CLIMATE CHANGE

PUBLIC CONVERSATION SERIES

Findings from Climate Conversations 2017/18

Prepared by The Surefoot Effect for The Scottish Government

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Background

The Scottish Government initiated a series of "Climate Conversations" in 2016 to encourage a discussion about how we can reduce the emissions that cause climate change, and prepare for a changing climate. Feedback from these conversations supports a better understanding of what people feel about the actions needed to cope with climate change.

The format for the conversations is described in the Climate Conversations "How to Guide[1]" based on the research undertaken by Climate Outreach on behalf of the Scottish Government and ClimateXChange. This guide offers a step-by-step approach to help people to engage with the issue of climate change and enjoy being part of a conversation. This approach is based around a 70-minute conversation with a group of approximately five to ten people.

For more background about the project and the findings of climate conversations held in 2016, see the earlier report "Findings from Climate Conversations September 2017"[2].

This current report summarises the findings from a series of 'Climate Conversations' undertaken with the Scottish public during 2017 and 2018, to 'take the temperature' of public views on climate change and on potential actions to tackle it. Ten conversations were held with non-environmental focused voluntary and community groups across Scotland.

The conversations included discussion of nine low carbon scenarios of what life might look like in Scotland in the year 2030. The scenarios covered Transport, Energy, Food and Consumption. This iteration of the Climate Conversations also provided participants with some selected information from the Met Office about climate change during the session. This was an experiment in response to feedback from participants in previous years that they wanted information about climate change from a trusted source.

The conversations were organised, facilitated and reported by The Surefoot Effect. The Surefoot Effect would like to thank the following organisations their assistance with organising conversations: Amnesty International; Association of Chartered Certified Accountants; Dumfries Writers' Group; Edinburgh Mountaineering Club; Mayfield Community Council; Police Scotland Youth Volunteers; Tagsa Uibhist; Transition Town Forres; Triratna Buddhist Group; and Young Edinburgh Action.

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[1] Climate Conversations 'How to' Guide
http://www.gov.scot/Topics/Environment/climatechange/lowcarbonbehaviours/climate-conversations-how-to-guide
[2] Climate Change Public Conversation Series: Findings from Climate Conversations September 2017
http://www.gov.scot/Topics/Environment/climatechange/lowcarbonbehaviours/findings-from-climate-conversations

Key Findings

Climate change and its causes:
- Most participants accept that climate change is happening and is due to human activity.
- There is however some of uncertainty about the role of natural cycles in climate change.

Impacts of climate change:
- Flooding and higher rainfall are the most widely stated manifestations of climate change in Scotland.
- Many participants were unable to suggest how climate change might affect the scenes they had chosen beyond the direct impacts of flooding and higher rainfall.
- A minority of participants suggested how climate change might have more complex impacts on the environment and quality of life, including wondering if it would still be possible to live in some coastal areas and whether future generations would be able to enjoy a beautiful natural environment.

Information about climate change:
- There is a desire for clear, reliable information about climate change.
- Several participants said the information presented was familiar and that they believed it was fairly well known.
- Participants were surprised that 15 of the 16 warmest years on record have occurred since 2000 and that scientists have known about the greenhouse effect since the 1800s.

Tackling climate change:
- Participants broadly accept and welcome the solutions and behaviours presented in most of the scenarios.
- Education is seen as important, but it is recognised that knowledge and awareness does not by itself translate into behaviour.
- There is some concern that some of the scenarios put too much onus on individuals, requiring too much time and commitment.
- There is a feeling that businesses and government should do more to make acting on climate change easier and attractive for individuals.
- There is a perception of a gap between government "rhetoric" and practical action, especially in relation to the planning system and financial support.
- There is widespread scepticism that the changes to public transport and travel habits presented in the scenarios could or would be delivered.

Taking action
- Most participants said in the end of conversation feedback they might take action as a result of the taking part in the Climate Conversation.
- The most popular proposed actions related to food purchasing and growing, followed by informing others about climate change, and making different travel choices.
- Three quarters of the proposed action given were personal actions that did not involve communicating or engaging with others.
- Two thirds of those giving feedback suggested information, funding, support and encouragement of others would help them undertaken actions.

- Nearly all follow-up survey respondents reported speaking to at least one other person about climate change as a result of the climate conversation. The largest number was over 100, the median was 4.
- Nearly half of follow-up survey respondents reported they had taken at least one action as a result of the climate conversation.

1. Introduction

1.1 Background

The Scottish Government initiated a series of "Climate Conversations" in 2016 to encourage a discussion about how we can reduce the emissions that cause climate change, and prepare for a changing climate. Feedback from these conversations supports a better understanding of what people feel about the actions needed to cope with climate change.

The format for the conversations is described in the Climate Conversations "How to Guide" based on the research undertaken by Climate Outreach on behalf of the Scottish Government and ClimateXChange. This guide offers a step-by-step approach to help people to engage with the issue of climate change and enjoy being part of a conversation. This approach is based around a 70-minute conversation with a group of approximately five to ten people.

For more background about the project and the findings of climate conversations held in 2016, see the earlier report "Findings from Climate Conversations September 2017"[3].

This current report summarises the findings from a series of 'Climate Conversations' undertaken with the Scottish public during 2017 and 2018, to 'take the temperature' of public views on climate change and on potential actions to tackle it. Ten conversations were held with non-environmental focused voluntary and community groups across Scotland. See Appendix A for details.

1.2 Methodology

In total 90 people participated in the ten conversations. Each conversation was associated with a non-environmental focused voluntary and community group. The groups included a local community growing group, a community council, a group of mountain climbers and group of young people engaging with a local authority. The conversations were held in cities, towns and an island.

In most of the cases the participants knew each other as fellow members of the group. In some cases, conversation was arranged as a standalone event to which group members were invited, in others the conversation was incorporated into one of the groups regularly meetings. The conversation was scheduled to take no more than one hour and thirty minutes.

While the findings from them are not statistically representative of the views of the Scottish public as a whole, they provide in-depth qualitative information about the participants' knowledge about and attitudes towards climate change, and potential measures to tackle it, as well as about broader issues arising from the conversations.

The conversations were facilitated using the 'How To' guide. They included two core activities from the 'How To' guide, and one new, pilot activity:

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[3] Climate Change Public Conversation Series: Findings from Climate Conversations September 2017 http://www.gov.scot/Topics/Environment/climatechange/lowcarbonbehaviours/findings-from-climate-conversations

1. *Core*: **Protecting what you love** activity: participants were asked to select one from a range of photos of Scottish scenes, discuss why they chose it and how the scene might be affected by climate change.
2. *New*: **Information about climate change** activity: Participants were given a sheet with information about climate change (see Appendix B). They were asked what information most surprised or interested them. The group then discussed their views on the information selected. This was a pilot in response to feedback from participants in previous years that they wanted information about climate change from a trusted source. This new activity was carried out between the other two.
3. *Core: **Scotland 2030 scenarios** activity*: participants were asked to consider 9 'low carbon scenarios' drawn from the 'Scotland 2030' publication, which give examples of what everyday life in Scotland could look like in 2030[4]. They were asked to consider which of these scenarios they felt most positive about, would support most strongly, or would be most likely to do, and which they felt least positive about, would support least, or would be least likely to do. They then discussed the scenarios.

