to the students.

Louise Batchelor: Perhaps you could do that as well as responding to Daniel Leary's question.

David Guggenheim: Last Saturday, I was on a panel at the Explorers Club when a fourth grader—I think that he was the only kid in an audience of stuffy older explorers and famous people—stood up and asked me what he could do to help people in his school understand the problems of the oceans. I looked at him and I said, "You're doing it." People have a greater fear of public speaking than they do of death, but he had the courage to stand up and ask a question. To the students here I say, "You, too, are doing it." That is extremely inspiring. You should never underestimate what your voice is capable of accomplishing. In many, if not all, cases, your peers and your schools will follow. A fifth grader whom I met in Georgia started a petition against the finning of sharks—the practice of cutting off their fins for shark fin soup—which made it all the way to Washington DC. We should never underestimate the power of a young voice in a democracy.

What was the other question?

Louise Batchelor: You have travelled so much that you are meeting yourself coming back the way—you cannot remember the question because of jetlag. The question was about what techno-fixes we can use in the oceans. We have already discussed carbon sequestration and whether that is burial for good or a bit of a temporary fix.

David Guggenheim: I have read a lot about the storage of clathrates—those interesting structures that are able to hold their mass under high pressure—at the bottom of the ocean. I am convinced that, technologically, such a step is possible. On one level, it is disturbing that we always think of the oceans as the place where we dispose of stuff when we cannot figure out where else to dispose of it.

The big challenge with some of those technologies is the sheer amount of energy that would be involved in making them happen. Some of the Pacific canyons off the west coast of the United States would be ideal storage sites, but thousands of miles of pipelines would have to be built to transport the carbon dioxide there. Although such techniques can work in a laboratory, I have yet to see evidence that they can be scaled up to work in reality.

I have a problem with some of the other proposals. The fertilisation of the oceans through, for example, the use of iron in the nutrient-limited environments in the southern ocean would interfere with the natural cycle of primary production in the oceans. Although, again, the

process might make a lot of sense in a test tube in a laboratory, it is another uncontrolled experiment on top of multiple uncontrolled experiments.

Louise Batchelor: I cannot believe that I said that those ideas might be red herrings. Forgive me.

To what extent is the European Union or the European Environment Agency looking at technical fixes to get us out of this mess?

Paul McAleavey: The EEA is not looking at technical fixes, for sure. On whether the EU is, I simply repeat the excellent point that was made earlier about the coincidence of the financial crisis happening with the climate crisis. We have an opportunity to ensure that a proportion of the stimulus packages is spent on some of the new technology that is being developed, and we have done some work to find out how much of those packages is being directed towards such investment.

Eddie Phillips (Go Greener): I represent Go Greener—we were called that before the Scottish Government came up with its go greener campaign, so I thank it for adopting our slogan. I want to talk about people's attitudes, because I think that we are missing something.

I am holding a WWF document called, "Simple & painless? The limitations of spillover in environmental campaigning". It contains a quote from the Cambridge physicist David McKay:

"Don't be distracted by the myth that 'every little helps'. If everyone does a little, we'll achieve only a little."

I will give a graphic example of that. When talking about the recent economic downturn, a relative of mine said, "Well, we're just going to have to put our climate change stuff on hold until we get over this economic situation." How wrong can you be? I believe that the Chinese character for "crisis" is two lines, one that means "danger" and another that means "opportunity". That is what we are facing.

We know that the recycling market is jittery. However, I believe that that situation also contains opportunities. I would be interested to know people's views on that. I do not believe that we should postpone our campaign; I believe that we should instead use the present economic situation to move the campaign up a gear.

Louise Batchelor: I agree. I heard an interviewer on "Newsnight", of all programmes, asking, "Now that we have the financial crisis, aren't environmental concerns a bit of a luxury?"

Mike Passway: On the point about iron fertilisation, you mentioned red herrings. According to the news this week, the problem is to do with red crustaceans. Iron salts were fed into

the ocean and the algae bloomed, as predicted, but it was then eaten by crustaceans. That is another geoengineering plan up the spout.

Louise Batchelor: Unintended consequences.

Somanath Narayan: On the urgency factor, I come from India and, when I get back home, I certainly want to speak to Government officials to persuade them to stop burning new coal and doing other things that contribute to emissions and to communicate to them the urgency of the situation. However, I need examples if I am to do that. The Climate Change (Scotland) Bill sets targets for 2020, which means that I will probably not get an appointment to sit down and talk to the ministers until 2025. Scotland needs to cut emissions now, so that I can persuade my ministers to start their efforts by 2015 or 2020 at the latest.

12:45

Louise Batchelor: Thank you for reminding us of that.

I want to throw the question back to someone from an NGO, so I am glad to see Richard Dixon's hand up. I want to know why NGOs are failing to get the message across. Why are there still so many people who choose not to believe that climate change is happening or who believe that there is no point trying to do anything about it? I am sure that you will mention that you have quite a big action planned.

Richard Dixon: Indeed. I will start where we started off this session, with the question of democracy and whether it is too weak a tool to achieve anything. We all know that politicians will only go as far as they think that they public want them to go. If a small but vocal minority makes a fuss about something, politicians may well think that a majority of people hold that view. It is difficult for politicians to judge the mood of the public and work out how much they can do on any given issue and still get voted in at the next election—to use the simplest representation of a politician's considerations.

Tomorrow night, we are holding our earth hour event. From 8.30 to 9.30 tomorrow night, people around the world will be switching off their lights. The lights of this building will go out, as will those of the Forth bridge and other buildings around Scotland. More than 100 million people will take part around the world, in 80 countries. The chief aim of the event is to show politicians that lots of people are concerned. They are only doing something simple—just switching off their lights—but they are sending a message to politicians, and politicians should understand that that gives them a mandate to go to Copenhagen, as leaders, and do something tough.

Louise Batchelor: You neatly ducked the hardest part of my three-part question. Why are NGOs such as WWF failing to get the message across to—I think—the majority of people?

Richard Dixon: Climate change is a challenge for people because, in their hearts, they know that it is a challenge to the way that they live. If you talk to people about recycling, it is easy to convince them to do a little bit of extra work, sort their refuse and put various things out on the right day—they can do that and feel that they have done their bit. Most people, however, know that if you talk to them about climate change, you are partly talking to them about not driving so much, driving a different sort of vehicle, insulating their home and doing stuff that they kind of know is right but do not really want to do themselves. If it is someone else's car that is going to go away, that is fine—more space for their car. However, the self-denial aspect is a challenge to many people.

Why do we not get the message across in a big way? The car industry spends hundreds of millions of pounds advertising cars and we spend a tiny pittance sending out press releases that sometimes get in the papers and on television. We are quite up against it.

Louise Batchelor: As you say, doing something about it is a pain, basically.

I thank everyone for their contributions; I am looking forward to more debate this afternoon.

The Presiding Officer: I thank Louise Batchelor for so ably managing this lively and important debate. I am delighted to say that Dr Ian Burton has arrived. We welcome him to the chamber and look forward to hearing from him this afternoon.

I am genuinely sorry to be leaving the conference at this point, but I have to get back to my constituency. As I intimated earlier, one of my deputies will take over this afternoon.

I do not know whether “enjoyed” is the right word, but I have found today to be incredibly stimulating and—yes, it is the right word—enjoyable. I applaud everyone who has contributed so well to the morning sessions, and I am sure that the rest of the day will be a great success.

12:49

Meeting suspended.

14:00

On resuming—

Climate Change and Scotland

The Deputy Presiding Officer (Alasdair Morgan): Good afternoon, ladies and gentlemen. Welcome back. I hope that you enjoyed your lunch. I thank those who provided displays in the reception area—WWF, the Met Office, the European Environment Agency and the Tyndall centre for climate change research. I am Alasdair Morgan, the Deputy Presiding Officer and your chair for this afternoon. I hope that you are looking forward enthusiastically to the afternoon's session.

We will move on to presentations with a different focus—the Climate Change (Scotland) Bill and how it will fit in with the international efforts that you discussed this morning. I invite Stewart Stevenson MSP to come to the well of the chamber. He has represented the Banff and Buchan constituency in the Parliament since he won a by-election in 2001. He was re-elected in 2003 and again in 2007, when he was appointed as the Minister for Transport, Infrastructure and Climate Change.

The Minister for Transport, Infrastructure and Climate Change (Stewart Stevenson): I thank Patrick Harvie and the other members of the Transport, Infrastructure and Climate Change Committee for inviting me to speak at this event. In my role as the Minister for Transport, Infrastructure and Climate Change, I have regular contact with the committee on a wide range of issues. The challenge of climate change remains a key priority in our discussions, particularly as the Climate Change (Scotland) Bill is passing through Parliament. I hope that this morning was useful and informative. We have an impressive range of participants, especially those who have travelled far to be with us from Canada, Bangladesh, Tanzania, India, Nepal, Indonesia and the United States.

As you know, the global impact of climate change is an enormously wide subject with many uncertainties and unknowns. In recent years, the science behind the subject has made it fairly clear that periods of dramatic change are likely. At a climate change summit that was held in Copenhagen earlier this month, scientists suggested that sea levels could increase by more than 1m by the end of the century. The latest projections are much more dramatic than previous estimates and mean that around 10 per cent of the world's population—some 600 million people—would be in danger of being flooded. As well as sea level rises, many areas of the world face more extreme storms, floods and droughts. They also

face worse shortages of food, water and energy, with the associated health risks.

Climate change impacts are not just events to worry about in the future; they are with us now. Already, some of the poorest people in the world, who are least responsible for the changes, are paying the price. The key message from the Copenhagen summit was that there is no excuse for inaction. One of the Government's key aims is to ensure that that mantra is adopted throughout Scotland by all of us who can make a difference—and that means every single one of us. It is an issue not just for the Government, for public bodies or for business; all of us, as individuals, have an important contribution to make.

In Scotland, as in the rest of the world, a twin-track approach is needed. We need to limit, by whatever means possible, the emissions that we produce. Our climate is already changing, and emissions have a delayed impact. Even if we stopped all our emissions immediately, global warming would continue for decades to come. This is not about preventing climate change—it is already too late for that; it is about trying to limit its worst effects. As well as reducing emissions, we must adapt to the changes that we experience. Summers in Scotland will be warmer and drier; winters will probably be wetter and stormier. Sea levels will rise and we will probably have more flooding and more landslides.

As organisations make their plans for the future, they need to plan for life in this different world. Some existing infrastructure—roads, harbours, water treatment plants, housing—might not be right in a changed climate. Of course, adaptation plans have to work in a low-carbon economy too. Good planning now can save pain later.

This year is a crucial one in global climate change. The global economic downturn should not and must not deflect us or the rest of the world from the pressing need to reduce emissions. We need to take stock of the situation and demonstrate that green economic revival is possible. Achieving sustainable economic growth remains our key purpose in the Scottish Government. The move towards a low-carbon economy is a significant economic opportunity for Scotland and one that we have to embed firmly in our policy processes.