All these activities generated in-depth and at times wide-ranging discussions which illustrated participants' knowledge and attitudes in relation to climate change and low carbon behaviours. Different views were expressed within and between individual conversations. This report reflects the range of views most commonly expressed across all the conversations, but does not set out to reflect each individual point expressed.

Notes were taken during each conversation. These were analysed to identify common themes and relevant issues arising from the discussions.

It should be noted that, while keeping the conversation on track and within time, the facilitators let the discussions flow naturally. The fact that a particular topic was not discussed may indicate that the conversation went in a different direction or dwelt on other issues, rather than reflecting a lack of interest in the topic.

Two further activities outside the actual conversation generated additional data for this report:
1. **Feedback form**: At the end of each conversation participants were asked to complete a feedback form. This included questions about what action they might take as a result of the conversation. (See Appendix C)
2. **Follow up survey:** This is a new element used in this set of Climate Conversations, with the aim of finding out what actions relevant to addressing climate change participants have taken as a result. (See Appendix D)

2. Findings

2.1 *Protecting what you love* activity

Participants were asked to look at a range of photos of Scottish scenes and to choose one which appealed to them or represented something they cared about. They were then invited to discuss why they chose it and how the scene might be affected by climate change.

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[4] Scottish Government (2015) Scotland 2030 project. http://www.greenerscotland.org/scotland-2030

The key findings from the *protecting what you love* activity are:

- Almost without exception participants accept that climate change is happening.
- Most accept this is due to human activity.
- Flooding and higher rainfall are the most widely stated manifestations of climate change in Scotland.
- Many participants were unable to suggest how climate change might affect the scenes they had chosen beyond the direct impacts of flooding and higher rainfall.
- A minority of participants suggested how climate change might have more complex impacts on the environment and quality of life, including wondering if it would still be possible to live in some coastal areas and whether future generations would be able to enjoy a beautiful natural environment.
- While there was little opportunity for discussion of these suggested impacts, other participants appeared inclined to accept rather than reject them.
- No differences between participants' views, for example by age or geography, emerged.

The sections below present the main issues that arose in discussion of different scenes, illustrated with representative quotes from participants.

Wildlife and plants

Photographs of wildlife and plants were often chosen because people were attracted by the animal or bird, or because the scene represented an interest such as hillwalking.

Participants were unable to say with any detail how the scenes might be affected by climate change. A notable exception in several groups was the knowledge that puffin numbers have declined due to a dearth of sand eels; though this was not related to climate change. A typical comment in the session was:

> *"More heat will kill plants."*

Coastal landscapes

Photos were chosen because of the beauty of the scenes and because the activities shown, such as camping, reflected people's interests.

Most participants said they expected climate change to cause flooding of low lying areas. Many also suggested there would be more rain.

> *"This will be changed: it will be underwater, there'll be lots more bad weather."*

> *"Thinking about living in an isolated rural place. Will it still be possible in the future?"*

Coastal towns and villages

Photos were chosen for a range of reasons and gave rise to discussion of climate change on society and economy as well as nature.

Participants said climate change might negatively affect fisheries and aquaculture as well as the tourist industry, as a result of changes in sea temperature, flooding and weather.

> *"Sea level rise may affect it; and impacts to wildlife and sea life. How bad does it have to get before people can't live there?"*

Inland landscapes

Pictures of mountains and wild landscapes, with and without humans, were chosen because they reminded people of interests such as hill walking and because of their beauty.

Many participants found it difficult to imagine how climate change might affect these views. Wetter weather was suggested, as were more wind farms.

> *"That picture of a mountain. It's beautiful and simple. Imagining it changing because of climate change? I'm not sure. I can imagine the snow disappearing. But I'm not sure what else might change in that picture. It's quite a bare landscape anyway."*

Cities and buildings

Pictures of cities and buildings were chosen by a few participants, often because of a personal connection with the place.

In the discussion participants were generally unable to say how the scene might be affected by climate change. There was some discussion of the energy performance of new buildings.

> *"It will be warmer in cities but I don't know what else."*

Agriculture

Pictures of highland cows and sheep appealed to several participants.

While no clear themes emerged about how climate change would affect them, discussion often included wider land use issues.

> *"There will be less sheep and more trees to help stop flooding."*

> *"How will consumption of beef change? Land management needs to change, biodiversity will change."*

Transport infrastructure

The photographs of transport infrastructure tended to be chosen as symbols of the need to change or, in the case of the Forth Rail Bridge, because of their iconic status.

They generated discussion about the potential of rail travel to reduce carbon emissions, and the importance of rail travel being affordable for all.

> *"I chose this because I believe that transport policy is vitally important if we are serious about tackling climate change."*

There were few suggestions of how transport infrastructure might be directly impacted by climate change.

Oil industry

Pictures of oil rigs and related shipping often prompted discussions about the change in the use of energy over time and the related impact on jobs and economy. Participants clearly identified oil infrastructure with the causes of climate change, and also with direct pollution. Some highlighted the jobs and economic benefits that have come from the exploitation of North Sea oil, and while saying that oil must be on the way out, wondering will replace those benefits. There was scepticism about the oil industry's response to climate change.

> *"Reminds me of working for Shell - black gold is coming to an end; what will it be replaced by?"*

> *"The oil industry. What are they doing about climate change? Probably doing some greenwash, but are they really changing? Should be investing in renewables!"*

Intergenerational issues

Several images, especially pictures of children playing outside, stimulated discussion about intergenerational issues.

Participants expressed concern that a beautiful natural environment would not be available to future generations as it will be negatively affected by climate change. Several also highlighted the potential of time in nature to engage young people in caring for the environment.

> *"I'm thinking about future generations. I want them to be able to play outdoors, to have the joy of discovery, being out in the sun."*

> *"Young people developing an appreciation of nature and the countryside is important. They are going to be more affected by pollution etc than we are."*

Leisure and sports

Several different images reminded participants of leisure and sporting activities. Generally participants imagined these would be negatively affected by climate change:

> *"We won't be able to have Olympics in hot countries as it will be too hot."*

> *"There may be no golf courses in future, less camping. These won't be appealing hobbies as it will be too wet."*

Global issues

Despite all the photos being of Scottish scenes, some prompted discussion of global issues such as the global impact of pollution and conflicts between different interest groups over resources.

> *"...the litigation in the United States between the farmers who farmed oysters and mussels, and the big cities and the corporations, all of whom were competing for freshwater and this is only going to get worse and worse."*

Some identified positive signs of international cooperation.

> *"Blue Planet II has talked about global warming and temperature rises in the ocean. Global action is being taken to combat this. If people and countries take action on this information maybe it won't be so bad."*

2.2 *Information on climate change* activity

This iteration of the Climate Conversations provided participants with some selected information from the Met Office about climate change during the session (below and Appendix B). This element is not included in the How to Guide, and was not used in previous conversations. This was a pilot activity in response to feedback from participants in the Phase 1 conversations that in general they wanted more information about climate change from a trusted source.

Participants were asked to read the information and to share with the group any items that they found interesting or surprising. This led naturally into a discussion of the information and people's responses to it.

The key findings from the *information on climate change* activity are:
- Most participants accept that climate change is happening and is caused by human activity.
- There was however some uncertainty about the role of natural cycles in climate change and a desire for clear, reliable information.
- Several participants said the information presented was familiar and that they believed it was fairly well known.
- The fact that 15 of the 16 warmest years on record have occurred since 2000 was the most surprising piece of information presented.
- The fact that scientists have known about the greenhouse effect since the 1800s was also particularly surprising to participants.
- Participants expressed doubt that greater awareness of climate change would by itself translate into changed behaviours.