At the end of this year, a crucial UN climate change conference will take place in Copenhagen. It marks the end point of a two-year negotiating process under the Bali road map and will, the world hopes, produce a successor to the Kyoto protocol. I was pleased to attend the Poznań UN conference in December, which was a key milestone in the process. Speaking to other states and regions from around the world, I took the opportunity to showcase developments in

Scotland as a model of international excellence and, of course, to learn from others.

Many of you here today might have seen already the latest climate change film, "The Age of Stupid", which is set in 2055. The film challenges many aspects of our consumer lifestyles, but the overriding message is: why did we not stop climate change when we could? This year is a critical turning point in the bid to avoid that question being asked in years to come.

Although Scotland is a small country with just 5 million people, we currently emit around one seven hundredth—0.15 per cent—of the world's global CO₂. If everyone in the world lived like the Scots, we would need three planets to support us. In other words, it can take just a few days for the average Scot to produce as much CO₂ as someone living in a developing country would produce in an entire year.

Scottish ministers are committed to a Scotland at the forefront of global efforts to reduce greenhouse gas emissions. From the outset, the Scottish Government has taken its responsibilities on climate change very seriously indeed. We realise the long-term significance of decisions that are made now and the moral obligation that we have to take action. We are working with the UK Government to help it to influence the European Union and the United Nations to make firm and ambitious commitments to protect the world's climate and safeguard future generations, particularly those in developing countries, who will be most impacted. We are also working in partnership with the UK Government and other devolved Administrations to deliver the targets in the UK Climate Change Act 2008, which became law at the end of last year. We welcomed the first report of the Committee on Climate Change in December 2008 and have submitted our views on the appropriate level of carbon budgets and associated issues to the Secretary of State for Energy and Climate Change in advance of his announcement alongside the Chancellor of the Exchequer's budget on 22 April. It is a seminal report that emphasises the challenge ahead but, importantly, makes it clear that it is a challenge that can and must be met.

One of the Government's goals is to address together the health of the economy and the environment. "The Government Economic Strategy" sets out our core purpose of sustainable economic growth. Central to that purpose are the sustainability targets to reduce emissions by 2011, based on 2005 levels, and by 80 per cent by 2050.

Scottish people are already quite well informed about climate change. A survey of more than 3,000 people living in Scotland was carried out on our behalf last year. I am pleased to say that only 1 per cent of respondents had never heard of

climate change, while 43 per cent said that they knew a fair amount about it. The majority of respondents—57 per cent—said that climate change is an immediate and urgent problem, although about a fifth—22 per cent—seemed to think that it is more of a problem for the future. Respondents were also asked whether they agreed with this statement:

"It's not worth Scotland trying to combat climate change because other countries will just cancel out what we do".

I am pleased to say that two thirds of those who were surveyed disagreed with that statement. Although we have to improve our environmental behaviours in Scotland, I am confident that the people of Scotland are primed for action to tackle climate change.

The passage of the Climate Change (Scotland) Bill will result in Scotland having a world-leading statutory framework to underpin action on climate change. The measures in the bill will put Scotland at the forefront of international action to tackle climate change. In our target of an 80 per cent reduction in emissions by 2050, we will include all the Kyoto greenhouse gases as well as emissions from international aviation and shipping. We will be the first country to do so. To ensure that there is progress and accountability, we have built into the bill a credible framework of annual targets and strong reporting requirements.

I am pleased to say that the first stage of evidence taking on the bill was completed earlier this month. My ministerial colleagues and I are grateful to all those who have taken time to present their views on our bill. All being well, we aim to achieve royal assent later in 2009. For my part, I recently gave evidence to the Transport, Infrastructure and Climate Change Committee on a number of issues that were raised during stage 1 of the bill. In response to strong opinion that was voiced at that stage, and in light of the developing scientific understanding, we have decided to have an interim target for 2020 rather than, as the bill proposes, for 2030. The level of the target will be informed by a number of considerations including the first report of the UK Committee on Climate Change, which I mentioned earlier, and the carbon emissions budgets that the UK Government adopts under the UK act. I hope that that demonstrates both our commitment to the need for early action and our recognition of the desire for greater certainty about the early years of Scotland's emissions reduction trajectory.

We are only too aware that setting the targets is the easy bit. Achieving them will require enormous effort, co-operation and perseverance. Every sector will have to play a part, and each individual will find individual challenges. An initial overview of measures that could contribute to an 80 per cent reduction was carried out on our behalf and was

published in November. We are now working to produce a discussion document for publication later this year, which will set out the key areas for carbon savings and the work that needs to be done to deliver those in the short, medium and long term to meet our interim and 2050 targets.

The ministerial team fully accepts the Stern report's conclusion that the cost of inaction on climate change far outweighs the cost of action. I may be the only minister with "climate change" in my job title, but every minister has to be a climate change minister. Projects to tackle climate change are under way in many sectors, including energy, transport, business, the public sector and housing. We are not waiting for the legislation to be in place before we take action to reduce emissions. We have already announced the £10 million saltire prize to encourage innovation in marine renewables in Scotland and around the world. We are pleased to have the National Geographic Society as our worldwide partner in that prize. Since the Government came into power, we have approved 20 large-scale renewable energy schemes, including the largest consented wind farm in Europe and one of the world's largest wave energy developments. We have surpassed the landmark of 3GW of renewables capacity. That is enough to power 1.5 million homes with clean, green energy.

We have also made significant investment in public transport infrastructure to tackle congestion and reduce emissions. We have launched a new sustainable travel programme called smarter choices, smarter places, and £15 million has been made available for seven demonstrator projects in communities throughout Scotland, from Dumfries to Kirkwall.

14:15

We have encouraged a number of key Scottish businesses to share knowledge and good practice by supporting the May day network. We have planned for the introduction of the carbon reduction commitment for commercial and public sector organisations, to extend trading of carbon emissions, and have announced proposals for the first stage of an ambitious area-based home insulation scheme, supported by £15 million of new Government funding, plus £15 million of match funding from other sources. The scheme is currently being developed, and we hope to launch it in the autumn.

To inform future decision making, we have made a commitment to assess the carbon impact of Government expenditure. We believe that there are few parallels to our approach. Although it presents considerable challenges, we will continue to work towards the development of methods that will help us to achieve our goal of reducing

emissions that are associated with the Government's expenditure each year of more than £30 billion.

In addition, we recognise the enormous value of community involvement in seeking solutions to climate change. To support activity on a community level, we have allocated £27.4 million to the climate challenge fund. I am extremely encouraged by the scope and innovation of the applications that we have received. Work is under way in the area.

In conclusion, Scottish ministers are committed to Scotland being at the forefront of efforts to reduce emissions. We can take a measure of reassurance from our knowledge that collective international action works. We must be clear that the task that we have set ourselves is achievable. We can and, no doubt, will continue to debate the difficulties that we face in seeking to achieve our goal. However, despite the scale of the challenge, our underpinning mindset must be that international co-operation can deliver the global action that is required to limit the effects of climate change for the sake of future generations, be they in the developing world or here at home in Scotland.

The Deputy Presiding Officer: The next presentation is by Simon Pepper. In 2000, Mr Pepper was awarded the OBE for services to sustainable development. He was the director of WWF Scotland for 20 years—until 2005—and served as an external appointee on the Cabinet sub-committee on sustainable Scotland. He is now freelance, but he has a special interest in promoting change in climate behaviour. He is chair of the Scottish Government's climate challenge fund panel.

Simon Pepper (Independent Climate Change Consultant): I start by thanking the Transport, Infrastructure and Climate Change Committee for its efforts in organising today's debate. I also thank this morning's contributors, especially those from other countries, who have given us a colourful insight into the dilemma that developing countries face.

As we all know by now, there is no question but that climate change threatens us here in Scotland, directly and indirectly, through its economic and other impacts. I hope that the case has been made that we should act in our own interests. However, I want to take a wider perspective, as the moral case globally should underpin our attitude to the issue. Poorer countries, especially in southern climes, are hit by a double injustice. They are least responsible for climate change—as we have heard—and they are hardest hit by its effects.

The facts are well known and well rehearsed. Let us not beat about the bush. It is confidently predicted that a temperature rise of more than 2°C would cause death and destruction on a massive scale, especially in poorer countries, not to mention indirect impacts on the whole world from the resulting disruption of economies and huge populations moving about. That would be a human catastrophe. In fact, “atrocities” might be a better word to use, given what we know about the scale of climate change and its human cause. We are in danger of witnessing a largely avoidable crisis, catastrophe or atrocity that has been caused by the greed and negligence of a large—but not very large—sector of the world’s population.

We know that the tipping point of a 2°C temperature rise, which will probably trigger that sequence of events, is expected to be reached in the next few decades, unless the whole world acts quickly and sufficiently to turn round emissions by about 2015. We know that we in the rich world are the most responsible for that state of affairs. In the past, we could claim to be the unwitting cause of the problem, but not now. In relatively recent years and months, the situation has changed critically. Climate change and its causes are now acknowledged facts that are beyond sensible dispute. It is interesting that one could not have said that even a year or two ago.

In 2009, we are poised at a significant moment in the world’s history. From now on, we all know where we stand and how the future will judge us. We have our responsibilities to fulfil. We know that if we kid ourselves that that would be too difficult, fail to take appropriate remedial action and continue to make matters worse, we must accept that we are taking an informed and active part in this outrage against the great mass of humanity, whose lives will be disrupted and destroyed.

Sure, other countries are implicated too, but we in Scotland have a triple duty to act, apart from our well-rehearsed economic interest in doing so and the various benefits for our health and wellbeing that were mentioned this morning. First, our part of this global problem is our responsibility. China’s part is China’s responsibility—let us not be distracted by that. The example that we heard this morning from the Maldives, whose population is one 10th that of Scotland, was dramatic. The Maldives is not waiting for others to commit to a zero-carbon future—it is getting on with that and committing itself to that target now. Secondly, ours is a disproportionately large part of the problem, because our per capita emissions are among the highest in the world. Thirdly, we aspire—rightly—to global leadership.

We have a clear choice that we can take. Do we take the necessary action to remove ourselves unambiguously from any complicity in the

catastrophe, or do we dither, delay, devise excuses and do less than is necessary? I stress that I see a compelling and overriding moral imperative that we must acknowledge and cannot dodge.

I congratulate the Minister for Transport, Infrastructure and Climate Change and the Scottish Government on the Climate Change (Scotland) Bill’s content, which has been recognised as potentially world leading, as the minister said. The setting of a target for 2050 and an interim target is the most important feature of the bill’s approach, because it allows Parliament to elevate decisions about the target above the inevitable policy debate that will continue for ever about how we reach the target from year to year. It is also commendable—I endorse what the minister said—that the bill covers all the greenhouse gases and international aviation and shipping. The bill is the first legislative proposal so to do.