The findings below are in two sections: firstly, general findings about people's responses to the information and the subsequent discussion, and secondly participants' comments on the specific text presented (boxed below). Unless noted below there is no evidence of participants from different demographics or geography holding views distinct from others.

Evidence of climate change

Overall there was an acceptance that climate change is happening and that it is caused by human activity.

> *"I think that the most surprising thing is that some politicians and leaders don't accept that climate change is happening."*

For a number of participants the information presented was not unfamiliar, and they believed that such knowledge was fairly widespread.

> *"It is shocking to see the statistics but this information is well known."*

While there were no dissenting voices it was common for participants to raise doubts, especially about whether natural cycles are also influencing climate change. There was a demand, both explicit and implicit for clear information about climate change.

> *"They have reported that the cycle of the earth, it does heat up and cool down over time. Don't get me wrong, I do believe we are consuming too much of our environment. But what I want to know is whether global warming is part of the natural cycle?"*

> *"Obviously there is the human influence, and we're seeing more extreme weather and temperature rising. […] It's just you get conflicting stories."*

Is evidence enough?

In some groups there were discussions about whether evidence of climate change was sufficient to bring about the changes needed to address it. Generally it was felt that the challenge was to change behaviours rather than to convince people of the causes and effects of climate change.

> *"I'm not saying that data is not important, I'm just saying that presenting the data is not going to bring about the changes that we need."*

It was suggested that people in Scotland are generally divorced from the effect of climate change. Some highlighted the effect that personal experience of, for example, of visiting retreating glaciers, had on them.

> *"We need facts and figures about human influence to be promoted, eg news about ice melts is not meaningful; what is meaningful for Scotland? We are not at the frontline for impact. We need to extend the circle of concern for example in South Africa, Cape town running out of water has struck a chord."*

The paragraphs below report participants' responses to the specific text presented (boxed).

Global warming and Greenhouse gas emissions

Evidence that CO2 emissions are the cause of global warming is very robust. Scientists have known since the early 1800s that greenhouse gases in the atmosphere trap heat.

Global CO2 emissions from human activity have increased by over 400% since 1950. As a result, the concentration of CO2 in the air has reached more than 400 parts per million by volume (ppm), compared to about 280ppm in 1750 (around the start of the Industrial Revolution).

The most common comment on this text was surprise that scientists have known about the greenhouse effect since the 1800s.

> *"The second paragraph just threw me! Scientists have known since the 1800s about the greenhouse effect. (murmurs of agreement) that's over 200 years ago!"*

Temperature

> 2016 was the first year in modern records where surface CO2 stayed above 400 ppm for the entire year. 2014, 2015 and 2016 all saw record global temperatures. 2017 is on track to be one of the top three warmest years on record. 15 of the 16 warmest years on record have occurred since 2000.

The most common comment, not just on this text, but across the entire document, was surprise that 15 of the 16 warmest years on record have occurred since 2000.

> *"15 of the 16 warmest years on record have occurred since 2000, you know that really spells it out about climate change."*

Ocean

> 2016 annual average sea level was the highest in the satellite altimetry record (1993–present), rising to 82 mm above the 1993 average.

This was mainly discussed in a group based in a low lying coastal area. There was general agreement that sea level rise is important but a difference of opinion about the extent to which others in the community recognised it as a problem.

> *"But do people really see sea level rise a threat? I'm sure they don't."*

> Responses: *"Lots of people do!" "I know people who are worried."*

Ice

> Glaciers have lost ice for the 37th successive year. The summer minimum Arctic sea ice decreased by 13.3% per decade from 1979 to 2016.

This was mentioned by participants in a few groups. Three participants referred to personal experience of seeing retreating glaciers.

> *"The year on year loss of ice and glaciers in the Arctic, that's just… the 37th successive year! (Voice of despair) I mean, yeah come on…"*

Human Influence

> More than 150 studies have been carried out looking at whether human influence on the climate contributed to specific extreme weather events. Almost all studies related to extreme heat indicate human influence. A smaller but increasing number detect a human influence in rainfall extremes.

The statement refers specifically to the causal relationship between human activity and extreme weather events. However, when this paragraph was mentioned by participants it was almost invariably assumed to relate to human activity causing climate change. They expressed surprise that evidence for climate change rested on so few studies.

> *"Surprised there are only 150 studies about man's impact - thought there would be more."*

In the subsequent discussion of this statement the facilitators pointed out that it related to specific extreme weather events, not to climate change. This indicates the ease with which information can be misinterpreted.

2.3 *Scotland 2030 scenarios* activity

This section discusses findings from the *Scotland 2030 scenarios* activity, in which participants were asked to read nine scenarios of what life might look like in Scotland in the year 2030 and to say which of these scenarios they felt most positive about and which they felt most negative about.

The key findings from the *Scotland 2030 scenarios* activity are:
- Participants broadly accept and welcome the solutions and behaviours presented in most of the scenarios.
- Education is seen as important, but it is recognised that knowledge does not always translate into behaviour.
- There is some concern that some of the scenarios put too much onus on individuals, requiring too much time and commitment.
- There is a feeling that businesses and government should do more to make acting on climate change easier and attractive for individuals.
- There is a perception of a gap between government "rhetoric" and practical action, especially in relation to the planning system and financial support.
- There is widespread scepticism that the changes to public transport and travel habits presented in the scenarios could or would be delivered.

Each scenario is presented below, followed by related findings and some quotes from the conversation.

2030 Scenario: Next generation - P7 learns about Carbon

> - Your local primary 7 class are learning about personal carbon accounting
> - One of the pupils has been quizzing you about what things used to be like in the 'olden days' before people cared about their carbon footprint
> - You tell him that when you were little there was only one kitchen bin that everything went into

Education was generally seen as important, and for many people it was the one they felt most positive about. There was a general view that young people are more knowledgeable about 'looking after the planet' than older people as a result of current education practice.

It was recognised however that knowledge does not always translate into behaviour, especially when young people do not see their parents and others acting as they have been taught.

> *"It's all very well teaching things at school, but a message that's not backed up by any activity at the home it might as well never have been mentioned."*

The broad approval for this scenario was qualified by a few participants, with reference to particular aspects of the scenario:
- Relevant education should be included throughout school and university;
- It puts pressure on those with least power to change individual behaviour rather than changing the system;
- Negative views of personal carbon accounting;
- The scenario is wrong to say "there was only one kitchen bin" when in the past many waste materials were recycled.

> *"I wouldn't tell the class that when I was a child there was only one bin! Because in Edinburgh we had the pig bin and paper collection!"*

2030 Scenario: Weekly food shop - more local, fresh food for you to cook yourself

> - You scan the barcodes to see where products have come from, to check the carbon cost
> - You cook most of your meals from scratch so don't have lots of packaging
> - You still try to minimise any packaging and recycle anything left.

Cooking from scratch was popular with many participants, it was seen as having multiple benefits including being healthier and cheaper. However, concern was expressed by some that other people would not take the time required to do so.

> *"I like the weekly food shopping and cooking food for yourself. Because it addresses food needs not just carbon emissions. It also means you will be eating more healthily and eating less processed food. I care about that."*

Knowing the source of products was attractive to some, but many felt scanning products would be inconvenient and time consuming. Shopping was often seen as enough of a chore without adding extra complexity.

Some questioned why this burden of choice should fall on the consumer, arguing that retailers should stock local, seasonal and unpackaged food.

> *"Shops should stock seasonal local food - do we really expect people to check everything?"*

2030 Scenario: Local streets – easier to cycle

> - Streets and city centres are designed for people – you find it safer and pleasanter to walk or cycle for short journeys.

Better provision for cycling to make it safer and more practical was seen as positive by all. Walking however was mentioned only in passing.

> *"'Streets and city centres are designed for people': I like that! It would be a step forward!"*

2030 Scenario: Growing your own local seasonal food

- You've had an enjoyable visit to the community garden
- You've been doing some weeding in your area of the garden, and enjoyed the banter over a cup of tea
- You took the bus to the garden but will lift-share back with a friend.

Growing food locally and in community gardens was seen by many as good idea. Additional benefits for mental health and community cohesion were also mentioned.

However some doubts were expressed about the practicality and popularity of this.

> *"We didn't like 'growing your own food' - the idea is good but the time commitment? More of a hobby than practical; asking people to go back to the past."*

2030 Scenario: Community energy

> - You arrive home to a warm home powered by: – the new district heating system for all the homes in your area – the air source heat pump you've just installed – the local community wind turbine
> - Granted, it was a bit of a hassle to get it installed, but it was worth it because now it's always a comfortable temperature in the house, you are not reliant on the delivery of oil and you don't have large energy bills.

The concept of community energy schemes was welcomed in principle by most participants, though uncertainty about the effectiveness of several particular technologies was expressed.

Where the benefits of schemes was believed to go to others (i.e. corporations) this was seen as negative.

> *"Community energy sounds very good. It feels to me because it's across-the-board, for everyone. If it could be done I would like to see ways in which the big companies weren't making a massive profit out of it."*

> *"All of the council flats in X have solar panels, but my electricity bills have gone up, so the council must be getting all of the benefit."*

Many people highlighted what they saw as a disconnect between government "rhetoric" and practical action, asking:
- Why doesn't the planning system require all new houses to have sustainable energy sources?
- Why is there not financial support to install renewable energy systems?
- Why does the planning system make it difficult to install renewable energy systems?

> *"Why don't they just say all new homes have to have solar panels? It makes me nervous about them when I don't see new homes with them; if they were that good why aren't they there?"*

2030 Scenario: Getting around – better transport

> - Using real time travel information streamed to your phone you are able to catch the train in perfect time
> - For longer journeys, or where public transport is limited, car clubs are popular, giving people easy access to a car. People book a car and pick it up in their neighbourhood.

Participants generally felt that better public transport, both buses and trains, was desirable but that at present the availability and convenience of public transport is frequently a barrier to use, especially in rural areas.

> *"We might like to take public transport, but there just isn't any to take! Or trains aren't working, or full of drunken awful people."*

Groups in rural areas often highlighted that car use is essential.

> *"Rural economies are very, very car centric, there are huge number of places you can't go to if you don't have a car. The bus service is atrocious."*

There was a degree of confusion between car clubs and lift sharing. The majority view was that both were inconvenient, mainly due to the difficulty of coordinating trips and being constrained by availability.

Some doubt was expressed about the environmental benefits of car clubs as people will still be driving.

In contrast to all the other scenarios there was widespread scepticism that improvements to public transport could or would be delivered - not only at the level of policy but also due to people wanting to use their own cars.

> *"If you look at the [region X] City Deal, it's not going to make any real improvements, the traffic is just going to reach the traffic jams quicker."*

> *"People are still going to drive around. It's just not doable."*

2030 Scenario: Keeping the heat in – warmer homes

> - In the morning your room is a comfortable temperature, despite the frost last night
> - You really feel the benefit of the extra insulation and triple glazing you installed – it hasn't even been necessary to heat the bedrooms in the mornings.

Insulation and related measures were seen as positive and worthwhile, with people often reporting benefits, especially improved comfort, from their personal experience.

> *"We have recently had a big scheme to put external installation on lots of houses locally, funded by the Scottish Government. I know myself the difference it's made having the house warm and comfortable. There is a lot of things we can do to improve. There should be more of that."*

However, some participants reported barriers due to the planning system.

> *"The council wouldn't let us put in double glazing, because the house is listed."*

2030 Scenario: Morning routine – short but hot showers

> - In the morning, you hit the timer as you jump in the shower and it starts to count down your 4 minutes of hot water
> - If you shower in the evening, you don't always use the timer, as you can make the most of the hot water generated by your solar thermal panels during the day.

Taking short showers was unpopular with all groups that discussed the scenario. People enjoyed their showers and were unclear why showers, as opposed to other uses of energy, were being 'regulated'.

2030 Scenario: Working life – work closer to home

> - With changes in the way people work, more of us are working more flexibly, with fewer long daily commutes to our work place
> - It's common to use a local office close to our home or take advantage of local shared working spaces where desks can be hired from day-to-day
> - Many tradespeople have developed new skills to install energy efficiency and renewable heating systems for homes and businesses – this work now contributes most of their income.

The potential of shorter commutes to reduce stress and improve work life balance was widely welcomed.

Feelings about working from home and from shared working spaces were mixed.

Many people emphasised the importance of the social aspects of working life and felt that these would be compromised by working from home.

Local, shared working spaces were seen as having potential to provide social contact, compared with working from home, though lack of connection with one's work team were a concern for some.

Several participants shared their own positive experience of working from local hubs.

The potential of working more locally to significantly reduce traffic congestion and carbon emissions was highlighted by some participants.

2.4 Findings from feedback form

A feedback form (see Appendix C) was offered to all 90 participants at the end of the conversation to be completed before they left. 86 forms were returned to the facilitator. Participants were asked "What are the two actions you might take as a result of this conversation?" and what help might be useful. In both cases no options were given on the form and we analysed free text data.

The key findings from the feedback form are:
- Nearly all respondents said they might take action as a result of the taking part in the Climate Conversation.
- The most popular actions related to food purchasing and growing, followed by informing others about climate change, and making different travel choices.

- Three quarters of the action given were personal actions that did not involve communicating or engaging with others.
- Respondents suggested what might be helpful for two thirds of the actions, including information, funding, support and encouragement of others.

The feedback form was completed by 86 participants, 77 (90%) said they might take action, and a total of 133 relevant answers were given. (Nine participants did not respond to this question, some noted one action and a few noted more than two.) The responses have been grouped into the category shown in Table 1.

Table 1: The actions participants reported in the feedback form that they might take.

Category	Number of actions*	% of all actions
Food	26	20
Inform & Discuss	20	15
Transport	20	15
Research	16	12
Home energy	15	11
Reduce/reuse/recycle	15	11
Water	7	5
Community energy	5	4
Other	9	7
Total	**133**	**100**

*Some participants reported more than one action

The same responses were also analysed to identify comment by the sphere activity: whether it was *personal action*, relating only to themselves, *communicating* about climate change, or *engaging* in group or community activity on climate change. See Table 2.

Table 2: Actions by sphere of activity

Category	Number of actions*	% of actions
Personal action	98	74
Communicating	17	13
Engaging	18	14
Total	**133**	**100**

*Some participants reported more than one action

For each action they proposed, participants were asked to indicate what might help them take it (Table 3).