I also congratulate the minister on his emphasis on the scientific basis of targets. He has been correct repeatedly to stress in submissions to the Transport, Infrastructure and Climate Change Committee that targets will be determined objectively in response to scientific advice and not to short-term political considerations. We should all round on any political party that seeks to secure reduced targets for electoral advantage.

That said, I hope that the debate will explore some key points about the bill, to put a bit more flesh on those broad commitments. I will touch on five topics that others might want to pick up on. The first is whether the bill commits us to enough. The world needs leadership, so to aspire to be the best in the world is a good start, but if being the best in the world does not guarantee that the job gets done, it is not enough. The test is whether, if everyone followed us—which is what people do to leaders—the climate crisis would be resolved. Currently, the answer, sadly, is no. Recently, Lord Stern summed up the serious concerns that the climate is changing much more quickly than expected and that the world is responding much more slowly than expected, so the need for remedial action is multiplying. The commitments in the bill, especially in the period up to 2020, for which we have no targets as yet, are not sufficient. My first question is whether the bill is ambitious enough.

My second point is on whether the targets will really be driven by the science, as we understand the commitment is. Despite the minister’s assurances that that is the case, the argument tends to creep in from Government that certain challenging targets would not be achievable. We must be very careful about that, because it is a sign that expediency, not science, is starting to influence our choice of targets. Does that

argument mean that we cannot meet the targets without discomfort or economic disadvantage? If so, it is difficult to see how we square that with the known implications of failure to tackle climate change for hundreds of millions of people in the world. Is that what we mean by leadership? I do not think so. We cannot ignore the plight of two thirds of the world's population because of relatively minor discomfort that we might have to suffer. Any pain that we feel would be very small compared with the misery that climate change is sure to inflict on hundreds of millions or perhaps billions of others. Therefore, my second question is whether we have a cast-iron guarantee that the targets will be set on a scientific basis, leaving aside political considerations.

My third question is whether the bill requires change soon enough, which is another dimension of the story. Will the bill deliver our share of the necessary net emissions cuts to avoid a 2° rise and the tipping point? At present, the bill commits the current Administration to little if anything beyond what it is doing already—the current score is a mere 1.3 per cent reduction per annum. An interim target in 2020 is welcome news; a world-leading number on that target would be even better news, if it were science driven. That target should drive demanding annual targets up to 2020, starting now.

The Tyndall centre for climate change research recommends 6 to 9 per cent per annum cuts from now, which makes the current figure of 1.3 per cent look, frankly, pathetic, although it complies with the bill as it stands. I wonder why the minister is waiting to request advice on which to base the 2020 target and annual reductions up to that date. The Government does not need legislation to set its targets now, which we understood from its manifesto it planned to do. Time is of the essence. Clear signals are needed sooner rather than later and delays in setting the targets or getting on with achieving them merely add to the burden for future Administrations and generations. My third question is whether the bill demands, and commits us to, action soon enough.

My fourth point is on whether we are measuring the right thing. We could cut the emissions that we produce here in Scotland and still make no difference at all to climate change if we simply import our needs from other countries. Whatever half-measures the international community is signed up to, surely, if we aspire to leadership in Scotland, we must measure and report at least the level of emissions for which our consumption is responsible, wherever in the world the emissions take place. We must also limit access to carbon credits as a way of avoiding more direct responsibility for our emissions. Thirdly, we need to set and measure cumulative budgets for our emissions so that we can see the whole picture of

what our contribution will be between now and 2050. That is the fourth question, about measuring the right thing.

14:30

Lastly, I want to ask what is to fear. My feeling is that the Government is seriously underestimating the galvanising effect of leadership in setting targets early, even if those targets turn out to have been too ambitious. Once those targets are set, we will know where we are heading. The current situation—which a lot of people in the chamber would describe as a sort of paralysis, in which there is a great sense of urgency and a clamour for change but that change is not happening—arises from the fact that we have not yet set the targets. Once we have set them, we will be off and will know where we are going. That will get people moving.

The Scottish Government's projections for the possibilities of early change are very timid. Okay, macro projects—the big investments—often take up to a decade to mobilise. However, the people can be mobilised surprisingly quickly with the right leadership and all the people together—all 5 million of us—can make a big difference both as individuals and as communities. For much of the population, a 10 per cent reduction is not difficult at all. Those of us who have tried it can testify to that.

The climate challenge fund applications that I see give a very encouraging insight into the remarkably ambitious, creative and enthusiastic willingness of communities throughout the country to respond with effective action. However, they need leadership and key milestone targets to sustain their belief in the possibilities of a better world—a happier, healthier, safer, greener world in which enlightened Scotland is a beacon to the international community.

The part that NGOs have to play in that was mentioned this morning. NGOs are straining themselves to mobilise the public mandate, but because of the sense of paralysis without targets, it is difficult for them to do so. No imperative is appearing from the top to drive people on. Tomorrow's earth hour, which has been organised by WWF, will be one more sign of the growing public clamour for a strong lead and a strong bill.

Those are the five questions that I want to ask. Are we talking about doing enough? Is it science driven? Are we doing it soon enough? Are we measuring the right thing? What is to fear about ambitious, early, strong targets? I am sure that those and other points will be raised by others during the debate. My main point is that we should not distract ourselves with the failings of other countries; we should do what is morally necessary

to fulfil our responsibilities to the future. Our claim of leadership demands no less than that.

First, we should set ourselves targets that are based not on what is easy or on what is influenced by what is easy, nor on what others are doing although we hope that they will follow, but only on what the science says is necessary to prevent the worst effects of climate change. That is the overriding moral imperative, and leadership of that kind would resonate powerfully around the world. How we will meet those targets and how we will minimise the effect of the targets on our own people are important but secondary considerations. We can move much more decisively into a discussion about the how as soon as we know more clearly what we are aiming to do.

We must grasp the nettle soon and set appropriate targets that are as challenging as necessary. Let it never be said that we failed to act in a timely and sufficient way when we knew what was needed; let us not be guilty of negligent inaction in the face of such a dire crisis for the world.

Scotland's international reputation has a lot to gain and a lot to lose. The genie is out of the bottle; we claim leadership. I hesitate to refer to our track record as a footballing nation, especially in advance of tomorrow's game but, as far as such claims are concerned, there is an ominous precedent in the world cup of 1978. Those who can remember the disastrous vainglory of Ally McLeod and his ill-fated approach to leadership in that challenge will understand what I mean when I say that Scotland does not need claims of world leadership full of sound and fury but, in the end, signifying nothing. At this time and in this field of play, the stakes are much too high.

The Deputy Presiding Officer: Thank you, Mr Pepper.

As you know, Dr Ian Burton was not able to deliver his presentation this morning. I am glad to say that he has joined us and I invite him into the well of the chamber.

Dr Burton is a scientist emeritus with the adaptation and impacts research division of the Meteorological Service of Canada; professor emeritus at the University of Toronto; co-chair of the Ontario expert advisory panel on climate change adaptation; co-chair of the World Bank expert group on the pilot programme for climate resilience; and a visiting fellow at the International Institute for Environment and Development in London. I am not sure whether there is something about the environment that generates jobs with very long titles, but Dr Burton is nevertheless very much welcome.

Ian Burton (Meteorological Service of Canada): Thank you very much. It is a great pleasure to be here and I apologise for not being present for this morning's presentations and discussions. I was on my way from an IPCC meeting in Oslo, but got diverted by airline problems. The IPCC—the Intergovernmental Panel on Climate Change, that is, not the independent police complaints commission—is preparing a new report for the international community on the effect of climate extremes in the creation of natural disasters.

I have been asked to give a view from Canada on climate change impacts and adaptation. I should point out that a view from Canada is exactly that: it is not the view from Canada and I am not speaking on behalf of anyone else. The question that I want to examine is whether we are doing enough about adaptation and whether what we are doing is being done in the right way. I apologise that, because of my late arrival, my presentation is something of a throwback to this morning's discussion.

Most of my remarks are based on a study completed in Canada in 2007 called "From Impacts to Adaptation: Canada in a Changing Climate 2007", which makes a thorough national assessment of the kinds of impacts that are now being experienced; contains some detail on the impacts that we might experience in the future; and takes a gentle tiptoe into the area of adaptation, movement towards which, although happening, is not as aggressive as it might be.

The report proposes a balanced response to climate change. There should be an appropriate amount of mitigation; in other words, we should try to reduce emissions to halt or prevent climate change. Such an approach ranges from using more energy efficient light bulbs to the long-awaited cap and trade programme, which is on its way. Adaptation, on the other hand, relates to the impact on climate change of small activities such as water conservation and whole-sector approaches such as integrated water strategies.

The goals of what was the first large-scale national assessment since the completion in 1997 of the "Canada Country Study: Climate Impacts and Adaptation" were to highlight advances made in our understanding of vulnerability and to provide a knowledge platform for what we hope will be the next stages in the process.

With regard to the nature and distribution of climate change in Canada, the globe on the slide that is being displayed illustrates changes in annual mean temperature in degrees centigrade between 1995 and 2005. As you can see, northern Canada is experiencing a dramatic amount of change, particularly in the McKenzie basin in the north west, where the change in temperature is

already having a significant impact on the environment and Inuit native people's lifestyles.

The next slide shows a number of little illustrations of the kinds of impacts that are being observed and measured. These represent only a small sample; there are many more. One might wonder, for example, why the pine beetle infestation in the boreal forest of northern British Columbia does not appear on this pictomap. The explosion of the pine beetle population and its subsequent killing off of the boreal forest, which is likely to affect the whole boreal belt from western to eastern Canada, is at least partly attributable to climate change, because the milder winters that the boreal forests have been experiencing—which are part of the general warming trend—have contributed in large part to the over-season survival of the beetles and the growth in their population.

In addition to these various observed trends and impacts, there has been a series of extreme disasters and catastrophic events. The next slide outlines four in particular: an ice storm; a set of wildfires; the tail-end of a Caribbean hurricane in the maritime provinces; and floods in the Saguenay region of Québec.

I have summed up why we must take a more serious approach to adaptation nationally and globally than we have done thus far in what I call the adaptation imperative. The lines plotted on the graph on the left-hand side of the slide set out the resident IPCC emission scenarios. They are a little bit out of date, and it is widely recognised that they are conservative—or, if you like, optimistic—in the amount of emissions that they expect to be produced. According to the most optimistic scenario, which is represented by the green line, global emissions will peak between 2040 and 2050. As the graph on the other side shows, if the peak were to be delayed for so long, global surface warming would continue well beyond the end of this century. As I say, those scenarios are now widely considered to be too optimistic.

As well as the adaptation imperative, there is what I like to call the adaptation deficit. I do not have the latest figures but in the period from 1950 to 2006 there has been a rapid rise of global total figures for insured and uninsured disaster losses. A lot of those losses have occurred in the developed world, with perhaps proportionally higher losses in the developing world. That shows that, despite the fact that, to date, we have not experienced as much climate change as we are about to, we have not been doing a very good job of managing our control and adaptation of and our response to weather disasters. Losses are already going up and, given where we ought to be, we are already facing a deficit in adaptation.