Table 3: Help required to undertake actions

Actions	Number of actions*	% of actions
Help required	91	68
No help required	42	32
Total	**133**	**100**

*Some participants reported more than one action

Proposed actions and help required

Food

A total of 29 proposed actions were given by participants. Of these around two thirds were related to changing purchasing and cooking habits to use more local and unprocessed food, to cook from scratch and to reduce packaging. All of these feel into the "personal" sphere.

> *"Buying food locally and in less packaging."*

The remaining third of actions related to growing food. In only two cases was the location they wished to grow food mentioned: once at home and once in a community garden. Only two actions fell outside the "personal" sphere: getting involved with a community garden, and promoting more growing of local food.

Help required for actions relating to purchasing and cooking were mainly changes in the market including:
- Supermarkets reducing the packaging on products
- More information from retailers about the origin of products

Help required for actions relating to growing food included recipes for local produce, the council making land available, and support from family and friends.

In both cases many participants did not indicate they needed any help.

Inform & Discuss

A total of 20 proposed actions were given by participants. Three quarters of these fell in the 'communicating' sphere of action. Of these the most frequently proposed was communicating about climate change with other people.

> *"Try and inform others about climate change"; "Write report of discussion for my congregation"*

Other proposals included:
- Continuing discussion with the group: *"Continued group discussion on the points raised"; "Gather feedback from [the group] about what we should do next."*
- Organising specific events, including further Climate Conversations: *"Organise a debate about global warming, possible involving schools;" "Hold more climate conversations with project participants".*

A quarter of proposals involved going beyond communicating to engaging more actively with others, including campaigning:

> *"Becoming more involved in community activism, both generally and in particular regard to mitigating the adverse effects of climate change."*

Most respondents indicated they would need help of some kind, primarily information.

Transport

A total of 20 proposed actions were given by participants. Over three quarters of these fell in the "personal" sphere of action, mainly stating their aim to change their mode of transport, in particular to cycle more; use public transport and to car share.

> *"Use public transport for long journeys (short difficult as I live in the country)."*

The remainder of the proposals related to "engaging" in wider activities:

> *"Funding application for an electric minibus."*

Just over half the respondents indicated they would need help. The main needs were related to better provision of public transport, and information or apps to access public transport information.

Research

A total of 16 proposed actions were given by participants, the most being to find out more about climate change and its effects.

> *"Take more heed of news and research on climate change."*

Some participants also said they wanted to find out more about actions they could take to combat climate change.

> *"Find our more about climate change and what realistic/simple changes I can make to my daily routine that will make a positive difference."*

All except one action were in the "personal" sphere.

Around two thirds of respondents indicated they would need help, primarily sources of information.

Home energy

A total of 15 proposed actions were given by participants. The commonest proposed action was to looking into improving the insulation of their home, followed by investigating solar panels, and improving heating.

> *"Look into insulating my home on a very tight budget."*

All actions were in the "personal" sphere.

Around two thirds of respondents indicated they would need help, mainly financial support, and also more information, including recommended suppliers.

Reduce/reuse/recycle

A total of 15 proposed actions were given by participants with the broad area of reducing packaging, especially plastic packaging, and also to recycle more.

> *"Recycle more, reduce products I buy that have a lot of packaging."*

All actions were in the "personal" sphere.

Around two thirds of respondents indicated they would need help, including for manufacturers and retailers to offer products with less packaging, more and better information.

Water

A total of seven proposed actions were given by participants. Six related to shorter showers, one to water use more generally.

The majority were in the "personal" sphere, a couple involved influencing the behaviour of others ("engage").

> *"Cutting down showers of everyone in the house."*

In terms of help, one respondent wanted a short timer.

Community energy

A total of five proposed actions were given by participants relating to investigating or encouraging community energy projects. All were in the "engage" sphere.

> *"To have some kind of community based energy for [the village] where I live."*

Most respondents needed help in the form of community support and/or funding.

2.5 Findings from follow up survey

On the feedback sheet completed at the end of the session participants were asked if they would be willing to take part in a follow up survey by either SMS (mobile phone text) or telephone interview.

The SMS survey asked participants how many people they had spoken to about climate change; whether they had taken, or planned to take, action as a result of the conversation, and what that action was. Participants who hadn't taken action were asked why not. They were also asked what they thought of the information they had been given to take away at the end of the session (see Appendix E). The telephone survey followed the same structure (see Appendix D.) Results from both surveys are reported together below.

Participants' willingness to undertake the survey and response rates are shown in Table 4.

Table 4: Willingness to undertake survey and response rate

	Number of people	**% of people**
Participants	90	100%
Willing to undertake survey	67	74% of participants
Completed survey	34	38% of participants 51% of those willing to undertake survey

The key findings from the follow up survey are:
- 38% of participants completed the survey
- 85% of respondents reported speaking to at least one other person about climate change as a result of the climate conversation.
- 47% of respondents reported they had taken at least one action as a result of the climate conversation.

Of the 90 participants, 67 were willing to take part in the survey, the majority choosing the SMS survey. For those who opted in to the survey, the response rate for completed surveys was 62% for SMS and 13% for phone, 51% for both methods. The later figure reflects the difficulty of find a participant available when calling them. Overall, 38% of participants completed a survey. See Table 5.

Table 5: Survey methods chosen and completed.

	Surveys selected	**Surveys completed**	**Response rate**
SMS	52	32	62%
Phone	15	2	13%
Total SMS & phone	67	34	51%

Neither	23	n/a	n/a
Total	90	34	38%

Number of people spoken to

All 34 respondents answered the question about number of people spoken to about climate change. Of these five didn't speak to anyone about climate change, 20 spoke to between 1 and 4 people, and 6 spoke to between 5 and 10 people. Three reported speaking to more than ten: 15, 25 and over 100 people each. The respondent who spoke to over 100 people was a speaker at a conference, and was inspired by their participation in the Climate Conversations to incorporate climate change into their presentation. (See Table 6)

Table 6: Number of people respondents spoke to about climate change.

Number of people spoken to by respondents	Number of respondents	% of respondents
None	5	15%
1 - 4	20	59%
5 - 10	6	17%
More than 10	3	9%
127*	34	100%

*This total excludes the 100+ people in the conference audience, as it was not a conversation.

Action already taken

Participants were asked: "Have you been doing anything (that you didn't do before) because of climate change?". 16 of the 34 respondents said they had taken action. (See Table 7)

Table 7: Action taken following the conversation.

	Number of respondents	**Percent of respondents**
Action taken	16	47
No action / no response	18	53
Total	**34**	**100**

The actions reported have been grouped into the categories identified from the feedback form analysis in Section 2.4 above. Several respondents reported more than one type of action. (See Table 8)

Table 8: The actions participants reported in the survey that they have taken.

Category	**Number of actions**	**% of actions**
Food	3	11
Inform & Discuss	2	7
Transport	7	26
Research	2	7
Home energy	3	11
Reduce/reuse/recycle	5	19
Water	4	15
Community energy	0	0
Other	1	4
Total	**27**	**100**

The actions taken are of a similar nature to those given in the feedback form, reported in Section 2.4 above.

Reasons for not taking action

Participants who said they had not taken any new actions were asked why. 11 responded, around half saying they already did many of the suggested activities. (See Table 9)

Table 9: Reasons given for not having taken action.

Reason	Number	Percent
Doing actions anyway	5	46
Lack of time	2	18
Don't know what to do	2	18
Lack of interest	2	18
Total	**11**	**100**

Further action

Participants were asked: "What else you might you consider doing in future?". Of the 17 participants who responded, 15 said they would consider doing something.

The actions reported have been grouped into the categories identified for the feedback form in Section 2.4 above. Some respondents reported more than one type of action. (See Table 10)

Table 10: The actions participants reported in the survey that would consider taking in future.

Category	Number of actions	% of actions
Food	3	18
Inform & Discuss	0	0
Transport	5	29
Research	1	6
Home energy	4	24
Reduce/reuse/recycle	2	12
Water	1	6
Community energy	0	0
Other	1	6
Total	**17**	**100**

The actions reported are similar to those proposed by respondents in their feedback forms, reported in Section 2.4 above.

Views on information taken away

At the end of each conversation participants were invited to take away further information: a sheet with suggestions and contacts for actions they might take (based on the Greener Scotland website) and two sheets about climate change from the Met Office. (See Appendix E).

In the survey participants were asked: "What did you think about the information that we gave you to take away?" Responses were free form text. 22 responded to the question with the majority saying they found it interesting and/or useful. (See Table 11)

Table 11: Respondents views on the information they took away from the conversations.

Response	Number of responses	% of responses
Interesting / useful	16	73
Not interesting / useful	2	9
Not taken / unread	4	18
Total	**22**	**100**

2.6 Actions proposed v taken

Participants were asked about actions they might take, or had taken, in the feedback form and the follow up survey. Table 12 shows the number of actions proposed and undertaken across the nine categories.

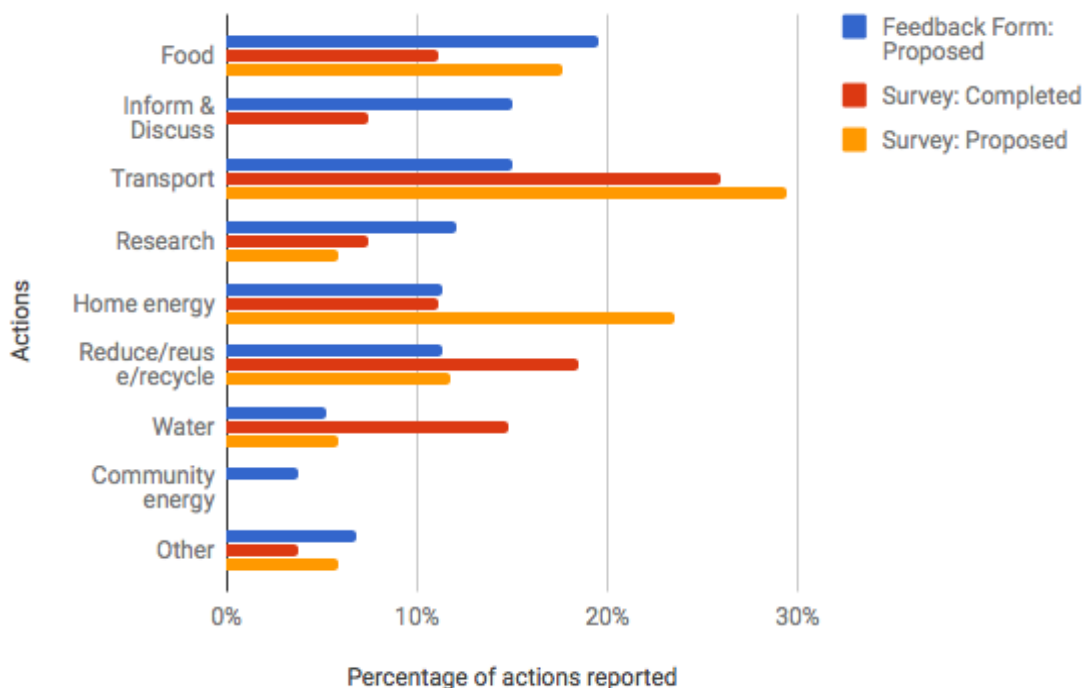*Table 12: Number of actions across categories proposed by those completing the feedback form, reported as undertaken by survey respondents, and proposed by survey respondents.*

	Number of actions		
Category of actions	**Feedback Form: Proposed**	**Survey: Completed**	**Survey: Proposed**
Food	26	3	3
Inform & Discuss	20	2	0
Transport	20	7	5
Research	16	2	1
Home energy	15	3	4
Reduce/reuse/recycle	15	5	2
Water	7	4	1
Community energy	5	0	0
Other	9	1	1
Total	133	27	17

While the number of actions reported as undertaken in the survey (27) is considerably less than the number participants said in the feedback form that they intended to do (133), this does not take account that the response rate for feedback form was 90% while that of the the survey was 38%. Adjusting for the response rate, and assuming that non-respondents likelihood of undertaking actions is the same as that of respondents, we would expect around 70 actions to have been completed. This assumption is weak, however it gives some indication that participants are likely to report undertaking many fewer actions than they proposed.

Chart 1, below, shows the percentage of each category of action by those completing the feedback form, reported as undertaken by survey respondents, and proposed by survey respondents. This suggests participants find it difficult to undertake food actions and to talk with others about climate change (inform & discuss). This may reflect the fact that food included food growing which has a long lead in time. Conversely it seems participants are able to undertake more transport related actions than they propose. These suggestions are based on qualitative data not intended for this type of analysis, and presented for interest only. The numbers of actions in the other categories are smaller still and any insights likely to be more unreliable.

Chart 1: Percent of actions across categories proposed by those completing the feedback form, reported as undertaken by survey respondents, and proposed by survey respondents.

3. Discussion

3.1 Knowledge about climate change

This section synthesises the main findings of the *protecting what you love* activity and the *information on climate change* activity.

Most participants accept that climate change is happening and is due to human activity. This broadly reflects the findings of previous conversations. Several participants said the information presented in the *information on climate change* activity was familiar and that they believed it was fairly well

known. The *information on climate change* activity revealed however that there is a level of uncertainty about the role of natural cycles in climate change; this is a new finding.

With respect to impacts, flooding and higher rainfall are the most widely stated manifestations of climate change in Scotland. Many participants were unable to suggest how climate change might affect the scenes they had chosen beyond the direct impacts of flooding and higher rainfall. A minority of participants suggested how climate change might have more complex impacts on the environment and quality of life, including wondering if it would still be possible to live in some coastal areas and whether future generations would be able to enjoy a beautiful natural environment. Again, this broadly reflects the findings of previous conversations.

These findings indicate there is a general acceptance of anthropogenic climate change, but that understanding of its impacts is limited.

3.2 Assessment of the *information of climate change* activity

The findings of this activity are included above; this section assesses the benefit or otherwise of this activity.

The aim of presenting this information was to respond to previous participants' stated need for reliable, consistent, trustworthy information about climate change. In selecting material for this activity our intention was to provide basic information about the causes and impacts of climate change to address some of the lack of awareness and misconceptions revealed in previous conversations. We anticipated this would provide a level of reassurance to participants and give them confidence in subsequent discussions with others.

We were surprised that it proved impossible within the project time available to find existing resources that met our criteria, in particular of being clear and accessible to a lay audience. In the absence of the ideal resource we summarised selected information from two resources from the Met Office: *Our changing world - global indicators* and *Observed changes in extremes* (See Appendix E for the resources, and Appendix B for our summary). As a result the information presented was a selection of facts about the direct impacts of climate change rather than the causes or indirect impacts.