14:45

Adaptation has so far been relatively neglected during the climate change negotiations—although that is changing—due to three myths. First, it has been said that it is a local and regional, and environmental, problem, and that we do not need to be concerned with it as a matter for international co-operation and development. That is not correct—adaptation is global and strategic and multisectoral. The types of disturbances that will occur in many parts of the world as a result of climate change will create problems and raise issues that go well beyond national boundaries.

Secondly, there is an idea that adaptation is antithetical to mitigation: that if one talks about adaptation, one is not serious about reducing greenhouse gas emissions. That is a myth, as the better we understand adaptation requirements, the stronger the case will be for mitigation. The third myth is that adaptation is defeatist. It is not, and if we do it properly, we will help to build social resilience.

I will comment briefly on Ontario. Canada is a federal state and a lot of the provinces are taking their own initiatives in adaptation. In Ontario, for example, a climate change secretariat that is mostly concerned with mitigation has been established in the premier's office. We have also established an Ontario expert panel on climate change, which is discussing the issues with ministries and leading them to take climate change adaptation into account in their practices and policies in areas across the board, including water, natural resources and ecosystems, infrastructure, energy, agriculture, health, emergency management, education and others.

The panel is helping Ontario to develop a long-term strategy for adaptation; enhancing the capacity of ministries to take adaptation into account in their programmes and policies; working with communities and stakeholders to bring them into the adaptation movement; and developing tools, incentives and regulations.

It has recently produced a guidebook on adaptation to climate change for Canadian communities, which is intended primarily for use at a municipal level. It is interesting because it does not simply address adaptation—although that is its main burden—but says that communities ought to be thinking, planning and developing their future to contribute to the mitigation effort and to contribute to adaptation in the context of a sustainable future.

The final slide shows the websites that give further information on the subject. I thank you for your attention—it is a pleasure to be here.

The Deputy Presiding Officer: Thank you, Dr Burton.

I welcome our final speaker: Professor Don Brown, from the United States. He is associate professor in environmental ethics, science and law at Penn State University, where he is currently teaching an interdisciplinary course on climate change and sustainable development and acting as programme director of the collaborative programme on the ethical dimensions of climate change.

Donald Brown (Penn State University): I am delighted to be here, and I thank the Scottish Parliament. I have been working on climate change for about 25 years, and I learn something new at every meeting I go to, which I find valuable—I have met many colleagues here today.

I congratulate the Scottish Parliament on its work. Listening to Stewart Stevenson, I know that I do not have to tell him some of the things that are in my presentation. Listening to Mr Pepper, too, I know that he is not the identified office for my comments, as he already gets what I am about to say.

I will reflect on the ethical and moral dimensions of climate change, on which I want to encourage us all to turn up the volume. Some people get the significance of Al Gore's claim—which he made three times in his movie—that climate change is a moral issue, but many do not. I will argue that climate change is not only a moral issue, but that it raises multiple civilisation-challenging moral and ethical issues.

There are things about the global scale of these problems that call out for an understanding that climate change is a moral and ethical issue. First, what people do in one part of the world can dramatically hurt people in other parts of the world—the slide shows the first human example of that in a very dramatic way. Secondly, the harm that people can cause to others in that way is potentially catastrophic. Thirdly, climate change is already happening. The chart that you can see on the slide was produced as part of work at the centre for health and the global environment at Harvard Medical School—it identifies the deaths that are already being caused by climate change. We heard a number of examples of such deaths earlier today. Fourthly, although Governments understand their mission as to protect national interests and those in one part of the world have no jurisdiction in or responsibility for other parts of the world, climate change affects other people. No national strategy—not even the Scottish national strategy—makes sense unless it is part of a global solution to a global problem. Countries cannot consider only their national interests.

We have to turn up the volume on climate change as a moral issue, at least in my country. As the economy slows down, people are saying, "It's not in our national interest to take on climate

change at this particular moment." If climate change is an ethical issue, we have obligations, duties and responsibilities, and excuses for not taking action are not justifiable. The idea that it is not in a country's national interest to do something does not wash if climate change is viewed as a moral obligation. The notion that climate change is a moral and ethical issue connotes that we do things not because of self-interest, but because of responsibility.

Framing the issue as moral does not necessarily mean that we will get consensus on what morality requires. As you know, some people look to religion for their truth in terms of their moral responsibilities, whereas in secular societies we look to a variety of ethical systems, utilitarianism and rights theories. Environmental ethics is about a misplaced focus—in my view—on differences between meta-ethical theories, because when it comes to policy, nothing turns on those distinctions. I will have to explain that claim to you at another time.

The point about climate change is that, even though we may have different ethical starting points, our analysis indicates that on many of the major policy issues on which climate change requires us to focus there is an overlapping consensus. In other words, it makes no difference that, in relation to some of the major moral and ethical issues that climate change raises, we may have individually different moral and ethical positions that dictate our responsibilities to us on a day-to-day basis. No ethical system would condone the status quo behaviour on climate change.

I wrote a book on the United States' behaviour on climate change. The US used three excuses for 20 years: scientific uncertainty; the cost to the United States alone, interestingly enough; and the idea that we did not have to do anything because the rest of the world was not doing anything. Mr Pepper hit eloquently on the reason why that final excuse does not wash as a moral or ethical excuse.

The fact that we have different ethical starting points does not mean that we may not agree on what ethics and morality require. More important, ethics knocks all the outliers out, even if there is a difference of opinion on the allocation question, to which I will refer in a moment. Some of the positions that have been taken on international allocation would, in our view, satisfy no ethical or moral theory.

Framing something as an ethical issue works in the real world for many public policy issues. That is critically important because most of the debate in the United States is framed by scientific and economic discourses that pretend to be ethically

and value neutral, but which obscure ethical and moral questions.

The next slide has a list of religious institutions in the United States that now take the position that climate change raises ethical and moral issues. I run a programme at Penn State University in which we work with applied ethics institutes around the world. We are always looking for collaborators because our mission is to turn up the volume on the ethical and moral dimensions of climate change. We have been in existence for about three or four years and have been trying to identify the major ethical issues that climate change raises. I will end by talking about two of them in a bit of detail.

The more we look at climate change, the more we see issues crying out to be understood as moral and ethical. In our “White paper on the Ethical Dimensions of Climate Change”, we identified civilisation-challenging moral and ethical issues. The first refers to what is called the stabilisation question: at what level do we try to stabilise carbon dioxide in the atmosphere? No national strategy, including the Scottish national strategy, makes sense unless it takes a position on the stabilisation question. As you will undoubtedly know, carbon dioxide in the atmosphere is already at 380 parts per million and it looks like it may be too late to stabilise it at 450ppm. The IPCC has talked about having 900 to 1,000ppm under the most pessimistic climate change scenarios.

It would be a civilisation-challenging problem by itself to try to figure out how to meet energy demands, given different possible stabilisation levels. The next slide has a graph that shows different curves. The bottom curve is for 350ppm, the next is for 450ppm and the next for 550ppm. People do not get the scale of the problem, because it would take a civilisation u-turn to stabilise at 450ppm. To make matters worse, the atmosphere is like a bathtub into which different people put different amounts. However, slowing down the tap water will not solve the problem. We must cut emissions way back. Every country would probably have to cut carbon emissions to under 2 gigatonnes per year to stabilise carbon dioxide levels.

We talked about the 2°C rise in temperature, but we did not talk about how incredibly difficult it will be to prevent that. Because of what is called climate sensitivity there is significant uncertainty about how much warming we will get with different levels of greenhouse gases in the atmosphere—we hear of figures from 2°C to 4.5°C. Time does not allow me to explain all the information on the next graph, but the middle curve shows the probability of exceeding a 2°C rise in temperature if we try to stabilise carbon dioxide in the

atmosphere at 450ppm. Even at that level, there is a 45 to 66 per cent chance that we will overshoot the 2°C rise. At 550ppm, and assuming that the IPCC’s distribution for climate sensitivity is correct, it is virtually certain that we will exceed 2°C.

The point is that all this is a moral issue. Scotland, Pennsylvania and the United States, for example, must take a position on not only targets but how they relate to the concentration levels of carbon dioxide in the atmosphere. Mr Pepper said that there is no need to be conservative about initial targets. I would argue that any target must be considered in the context of the position that is taken on the stabilisation question. We know that many parts of the world, such as Africa, are particularly vulnerable to a 2°C rise in temperature. For example, a 2°C rise will mean that Uganda can no longer grow coffee. We are probably at the tipping point of melting the Greenland and west Antarctic ice sheets, and Africa is particularly vulnerable to rises in sea levels.

15:00

The models disagree about the effects in different parts of the world, but they all agree that some parts of the world will get a lot drier. Many of those places are already getting drier. There is great human suffering—it would tear your heart out—in parts of Africa that are already getting drier where the models predict that they will.

So the first issue is: what is our position on the stabilisation question? That is a deeply moral question. The significance of its being a moral question is that we cannot simply look to our own interests to solve it. We need to understand that we have duties and responsibilities.

The last issue that I want to talk about is the allocation question. Now that we know that the world can accept only 2 to 3 billion tons of carbon per year if we want to stabilise greenhouse gas levels, how do we divide up those 2 to 3 billion tons? That is a huge, civilisation-challenging, moral issue. The next slide, which shows what parts of the world are emitting greenhouse gases and what parts are vulnerable, reveals an amazing disaggregation between harms and benefits.

There could be no more obvious moral and ethical question than what each country’s fair share of the global target should be. The map in the following slide, which is labelled “United States of Climate Change”, shows that, unfortunately, the entire emissions from India are equivalent to those of only two states—Texas and Louisiana—in the southern part of the United States. The US is way beyond its fair share of safe global emissions. I can say that without any fear of contradiction. No matter how the allocation question is posed or

what formula for distributing carbon emissions is used, there is no credible argument that, without radically reducing emission levels, the US is emitting its fair share.

The next slide deals with carbon dioxide contraction, which is the issue of how we allocate those 2 to 3 billion tons. That is a civilisation-challenging moral issue because, if we give each person an equal right to the atmosphere, the consequences for the rich countries are quite dire. Instead of having to reduce emissions by 80 per cent, the United States will probably need to reduce emissions by 96 or 97 per cent.

I will end by mentioning other civilisation-challenging issues that need to be understood as moral questions. Who will pay for the damages? The representative from Canada sort of started to touch on that. The question is also a moral issue concerning retributive justice. The world—certainly my country—has not even begun to wake up to the Stern report's conclusion that it will cost more to do nothing. The logical implication of that is that damages are already being experienced and someone will need to pay for them.

I could mention many other ethical and moral questions, such as who the duty holders are, but that would take a further 10 minutes. The answer is that we are all duty holders—individually, locally, regionally, nationally and internationally.

Thank you for your attention.