Despite these limitations the activity stimulated useful discussions, in particular revealing confusion over the role of natural cycles in climate change.

Broadly the 'facts' were accepted as being true, though without information on indirect impacts, the relevance of the direct impacts to people's lives was limited. Despite this, the information and subsequent discussion generally appears to have reinforced the reality of climate change.

The follow up survey asked participants what they thought about the information they were given to take away; most respondents reported that it was useful. However the information given included not only the Met Office sheets, but also information on actions people can take. It is therefore not possible relate this confidently to the information about climate change.

Overall, our assessment is that the *information on climate change* activity is worthwhile, but that it would be enhanced by using different material that more closely meets the need for basic information about the causes and impacts of climate change.

3.3 Tackling climate change

This section draws mainly on the *Scotland 2030 scenarios* activity while incorporating relevant information from other parts of the conversations.

Participants broadly accept and welcome the solutions and behaviours presented in most of the scenarios in the *Scotland 2030 scenarios* activity.

Education is seen as important, but it is recognised that knowledge and awareness does not by itself translate into behaviour. This is reinforced by similar points made in some groups, in the *climate change information* activity.

There is some concern that some of the scenarios put too much onus on individuals, requiring too much time and commitment, and a feeling that businesses and government should do more to make acting on climate change easier and attractive for individuals.

However, there is a perception of a gap between government "rhetoric" and practical action, especially in relation to the planning system and financial support. This is echoed by widespread scepticism that the changes to public transport and travel habits presented in the scenarios could or would be delivered.

The findings in relation to specific scenarios are broadly similar to those of previous conversations.

3.4 Taking action

This section highlights key findings about participants' reported intentions, at the end of the conversation, about taking action on climate change and their reported actions and intentions in the subsequent survey.

While nearly all of those completing the end of conversation feedback said they might take action as a result of the taking part in the Climate Conversation, less than half of the respondents to the follow up survey reported they had taken at least one *new* action as a result of the climate conversation. However, while the number of respondents to the question about why they didn't take action is small, half of those said they already did a lot of the actions.

This suggests there is potential to increase the number of people taking action as a result of their participation.

As reported in section 2.4 above, we analysed the 133 proposed actions by the sphere activity: whether it was *personal action*, relating only to themselves (74%), *communicating* about climate change (13%), or *engaging* in group or community activity on climate change (14%). While these are intentions and not reported actions, it is interesting that as many as a quarter of all actions involve communicating or engaging with others. These types of action were not promoted in the information to take away, nor were they highlighted during the conversations. This suggests that with some revision of the information provided, including links to appropriate resources, climate conversations could be more effective in encouraging a cascade effect of greater awareness and action on climate change.

While most respondents to the follow up survey reported speaking to at least one person about climate change, only five respondents speaking to more than five people. This also suggests potential for greater impact.

Notably one respondent spoke about climate change to over 100 people. They were a speaker at a conference, and was inspired by their participation in the Climate Conversations to incorporate climate change into their presentation. This suggests there may be potential to engage 'non-climate change' opinion formers and influencers in climate conversations with significant benefits.

3.5 Follow up survey

The follow up survey was a new element to Climate Conversations. The findings of the survey are reported in Section 2.5 above; this section reflects on the usefulness of this element.

Over two thirds of participants were willing to take part in the survey, the majority choosing the SMS survey. For those who opted in to the survey, the response rate for completed surveys was 62% for SMS and 13% for phone.

This indicates the SMS survey was an attractive option to participants and the response rate was acceptable. The phone option was less attractive and the response rate was very poor, and several calls were often required to try to reach a respondent. If the follow up survey is carried out with future Climate Conversations we recommend not offering the phone option. The SMS survey was generally effective. However technical limitations meant that a few longer answers were not properly recorded. Despite this we would recommend this option in future.

The SMS survey sent to each participant was identical. However, it is technically possible to pre-populate the survey with information from the end of conversation feedback form to create a tailored, personalised survey, for example "John, you said you would look at getting cavity wall insulation. How did you get on with that?" This would likely generate a high response rate.

Indeed, with the appropriate technical solution, the follow activity could, subject to addressing privacy issues, evolve from a simple survey into an automated, integrated way of providing information, support and motivation, as well as gathering research data. For example:
- End of conversation feedback form: John says he will look into installing cavity wall insulation.
- Text sent: "John, you've said you'd look into cavity wall insulation. Here's a link to [relevant EST page]"
- Later, "John, you said you would look at getting cavity wall insulation. How did you get on with that?"

Appendix A: Climate Conversations groups, locations and participants

Groups	Location	Participants			
		Total	**Male**	**Female**	**Age Range**
Triratna Buddhist Group	Balquhidder	7	3	4	37 - 81
Police Scotland Youth Volunteers	Cumbernauld	20	12	8	13 - 64
Dumfries Writers' Group	Dumfries	9	3	5	47 - 70+
Edinburgh Mountaineering Club	Edinburgh (1)	9	5	4	29 - 50
Young Edinburgh Action	Edinburgh (2)	6	0	6	16 - 43
Cooking group, Transition Town Forres	Forres	8	4	4	35 - 65+
Association of Chartered Certified Accountants	Glasgow	9	6	3	28 - 52
Mayfield Community Council	Dalkeith	3	3	0	59 - 65+
Amnesty International Local Group	Perth	10	3	7	54 - 82
Community growing group, Tagsa Uibhist	Uist	9	4	4	39 - 80
	Total	**90**	**43 (48%)**	**47 (52%)**	**16 - 82**

Appendix B: Information on Climate Change

The following information was given to participants during the conversation.

Some Information on Global Warming and Climate Change from the Met Office:

Global warming and Greenhouse gas emissions

Evidence that CO2 emissions are the cause of global warming is very robust. Scientists have known since the early 1800s that greenhouse gases in the atmosphere trap heat.

Global CO2 emissions from human activity have increased by over 400% since 1950. As a result, the concentration of CO2 in the air has reached more than 400 parts per million by volume (ppm), compared to about 280ppm in 1750 (around the start of the Industrial Revolution).

Find out more about the facts and science behind climate change by visiting the Met Office www.metoffice.gov.uk or the UK Committee on Climate Change www.theccc.org.uk websites.

Temperature

2016 was the first year in modern records where surface CO2 stayed above 400 ppm for the entire year. 2014, 2015 and 2016 all saw record global temperatures. 2017 is on track to be one of the top three warmest years on record. 15 of the 16 warmest years on record have occurred since 2000.

Ocean

2016 annual average sea level was the highest in the satellite altimetry record (1993–present), rising to 82 mm above the 1993 average.

Ice

Glaciers have lost ice for the 37th successive year. The summer minimum Arctic sea ice decreased by 13.3% per decade from 1979 to 2016.

Human Influence

More than 150 studies have been carried out looking at whether human influence on the climate contributed to specific extreme weather events. Almost all studies related to extreme heat indicate human influence. A smaller but increasing number detect a human influence in rainfall extremes.

Appendix C: Feedback form

This information will remain with The Surefoot Effect and The Scottish Government and will not be shared with anyone else

Name: **Gender :**   **Age:**

Which part of today's discussion did you enjoy the most? Why?

Which part of today's discussion did you enjoy the least? Why?