The Deputy Presiding Officer: I thank Professor Brown and all our speakers.

We now move to a discussion session for the remaining hour or so. I encourage delegates to raise points about anything that they have heard this afternoon or anything else to do with the Climate Change (Scotland) Bill. I remind those who wish to speak that they should raise their hand and, when invited to speak, wait until the red light on the microphone goes on. It would be helpful if people could stand up when they speak and introduce themselves and their organisation.

As happened this morning, I will now hand over to Louis Batchelor, who will manage the debate.

Louise Batchelor: I thank the speakers for those further excellent presentations. It is Friday afternoon, we have had a good lunch and thoughts are turning to the weekend, but the big theme or message that has emerged from today's event is the urgent need to take action, the lack of time that we have left, and how quickly we need to find things that we can do. Those are themes to explore.

I am very glad that the Minister for Transport, Infrastructure and Climate Change, Stewart Stevenson, will be here for about 15 to 20 minutes. I am not going to waste his time by

talking a lot, but I want to bring the discussion back to the pragmatic level and ask: how much difference will the Climate Change (Scotland) Bill proposals make to our everyday lives? As Simon Pepper asked, do they go far enough? Will they make us drive less, consume less and insulate our houses better? Will they speed up the rate at which wind farms are given permission or at which marine energy is developed? Will we end up having to rely on carbon credits to meet the targets? You know what the questions are, so who is going to start?

Richard Dixon: I am the director of WWF Scotland. We have had two interesting presentations about the moral issue that is climate change, but one dimension that was missing was Scotland's moral role. We have had James Watt commercialising the steam engine, Mr Dunlop and his tyre, and Mr Macadam and his lovely road surface; Patrick Macmillan and his bicycle do not really outweigh the fact that Scotland created climate change and it is all our fault. There is a moral duty on Scotland to help lead us out of the problem, and we heard from international speakers this morning the interest in the Climate Change (Scotland) Bill as a measure that could help to lead discussion towards a good result in Copenhagen.

Three aspects seem to me to be the most important: two are to do with content and one with process. On content, the most important thing that the Scottish bill will do is include aviation. We are nearly there on agreeing how to do that correctly, and it is terribly important because no one else is doing it and it sends a clear message to Copenhagen.

On process, we talked this morning about timescale. We talked about urgency, but another aspect is not just all of us acting urgently to put urgent targets in place but how long it takes the bill to get through Parliament. If the bill heads towards becoming an act before the summer, it will be a very important piece of paper to wave about in the run-up to Copenhagen. If, however, it finishes off some time in November, no one will take any notice of it internationally. Part of the urgency is about turning the bill into an act and getting it out there to make a difference in time.

The other key content issue is one that Simon Pepper raised—early action. The minister talked about early action, and it is welcome that the 2030 target in the bill will become a 2020 target, but the key issue is what level it is set at and what combination of percentages will operate in that first decade. At the moment, we do not know any of that; we know only that there will be a 2020 target, but we do not know how hard politicians will be driven. As I said this morning, our prescription

is to set a 3 per cent target every year right from the start so that we know where we are going.

The UK Committee on Climate Change has come up with two sets of numbers: 34 per cent and 42 per cent, the difference between which being how hard we try and, partly, whether a global deal is put in place. If there is such a global deal, that committee says that we should go for 42 per cent.

Louise Batchelor: That is for 2020.

Richard Dixon: That is for 2020. The UK committee is clear that the 42 per cent target is what the UK should go for and that it is only in limited circumstances that we should be unambitious and go for the 34 per cent target. The 42 per cent target is the benchmark, but Scotland has some natural advantages, such as our great renewable energy assets, so we could go for even more. I wonder whether the minister will comment on his thinking so far, particularly on the relevance of that 42 per cent target that the UK committee says that the UK can achieve. Why can Scotland not say straightaway, "Yes, of course, we can do that"?

Louise Batchelor: Minister, that is a pretty clear question on the 42 per cent target. Ministers might include aviation in the bill, but will it turn into a must?

Stewart Stevenson: Aviation is a must; the issue is simply a legal drafting one and, if people are uncomfortable with it, we will look at the drafting.

We are a Government of 47 members facing an Opposition of 81 so we are not totally in control of the timetable, but we are hoping to have the final stage of the bill in the last week before the summer recess—in other words, at the end of June. However, if material issues arise, I have made the commitment to the Transport, Infrastructure and Climate Change Committee, which organised today's event, that it will have the time to deal with them. In a sense, we should not be unduly precious about timescale if we need to give parliamentary time to material issues. Patrick Harvie, the committee convener, and I will work together on that because he shares the ambition to get moving as quickly as possible.

The 42 per cent stretch target is precisely that. We want to get scientific advice on the matter, so that we know what direction to take. Simon Pepper said that it would be better for us to set ambitious targets and not meet them than to set targets that we can definitely achieve. We will probably take a different view on that, because the credibility of targets will be damaged if we set targets that we consistently fail to meet. We must engage with the scientists to get the balance right. A number of assumptions in UK terms are associated with the

42 per cent target. I refer to the half of our carbon that can be traded under European rules.

Simon Pepper asked why we are not asking the UK Committee on Climate Change for advice right now, instead of waiting until the bill has been passed. First, if the bill goes through Parliament on schedule, we will have time to get advice on the schedule that is included in the bill. Secondly, we do not know what the legislation will look like until the parliamentary process has been completed, so we do not have the necessary context. However, we are working closely with the UK committee on the matter and are discussing the provisions that we want to include. We will not ask the committee for advice formally until the bill has been passed and we know what the legislation looks like, but we are interacting on the provisions that it is our ambition to include. I hope that my comments give some reassurance not only to Simon Pepper and Richard Dixon but to others who are listening. Our ambition is to make the kind of progress that is needed.

Louise Batchelor: Thank you, minister—we are certainly not done with you. I suspect that we are also not done with targets.

Duncan McLaren: The minister is well aware of all of the things that we ask for, so I will not go through a long list of them—I will make just two points now.

First, given what we have just heard about ethics and urgency, the issues of a stabilisation level and an allocation between countries come together in the setting of a cumulative budget for the total emissions that a given country may emit over the period from now until about the middle of the century—let us take 2050, which is the date in the bill. The biggest provision missing from the bill is a commitment to ask the UK Committee on Climate Change to provide scientific advice on the total budget for which Scotland would aim. That would allow ministers a bit of flexibility in determining how far above 3 per cent per year they must go, and when, to deliver a safe outcome. Will the minister ask the committee for advice on what would be a fair and safe cumulative budget?

Louise Batchelor: That is a pretty big question.

Duncan McLaren: I have a second, smaller question—although it is not really so small. We have talked a great deal about the urgency of action. I want to stress the urgency of some non-action—not doing things that would lock in massive emissions in the future. The minister is responsible for deciding whether, as part of the national planning framework, Scotland will go ahead with large coal-fired power stations, which, without carbon capture and storage technology from day 1, would risk large emissions that would

blow apart any safe budget. I urge that, when necessary, we urgently take decisions not to do things, as well as decisions to do things. [Applause.]

Louise Batchelor: Duncan McLaren raised two issues: cumulative totals and the need for major reversals or changes of heart on some planning issues.

15:15

Stewart Stevenson: Setting a cumulative budget is an interesting issue. In effect, if we set annual targets, we need only add up the numbers to arrive at a cumulative budget. I have already told the Transport, Infrastructure and Climate Change Committee that we are happy to do the arithmetic that will translate the annual budgets into a cumulative budget.

The closer together the targets that any country chooses to set—be they five-year, three-month or one-day targets—the closer we get to understanding what the cumulative budget is. We must remember that the targets are, in any event, only the surrogate for what we are trying to achieve, which is to keep the temperature down. That has been covered in a number of the presentations today.

We need to keep our eye on 2050. As I have said to many people, 2050 is a great challenge, not least because I will be 104 years old. It is some distance ahead, and we might have to do later other things that we cannot conceive of today. I am entirely relaxed about cumulative budgets. In essence, we are doing the arithmetic on that.

Duncan McLaren spoke about the provision in the national planning framework, which is our horizon to 2030 for spatial planning, and he referred to the provision for carbon-capture-ready coal-fired power stations. The technology is not ready today, so we cannot make that commitment.

On the other side of the balance sheet, the other very important thing in the national planning framework is the commitment to develop marine renewable energy. We have one quarter of Europe's potential off our shores—60GW of potential renewable energy. What does that big number mean? It is more than 10 times what we produce as electricity as a nation now, and we are already a nation that exports electricity. The potential for marine energy exists, and the £10 million saltire prize is designed to promote the technical, scientific and engineering work that will improve marine tidal energy generation. We have two types of marine energy that will take us in that direction: wave energy and, down at the bottom, tidal energy.

We would like there to be action on carbon sequestration, which will help us to re-engineer existing plants of a variety of kinds, not just in the power sector. As yet, however, the technology is not there; it is at a relatively early stage, particularly as regards turbines.

Louise Batchelor: Let me bring you back to the subject of Hunterston, minister. This morning, we were talking about capturing hearts and minds, and some people were saying how difficult that is. Some people get it about climate change; others do not. Is part of the problem not that our Government is sending out mixed messages? You are speaking about marine energy and other good things, but you then say that you will have a coal-fired power plant as well. Is there not a real presentational problem in even mentioning that?

Stewart Stevenson: We have to be able to replace the capacity that will come out of our system when our two nuclear power stations close down in the middle of the next decade and the decade after that. Coal is one part of what might be the answer on that timescale, but the longer-term answer will undoubtedly be tidal energy. We are already getting a significant amount of energy from wind power, but wind power is not as reliable as tidal power. Geothermal power is also part of the issue.

Louise Batchelor: So you are saying that you do not have a choice.

Stewart Stevenson: We do not have a choice in the short term, but that is why carbon capture is so important.

Judith Robertson (Oxfam Scotland): I am head of Oxfam Scotland. I would like to bring this morning's international discussion into this afternoon. I am here with my colleagues from many of the countries where Oxfam works—we work in more than 100 countries around the world, for which the immediate issue of climate change is devastating. Hundreds of millions of people's lives are being affected now: for example, subsistence farmers all over the world cannot rely on basic grain supply to get their crops to grow. The situation is not just being caused by poverty; it is causing poverty.

We have an opportunity, through the Climate Change (Scotland) Bill, to show the way. It is still just an opportunity, however—that is the point that I wish to make. I am glad to hear that the questions around annual targets and the 2020 target are still open, but the question needs to close—and do so quickly in such a way as to deliver what the science says. We need to deliver by 2020 in order to deliver what we need by 2050.

We have heard repeatedly that there is no option. We have heard moral arguments, arguments about practicality and efficiency, and

economic arguments. I do not know how many more arguments our politicians need to hear to be convinced that the issue is a live one.

Louise Batchelor: Can we make that into a narrow question about targets?

Judith Robertson: No. It is not a narrow question.

Louise Batchelor: Could you make it into one?

Judith Robertson: No. I want to come back to Simon Pepper's point about confidence and the Scottish football team. The Scottish football team believed that it could win that world cup, but it could not score the goals. Scotland believes that it can lead on climate change legislation—and it can do that—but it has to put the ball in the back of the net. That is basically what I am trying to say, and I would like the minister to say how we will do that.

Louise Batchelor: Thank you for that point. I will turn that into a narrow question for the minister. Are we off with Ally's army? What is the problem with setting annual targets immediately? Everyone tells us that, unless we act within a decade, it will be too late.

Stewart Stevenson: The simple answer is that we do not yet have the science to set the annual targets in the Scottish context.

Louise Batchelor: But have we not seen the science? We know what is happening.

Stewart Stevenson: No. We need a consistent source of scientific advice. At present, we are committed to using the UK Committee on Climate Change, which is currently the best available source. It is important that we use that committee, which has only just been established formally under the UK Climate Change Act 2008, although it existed in shadow form for several months before that.

Scotland's situation is different from that of other countries, so we need specific advice. As I said, we are responsible for one seven hundredth of the world's emissions. Nonetheless, we have to do at least one seven hundredth, if not rather more, in our response, because of our unique opportunities. If we start by making political decisions rather than being driven by the science, we will continue to make political decisions. Future decisions will be adverse rather than beneficial if we allow them to be made at the minister's desk—even with a minister as enlightened as I am.

Louise Batchelor: I thought that we had the science, so I am confused now. Do we have any points on the science?

Justin Kenrick: The science is absolutely crucial. Lord Turner admitted that the UKCCC's findings are based on the IPCC 2007 modelling, which was based on pre-2006 data. We are

getting data now about the Arctic and the permafrost, and we have Kevin Anderson's work at the Tyndall centre and Jim Hansen's work at NASA. All that work shows that the situation is much more drastic than that modelled in the UKCCC's findings. So to follow the science, we should not follow those processes; we should follow what the scientists say now and what they said in Copenhagen last month. The Government is right to follow the science. I am looking at the man sitting next to me, as he is from the Tyndall centre. If I understand it correctly, the Tyndall centre says that we need annual cuts of 6 to 9 per cent now.

At the end of the morning session, Louise Batchelor said that dealing with climate change is a real pain, but I want to say that it is not. I am from the Portobello transition town organisation. I have found that dealing with climate change is a fantastic opportunity to change the way in which communities live and to make them sustainable and vibrant places. Debbie Walker said this morning that, when we take the required steps in response to climate change, we immediately make an economic benefit and improve people's lives. A 6 to 9 per cent reduction in the next year and the year after will enable us to make the changes that we need in our lives. It is a pain not dealing with climate change. That is not a moral pain as a result of the effects on others but a pain because it leads to extinction for us.

Louise Batchelor: Good point.

Rachel Nunn (Going Carbon Neutral Stirling): I will make a pun that is worse than Louise Batchelor's one this morning about a red herring. My team of eight people are at the coalface in dealing with the disinterested public—unlike those in transition towns—and trying to get them to take action on their carbon footprint. Tonight, I am going to a tae kwon do group that has kids and, later on, adults. The guy told me, "You can't talk to the kids, because you can't brainwash them about climate change—I'm not having that." It is an interesting observation that the majority of people in Scotland still seem to think that talking about climate change is slightly taboo, slightly greeny and possibly slightly religious. It worries me that that attitude is still out there. I am allowed to talk to the adults in the group, although I am not sure who is more scared. I wonder whether I am more scared of the rejection, if they do not want to start reducing carbon, or they are more scared that I will ask them to do something. Communication and leadership are essential, and Simon Pepper is right that we need targets and that we need them to be communicated.

I think that there are three businesses on the list of delegates for today's event. Two of them were due to sit between me and Doug McLaren, so they

are either really titchy people or they are not here. If today's event is an informed debate about how we can get a collective and collaborative solution, why are businesses not at the table?

Louise Batchelor: I must admit that I asked where the businesses are and whether they are comfortable with what is proposed in the Climate Change (Scotland) Bill. The encouraging answer was that, by and large, they are comfortable with what is proposed, so we should not be too depressed about the lack of business representation.

Kat Jones (Scottish Natural Heritage): Professor Brown said that climate change is a moral issue and that Governments and states therefore have no excuse for failing to act. The same is true of individuals. My point is about the personal action that each of us needs to take.

There is lots of discussion about reducing our greenhouse emissions through decarbonisation of the economy, and we need to find alternative, low-carbon technologies to take the place of polluting technologies. However, although low or zero-carbon alternatives exist in some cases, we must wake up to the fact that there are by no means zero-carbon alternatives for all our goods and services. Almost everything that we do emits carbon to a greater or lesser extent, and as such it will be a huge challenge to make the cuts that we need to make. Measures to increase efficiency and reduce waste therefore play a huge part in the reduction of emissions, including the use of waste heat, the insulation of homes and more efficient transport.

We need to use our resources as efficiently as possible and we need alternative technologies but, if we want to avoid dangerous climate change, we need to reduce our consumption. We need to use our cars less or not at all, to fly less or not at all, to buy less stuff, to heat less, to mend things and to use less electricity.

Louise Batchelor: I think that most people here would agree with you, but do you have a question?

Kat Jones: The question, I suppose, if the minister is still here—

Louise Batchelor: He is still here—just.

Kat Jones: The positive message is that avoiding climate change means that we need more active transport. We need to walk or cycle and become fitter people. We need to live closer to where we work and to spend more time in our communities. I would like to see an emphasis on that side of the action that we can take on climate change.

Louise Batchelor: Minister, at the last count, only 1 per cent of the transport budget was spent on walking and cycling. Why is that?

Stewart Stevenson: Well, of course, walking is very cheap. I walked here today, and I can tell you that, in the 680 days for which I have been in office, I have made 351 walking journeys of 10 minutes or more. That equates to some 300 miles that I have walked on ministerial business, and that includes only the journeys of 10 minutes or more. Not only that, but let me share with you—I think you are adult enough for this—that I have lost so much weight that I can no longer keep my trousers up without braces. I say that not in a vainglorious way but to illustrate the fact that climate change is about individual action. I think that that is what Kat Jones was saying.

In the past two years, I have almost halved the number of car miles that I travel. It was 40,000 miles. It is still quite high and is substantially above the average, so there is clearly more that I can do, but 59 per cent of my personal journeys are accounted for by rail, walking, bus, ferry, cycle and subway.

Louise Batchelor: I am going to be rude and interject. That is impressive, but your Government still has a massive road-building programme.

Stewart Stevenson: Actually, the Government has a massive railway programme, which has seen a 30 per cent increase in patronage of our railways. We are also putting more money into buses and changing the way in which we support the fuel subsidy of our buses to make it more ecologically focused. Under that work, there will be more rewards when behaviours are more ecologically focused.

We heard earlier about the Tyndall centre. I am not familiar with the figures of 7 to 9 per cent. I will go back and look at that, but I think that the numbers are rather different.

We also heard about Lord Turner, who is one of the great communicators in politics. He is not of my political persuasion, so you should believe it when I say that. He told a Westminster committee that, if the economy grows by 3 per cent per annum—when he said that a year ago, that was reasonable—and the cost of 2 per cent of GDP that Sir Nicholas Stern identified applies, the growth that would have been delivered in January 2050 will be delivered later in the same year. That provides a context for the fact that the pain—the cost—of heading in the right direction is entirely affordable.

15:30

Rachel Nunn talked about not being allowed to brainwash kids. I think—and I suspect that others

think so, too—that the kids are doing the brainwashing, because they have got it much more than we wrinklies have. The kids are proselytising, educating and intervening in their parents' activities, so do keep up your work.

Businesses in Scotland—and elsewhere, I think—are heavily engaged. One hundred and forty businesses have signed up to the May day network, and the climate change business delivery group, which is independent of Government, is working with the Government. Back when I was appointed as a minister nearly two years ago, my second engagement was to talk to the Confederation of British Industry Scotland in Edinburgh. I was surprised to find myself in a room of people who were engaged and enthusiastic. Of course, they were enthusiastic not because of the ethics or the morality, to which I sign up, but because they could see a profit in reducing their energy use. If that is what will take business on the road, let us work with it and have the morals and ethics a wee bit later. If businesses at least do the right thing now, that will be a modest help.

I say none of that to underrate the challenge, which is undoubtedly substantial. Please forgive me for leaving now, as I must undertake other duties.

Louise Batchelor: Thank you very much, minister. As you leave, questions will still be ringing in your ears.

I will try to bring in people who have not had a chance to speak. Two people are trying to speak; I call Adrian Shaw first, but I promise to take you both.

Adrian Shaw (Church of Scotland): I was delighted to hear about the ethical issues that Donald Brown raised, because for the Church of Scotland climate change is primarily an ethical issue, as it will cause much damage to many people around the world. For that reason, we strongly support the Climate Change (Scotland) Bill.

However, we are concerned that the Government will get nowhere near an 80 per cent target by 2050 or any other interim target—no matter how stringent—unless people in Scotland believe in and are committed to action. For the necessary changes to be effective, people must be aware of their scale. We have heard some of the changes being discussed. People will have to believe that those changes must be made in their lives and those of their communities and they will have to know how to make those changes. We are quite a long way from that in Scotland, despite the many exciting projects that we have heard about.

I will draw a parallel with the hugely successful act that the Scottish Parliament passed to implement the smoking ban. Literally overnight,

that changed behaviour in Scotland for the better. Was that legislation so successful because of its fine detail, or because it was argued about, debated and well known and because people said, “I will do it,” when it had to be implemented? We must be in such a position with climate change, but I do not think that the bill will deliver that.

Louise Batchelor: Is the Church of Scotland leading by example?

Adrian Shaw: Scotland has 200 eco-congregations of different denominations. They are people who want to make the change and who want to help cut emissions. That is part of the process and of the solution.

Louise Batchelor: I apologise to Mike Robinson, who stood up at the same time as Adrian Shaw. It is his turn now.

Mike Robinson (Stop Climate Chaos Scotland): I must wear a different coloured shirt next time.

I will start with a semantic point. The annualised targets about which people are nervous are not targets, but minimum targets. It is critical that we use the right terminology. Nobody will applaud us for getting near those levels; we are meant to try to exceed them. I reiterate what my colleague Justin Kenrick said: most of the science refers to cuts of 8 to 9 per cent. The longer we leave it, the higher the targets will probably become. That might be an incentive to rush the bill through before the summer.

I will pick up on carbon capture and storage and on coal-fired power. Of course that remains an issue. It is counterintuitive to proceed with CCS when we are pushing through legislation on climate change. The Massachusetts Institute of Technology said that it did not think that CCS would be practical until 2030, so that technology can hardly address the urgency of the situation.

Louise Batchelor: Thank you very much for making that point.

Bill Slee (Macaulay Land Use Research Institute): I return to the role of the rural land use sector in addressing climate change. It is a pity that the minister has gone—

Louise Batchelor: There are plenty of other people listening and the event is still being webcast, so do not worry.

Bill Slee: We need to get our ducks in a row. There are areas of rural policy in which the targets are not being achieved. We are way below the target of achieving 25 per cent forest cover by 2050. Forestry is invaluable because of the scope that exists for it to be used as a renewable fuel and, as we heard earlier, as a renewable building material.

Another area of rural policy is the Scottish rural development programme, under which grants for renewables are potentially available, but enormous bureaucratic obstacles are put in the way. In parts of Government that could be driving forward the climate change agenda and pushing renewables, there are many obstacles that are not being removed. If we are to reach the targets, it is incumbent on us to get all the ducks in a row—we must ensure that all the directorates of Government are working together effectively. I do not believe that they are at the moment.

Louise Batchelor: We saw what happened when the former Minister for Environment tried to push through an idea to lease off parts of the forests—he failed utterly. What is your opinion of that proposition?

Bill Slee: It was exactly the wrong type of activity. If we want to get communities involved, surely the way to do that and to make possible the provision of localised renewable energy would be through the community forest land scheme, which allows communities to lease or purchase forest land, rather than by leasing it to a multinational company.

Louise Batchelor: Everyone who has their hand up has spoken before. I think that Eddie Phillips has had his hand up the longest.

Eddie Phillips: Although I am here representing Go Greener, I am convener for environment on East Renfrewshire Council as well—I sometimes forget which organisation I am representing.

I am really sorry that the minister has gone because I wanted to put him on the spot. The bill is largely okay, but it is long on what and short on how. Its problem is that it says that tackling climate change is partly down to individuals and partly down to the Government and councils, but there is a missing link, which is core-funded community-leading organisations—in other words, organisations such as Carbon Neutral Stirling, Carbon Neutral Biggar and Go Greener. Such organisations are extremely important. We need them to be supported by the Government and councils if we are to take the message on to the doorstep. There needs to be a step change, and for that we need leadership. Go Greener, the organisation that I represent in East Renfrewshire, is showing such a lead, but we need core financial support for community organisations. We need a commitment on that, and I had hoped that the minister would be asked to respond to that, but that will obviously not happen today.

I finish by saying to the Government, “Well done for what you have achieved, but it is not enough.” We need support for local groups such as Go Greener. We know what we need to do; what we

want are the resources to do it. Please can we get them?

Louise Batchelor: You have highlighted another of today’s running themes, which is about how we get any Government to take good, pioneering, radical action. Does the impetus come from the grass roots up or from the top down? What are the mechanisms? Do we all have to take to the streets? It is clear that communities are starting to take action. I guess that we just need more communities to do that.

We will have another point from the Youth Parliament.

Liam Beattie: Good afternoon. I represent the Scottish Youth Parliament, which debated the bill a few weeks ago at our general meeting in Dunfermline. Although it received overall support, I have two concerns about it. It is a shame that the minister has gone. The first point is about public transport and the second is about aviation.

The brilliant idea of simply not using the car is impossible for people who live in rural areas. This morning I had to spend two and a half hours travelling the 50 miles from Hawick in the Borders to Edinburgh. The car is a much better alternative. Unless better public transport infrastructure is put in place in Scotland, people will not use public transport. They will say, “Why should I have to go on public transport when it is a lot simpler to use my car?”

On aviation, why should a low-income family be prevented from flying to Spain once a year, for example, when a person who works in Canary Wharf can easily fly down to London every day without thinking about the rise in the tax?

Louise Batchelor: There is a huge issue around who should fly and who should not, but I am not sure that today is the day for that discussion. Does it depend on how much money you have, how important your job is or your reasons for flying? It is a massive debate.

No one should worry about the fact that the minister is not here, because members of the committee are still here, and so are the civil servants. You can decide for yourselves whether you think that they are less important than the minister, but his eyes and ears are still here.

Adrian Loening: I am rather concerned that all of the discussion has been rather long on encouraging people to address climate change issues. I am grateful to our friend from the Church of Scotland, who mentioned the smoking ban, because I believe that we need to force measures on the population. For example, I would not be allowed to build a house that had doors that were 2in too low or which did not have a bathroom. However, we are allowed to build houses with

poor insulation and no solar panels and to create streets around them with infinite street lighting and parking places. We need to build into the system a way of ensuring that those matters are dealt with.

I will steal a sentence from a friend of mine who said, "If the world was a bank, we would have saved it since Christmas." Well, the world is a bank, actually.

Louise Batchelor: And a much more important one. Are you saying that, given the nature and urgency of the challenge, we should be almost on a war footing now, and that things should be happening tomorrow?

Adrian Loening: There is technology in existence and straightforward things that we can do. As soon as the bill is passed by Parliament, we can legislate to ensure that no house will be built in Scotland without a solar water heater. The technology is simple; last year, I bought one on eBay for £500, and it works beautifully.

Juliet Swann (RSPB Scotland): I want to pick up on the point that the gentleman from the Macaulay Land Use Research Institute made about land use, especially given that many of the presentations today have been about the impacts that we are already seeing on the land around us and how we are adapting to that. As Dr Burton said, we should not apologise about talking about adaptation as it is part and parcel of the fight to tackle climate change. As the gentleman from the Macaulay Land Use Research Institute said, there are already mechanisms that we can use—we could leave this chamber today and go out and start improving how we adapt to climate change. We can do things now around natural flood management and restoring our peat bogs, for example, that will benefit communities, people's health and the economy as well as fighting climate change.

Dr Burton talked about how the Canadian Government is moving forward on adaptation. I would like to know how it is driving that and what it is doing to achieve the adaptation changes that are necessary.

Louise Batchelor: That is a good question. Dr Burton?

Dr Burton: Very briefly, it is not doing as much as it ought to be doing. It is getting started.

Louise Batchelor: Give us a glimpse of what it is doing.

Dr Burton: We are proposing that the five-yearly land use plan updates that are done at a municipality level should now take climate change into consideration, in relation to adaptation and mitigation. That would involve precisely the kinds of things that the questioner referred to.

Louise Batchelor: That is good.

Fran Loots (Comrie Development Trust): I am from the Comrie Development Trust, and I also work part-time for the John Muir Trust.

We have heard quite a lot about renewable energy, and there is a need to consider that. However, there is an important step before that, which involves the amount of energy that we use in the first place. If the Scottish Government is saying that it does not necessarily need legislation in order to act in this area, the biggest thing that it could do at this time is to make a massive commitment to energy efficiency measures. That would hit two targets at once: it would reduce the amount of emissions, because we would need less energy; and it would have a significant impact on the economy. Those are fairly simple and straightforward measures that are within the Government's gift.

15:45

The other issue is about how we look at how energy is delivered in the long term. One of the communities with which I have had contact with my John Muir Trust hat on is on the island of Eigg. It is interesting to look at what has happened there, where people have gone from a system of relying very much on diesel for their generators, for example, to a system of 95 per cent electrification that relies on renewable energy. The technology is there, and the situation is interesting, but what is really significant is the steps that the community have taken to have responsibility for their lives. They have put a cap on how much electricity they can use. If they trip the system by using too much in their homes, it gets cut off and they have to pay to get it restored. That seems a simple and neat way to deal with the matter—behaviour has consequences and actions issue from them. I would love a system like that in my house; I have teenagers who know all about the world and the changes in it, but they feel that they cannot do much.

Louise Batchelor: They still want to use the tumble dryer.

Fran Loots: Exactly. They do not connect their actions with what happens.

Louise Batchelor: Those are two very good points on which to end the session, particularly the point about energy efficiency, which most people know is a subject very close to Patrick Harvie's heart. I have been asked to hand back to Patrick Harvie, who is convener of the Transport, Infrastructure and Climate Change Committee. Thank you all very much.

Concluding Remarks

Patrick Harvie: I thank Louise Batchelor for her contributions and facilitation throughout the day. I also thank the committee clerks, the events team, the broadcasting unit, the official report and the security staff, who have all helped to make today possible. I thank our speakers, the MSPs and all participants, the Presiding Officer and the Deputy Presiding Officer.

I also extend my thanks to the minister in his absence. I was particularly interested in his comment that all we had to do was to add up those short-term targets to know what the total budget will be. That seems a clear indication that those minimum, anything-above-zero, targets are going to be replaced with some specific targets—numbers that we can add up. I very much look forward to amendments along those lines from the Government—if the Government forgets to lodge them, perhaps somebody else will.

In the morning session, I was really struck by some of the generational issues that were expressed. I grew up with a bit of an environmental activist mother, as Louise Batchelor knows. I used to hear phrases such as, “If we don’t get this right, future generations will never forgive us.” That kind of statement is outdated now and we should stop saying it. It is not about future generations any more; it is about this generation. It is about people living on this ball of rock who are suffering right now; it is about our generation not only having to take responsibility for its actions but living with the harm that has already been caused all around the world. Still we hear of people, particularly in the rich world, seeking indulgences, as Duncan McLaren called them in our morning session—the things that we can do that make us feel a little better, but which do not deal with the fundamental problem.

I lay that charge not just at individuals, because there is a tension between individual and Government effort. Governments more than anyone else are guilty of seeking indulgences at the moment: they seek a policy on this or that, but they do not stop doing the harm at the same time. Our approach will work only if we stop causing harm by building unnecessary roads, expanding airports that we do not need to expand and building new coal-fired generating capacity. If we stop doing those things and do the good stuff, we will get somewhere, but if we take a more-of-everything approach, we will fail.

There is a really crucial moment for all of us. Everyone in the room is aware of how important this year is—not just for Scotland, with its domestic bill, but for the world, with the negotiations that will take place at Copenhagen. There is a fear that we could move from denial

and inaction to defeatism and inaction. Rather than moving from one irrational state to another, we should occupy the rational space between the two, which is to take action.

I was delighted to hear about some of the inspirational action that is planned and is already being taken in the Maldives, to which I pay tribute. We saw a photograph of the country’s capital city, surrounded by a little defensive sea wall. If any country could be forgiven for thinking, “This is not our problem—we must just deal with survival,” or for making a flippant comment about the proportion of the world’s greenhouse gas emissions that it produces, it is the Maldives. However, the Government of the Maldives has not done that but has sought to give genuine leadership. It may have set long-term targets, but it is not waiting to meet those targets or for the rest of the world to act. Instead, it has decided to take action now, within an understandable timescale of 10 years, to show the world that that can be done. I thank Ahmed Moosa very much for his contribution.

Can Scotland show such leadership? Simon Pepper provided us with some useful suggestions. He and others in the chamber talked about having science-driven targets and about starting policy initiatives now, rather than waiting for targets to get through Parliament. The Government of the Maldives has just come to power; the Scottish Government set its 3 per cent policy target nearly two years ago, but the Parliament is still working through the legislation. There is no reason for us to wait for the bill to be passed—we should crack on with the policy target of reducing emissions by a minimum of 3 per cent per year.

We should amend the legislation by, for example, setting limits on the use of international credits. If we accept that we must achieve transformational change in our levels of greenhouse gas emissions and in our contribution to the harm that is being done around the world, it is bizarre to imagine that we can use unlimited international credits as another form of indulgence to meet our targets. We need to make clear that the huge bulk of the effort must be domestic.

I want to say something about the wider issues—the underlying philosophical issues that sometimes get lost when we talk about targets. The concept of a green new deal was behind some of the comments that were made and some of the questions that were asked. When previous generations spoke about a new deal, they were facing a recession and the prospect of war. Behind that threat was a philosophy—the ideology of fascism. People had to deal with the problems caused by the recession in a way that was consistent with combating that ideology. In creating a green new deal—the phrase has been

picked up by Governments around the world—we must take an approach that allows us to deal with the recession and climate change and to move away from using fossil fuels, which are running out, but we must also address the underlying ideology that drives a lot of the harm that has been caused.

I call that ideology consumerism. In the rich western world, we adopted a consumerist economic model. That did not happen through a law of nature—consumerism is not innate to humanity. Instead, there was a deliberate, conscious decision to adopt a political and economic model in the rich world that has allowed the rich to get richer and the poor to get poorer, half the world to be too fat and half the world to be too thin, and precious resources to be plundered and squandered. The consumerist model has allowed the rich world to squander its wealth and to overconsume, while elsewhere some of the most basic human needs are left unmet.

If the climate change challenge requires from us what was described today as a civilisational U-turn, is that not about time? Should we not welcome the opportunity to create such a U-turn? If we see a green new deal only as a stimulus and as a way of reviving life in the economic model that caused the harm in the first place, we are certainly being unambitious.

Overturing a consumer economy—to create what we might call a conserver economy—would mean living within our ecological and financial limits. Yes, that means living with limits on our emissions of greenhouse gases such as CO₂, but that is just one expression of the required change. The limits within which we must live include those for land, water and marine harvest. We have been living beyond those limits.

The green new deal must also have something to say about—this is a dangerous word—population. I do not know what that is yet, because anyone who ever even raises the question is told to get back to China. However, the population question will need to be resolved in some way—I do not know exactly how.

The green new deal will also need to redefine what progress means. We will need to come to an accommodation with the idea that economy shares its roots with ecology. The economy is not just about money—I do not know where such an idea came from—but about all of life. If “sustainable economic growth” is to mean anything—if I am ever to stop laughing at the phrase as an inherent contradiction—both Governments and individuals will need a change of mindset as well as a set of targets.

Over the next few weeks and months as the Climate Change (Scotland) Bill moves through the

committee process, let us focus on getting the targets and framework right but let us not imagine that setting the targets will mean that the job is done. Once the bill has been passed, we will have only the beginning of a transformational change in our economy, society and politics. I hope that everyone here will continue to contribute to that transformational change.

I thank everyone for their contributions today.

The Deputy Presiding Officer: I thank Patrick Harvie in his capacity as convener of the Transport, Infrastructure and Climate Change Committee—another one of those long titles—for bringing together such a diverse range of delegates from all over the world, and from across the climate change world.

I also thank Louise Batchelor, who facilitated our discussions. It is always helpful to have a professional doing the job instead of us amateurs.

Finally, my greatest thanks go to the delegates who have taken part. I apologise to those whose contributions could not be taken this afternoon or, indeed, this morning. I thank all the speakers and delegates for their enthusiasm and for the content of their contributions. In particular, I thank those participants who have travelled here from afar and who have given us valuable insight into what climate change means for their countries. They have helped us to understand the impact that our actions have not just in our own small country but globally.

As delegates leave the chamber, they will be guided to the exit via the garden lobby, where there is a global change exhibition that demonstrates how communities in four continents have responded to climate change. The exhibition brings together the work of various leading nature photographers from *Africa Geographic*, *Australian Geographic*, *Canadian Geographic*, *New Zealand Geographic* and the UK magazine *Geographical*. I hope that everyone enjoys the exhibition.

Thank you all for coming to the Scottish Parliament, and safe home.

Meeting closed at 15:59.

ALPHABETICAL LIST OF DELEGATES

- A** Jillian Anable (Scottish Transport Studies Group)
Ian Angus (Royal Town Planning Institute)
Richard Aspinall (Macaulay Land Use Research Institute)
Simon Aumonier (Scottish Transport Studies Group)
- B** Clifton Bain (RSPB Scotland)
Ben Barclay (Children's Parliament)
Una Bartley (Christian Aid)
Rahul Barua (University of Edinburgh Carbon Management Masters Programme)
Louise Batchelor (Facilitator)
Helen Bath (British Red Cross)
George Baxter (Scottish and Southern Energy)
John Baxter (Scottish Natural Heritage)
Liam Beattie (Scottish Youth Parliament)
Stephen Benn (Royal Society of Chemistry)
Stephen Blackmore (Royal Botanic Gardens Edinburgh)
Donald Brown (Penn State University, United States)
Ian Burton (Meteorological Service of Canada)
- C** Foysol Choudhury (Bangladesh Samity Edinburgh)
Chloe Clemmons (Church of Scotland)
Robert Colburn (British Red Cross)
James Cooper (Transport Research Institute)
Matthew Crighton (Unison Scotland)
Kevin Cullinane (Transport Research Institute)
- D** Dario dalla Costa (Scottish Government)
Richard Dixon (WWF Scotland)
Gary Dunion (WWF Scotland)
Fiona Duthie (Scottish Government)
- E** Christopher Ellis (Royal Botanic Gardens Edinburgh)
Corinne Evans (Friends of the Earth Scotland)
- F** Malcolm Fleming (Oxfam Scotland)
Stuart Francis (Friends of the Earth Scotland)
Allan Fraser (Scottish Government)
- G** Sam Gardner (WWF Scotland)
Stephen Garvie (Building Research Establishment)
Mary Gibby (Royal Botanic Gardens Edinburgh)
Rob Gibson (Scottish Parliament Transport, Infrastructure and Climate Change Committee)
Charlie Gordon (Scottish Parliament Transport, Infrastructure and Climate Change Committee)
Rob Gowans (Scottish Youth Parliament)
Anna Graham (Business Environment Partnership)
David Guggenheim (1planet1ocean)
Anil Gupta (Convention of Scottish Local Authorities)
Kushal Gurung (University of Edinburgh Carbon Management Masters Programme)
- H** Charlie Halpin (NHS Lothian)
Robin Harper MSP
Tom Hart (Transform Scotland)
Patrick Harvie MSP (Scottish Parliament Transport, Infrastructure and Climate Change Committee)
Andrew Henderson (Scottish Government)
Alex Hill (Met Office)
Julian Holbrook (Scottish Climate Change Impacts Partnership)
Kaitlin Hynd (Inverkeithing High School Energy Group)
- I** Fordhadul Islam (Bangladesh High Commission)
- J** Glyn Jones (Go Greener)
Kat Jones (Scottish Natural Heritage)
- K** Justin Kerrick (Pedal Portobello Transition Town and Holyrood 350)
Steve Kerr (Scottish Government)
George Kolasinski (Go Greener)
- L** Daniel Leary (Natural Environment Research Council)
Andy Leitch (Forestry Commission Scotland)
Adrian Loening (Carbon Trade Ltd)
Fran Loots (Comrie Development Trust)
- M** Liam Macauley (Scottish Government)
Murdo MacDonald (Church of Scotland)
Emma Margaret (Comrie Development Trust)
Paul McAleavey (European Environment Agency)
Peter McCarthy (British Red Cross)
Cathy McCulloch (Children's Parliament)
Helen McFarlane (Royal Society of Chemistry)
Alison McInnes (Scottish Parliament Transport, Infrastructure and Climate Change Committee)
Doug McLaren (Tayside Foundation for the Conservation of Resources)
Duncan McLaren (Friends of the Earth Scotland)
Kristen Miller (Convention of Scottish Local Authorities)
Asher Minns (Tyndall Centre for Climate Change Research)
Fiona Montgomery (Unison Scotland)
Ahmed Moosa (Maldives Government)
Alan Motion (Met Office)
- N** Ibnu Najib (University of Edinburgh Carbon Management Masters Programme)
Somanath Narayan (University of Edinburgh Carbon Management Masters Programme)
Hussain Naseem (Independent)
Colin Neilon (Inverkeithing High School Energy Group)
Chris Nixon (Forestry Commission Scotland)
Rachel Nunn (Going Carbon Neutral Stirling)
- P** Fiona Page (Scottish Government)
Guillaume Pajot (Macaulay Land Use Research Institute)
Sean Parkhill (RSPB Scotland)
Connor Paschke (Children's Parliament)
Mike Passway (University of Edinburgh Carbon Management Masters Programme)
David Paterson (ASDA)
Jo Paulson (Business Environment Partnership)
Cathy Peattie (Scottish Parliament Transport, Infrastructure and Climate Change Committee)
Simon Pepper (Independent Climate Change Consultant)
Eddie Phillips (Go Greener)
- R** Mark Rands (Royal Society of Edinburgh)
Siobhan Reardon (Transform Scotland)
Dave Reay (University of Edinburgh)
John Riley (Scottish Action on Climate Change)
Judith Robertson (Oxfam Scotland)
Mike Robinson (Stop Climate Chaos Scotland)
Andy Ross (Carbon Rationing Action Groups)
Lilian Rushaigo (University of Edinburgh Carbon Management)
- S** Adrian Shaw (Church of Scotland)
Bill Slee (Macaulay Land Use Research Institute)
Gillian Smith (Scottish Government)

Shirley-Anne Somerville MSP (Scottish Parliament Transport, Infrastructure and Climate Change Committee)

Gavin Stephen (Scottish Government)

Stewart Stevenson MSP (Minister for Transport, Infrastructure and Climate Change)

Michaela Stewart (Children's Parliament)

Steven Stewart (Stagecoach Group)

Pamela Strigo (High Commission of Canada)

Juliet Swann (RSPB Scotland)

T Hannah Taylor (Royal Society of Chemistry)
 Jessica Tattersall (Scottish Government)
 Cathy Tilbrook (Comrie Development Trust)
 Sagan Turner (Inverkeithing High School Energy Group)

U Wali Uddin (Bangladesh in Scotland)

W Debbie Walker (Scottish Transport Studies Group)

Sarah Watson (Oxfam Scotland)

Melissa Waugh (Scottish Government)

Jan Webb (Royal Society of Edinburgh)

Alan Werritty (Royal Society of Edinburgh)

Gordon Wilmsmeier (Transport Research Institute)

Gail Wilson (Stop Climate Chaos Scotland)

Ruth Wolstenholme (Scotland and Northern Ireland Forum for Environmental Research)

Christine Wood (Tullis Russell Papermakers)

Philip Wright (Scottish Government)

Connor Wyse (Inverkeithing High School Energy Group)