How would you prefer to take part in the <u>short</u> follow up element? Choose one…

Either

- **Text/SMS**   **Your mobile number:**

Or

- **Telephone interview**   **Your preferred phone number:**

Please turn over!

What are two actions you might want to take as a result of this discussion?

What help might you need to take those actions?

Any other comments

Please write your email address:_____if you would like to receive information about other opportunities to discuss climate change, learn more and take action.

<div align="center">

Thank you!

www.greenerscotland.org

www.surefoot-effect.com

</div>

Appendix D: Follow up survey

The text of the follow up SMS survey is given below. The telephone surveys addressed the same issues in a semi-structured interview format.

Intro: Hi %placeholdername%! Thanks for offering to answer a few questions about the recent Climate Conversation. If it's no longer OK, just reply STOP at any time.

Q1: How many people have you spoken to about climate change since the conversation?

Q2: Thanks! Have you been doing anything (that you didn't do before) because of climate change? (Text: yes or no)

Q3=Yes

    Q3a: Great! What new things have you been doing since the conversation because of climate change?
    Q3b: Please tell us a little bit about why you decided to do that.
    Q3c: What else you might you consider doing in future?

Q4=No

    Q4a: No problem! We're curious though ;) If you don't mind, please tells us why not, in just a few words.
    Q4b: What might you consider doing in the future?

Q6:   What did you think about the information that we gave your to take away?

Q7:   Would you like to talk on the phone about any of this?

Q7=Yes

    Q7a: Generally, when is the best time to call you?

Close: Thank you for sharing your experience. It will help the government improve the ways we all tackle climate change. Pam & Osbert

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Appendix E: Information to take away

Participants were given a sheet with the following information to take away at the end of the session, which was taken from the Greener Scotland website

---

What can I do right now?

Here are a few things we can all do right now that can make a big difference:

Turn down your thermostat
The winter months will often have us reaching for our cosiest clothes and turning the thermostat up, but we end up wasting energy that way. By turning it down by 1 degree not only will you still be cosy, it could save you up to £80 to £85 a year in a typical, gas-heated semi.

Walk or cycle
No one's asking you to be the next Bradley Wiggins, or even walk the West Highland Way, but choosing to leave the car and walk on shorter journeys keeps you fitter and healthier, and helps the environment too.

Wash at 30°C
There's nothing better than the smell of fresh laundry. Well, perhaps smaller fuel bills. Turn down your washing machine to 30°C and you'll not only save energy and money, you'll be kinder to your clothes too.

Use up your food
If the way to your heart is through your stomach, we've got some brilliant suggestions to get creative with your leftovers. By using up your food and planning mealtimes, you could save up to £470 each year and help Scotland fight Climate Change.

Look at alternatives to car travel: www.travelinescotland.com

Phone Home Energy Scotland for advice and offers: 0808 808 2282

Reduce (Re-use, Recycle)

When it comes to minimising the impact of consumption on Scotland's environment, the best place to start is by trying to reduce what we use.

Making careful decisions about what we buy can have a big impact on the environment.

Why reduce waste?

Food production, goods manufacturing, transportation and storage contribute to greenhouse gas emissions and costs that are passed on to us all. Making careful decisions about what we buy and trying to reduce waste can have a big impact.

Throwing out less reduces the amount of energy needed to transport and process waste and means less landfill too, which makes for a cleaner and greener Scotland.

Benefits of reducing waste

- Lessen the pollution and greenhouse gas emissions associated with landfill to help make Scotland a cleaner, greener place to live
- Cut the financial cost to your community of getting rid of waste
- Make household savings

Taking action

There are three big things you can do to reduce your overall waste:

Shop Greener

- Choose longer-life products, for example, by checking guarantee periods or use-by dates
- See what you can buy second-hand, at charity shops and online
- If you can, buy liquids and dry goods in refillable cartons that you can use again and again

Reduce Packaging – buy things with less packaging when possible

Reduce Food Waste

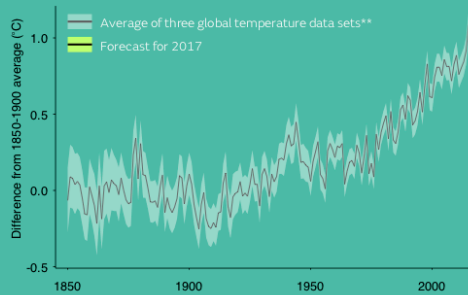**For more information please go to the Scottish Government website:**
www.greenerscotland.org
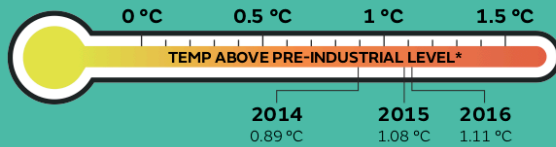
Met Office

Our changing world - global indicators

Global temperature

2016 was the second year in a row where global temperature was more than 1°C above pre-industrial levels*

15 of the 16 warmest years on record have occurred since 2000.

Average of three global temperature data sets**
Forecast for 2017

2014, 2015 and 2016 all saw record global temperatures. 2017 is on track to be one of the top three warmest years on record.

TEMP ABOVE PRE-INDUSTRIAL LEVEL*

| **2014** | **2015** | **2016** |
| 0.89 °C | 1.08 °C | 1.11 °C |

*Taken here as the 1850-1900 average
**GISTEMP (NASA), NOAAGlobalTemp (NOAA), HadCRUT4 (Met Office & Climatic Reasearch Unit)

The Rising Tide of Global Temperature

Animated chart shows years appearing from coolest to warmest, according to HadCRUT4 dataset.

Greenhouse gases

2016 was the first year in modern records where surface CO_2 stayed above 400ppm for the entire year.

Atmospheric concentration of CO_2 has risen by about 45% since pre-industrial times***
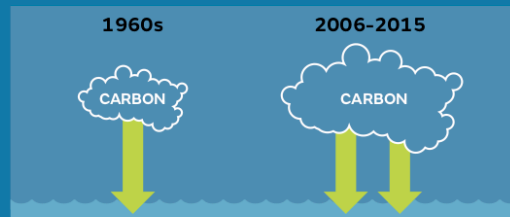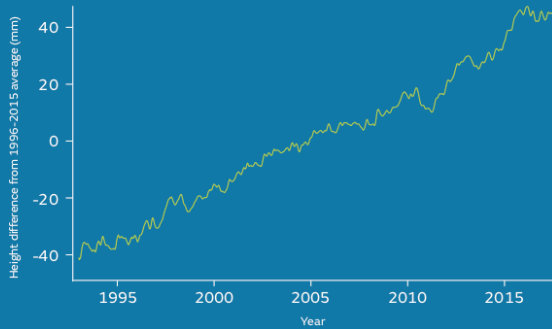
Full Mauna Loa CO_2 record

↑45%
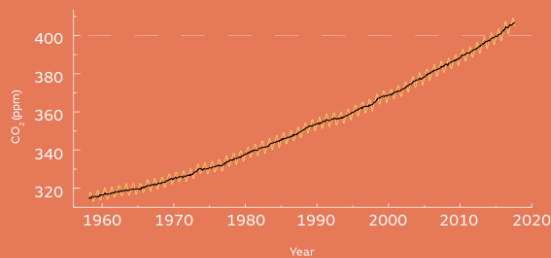
***Relative to preindustrial value of 280 ppm
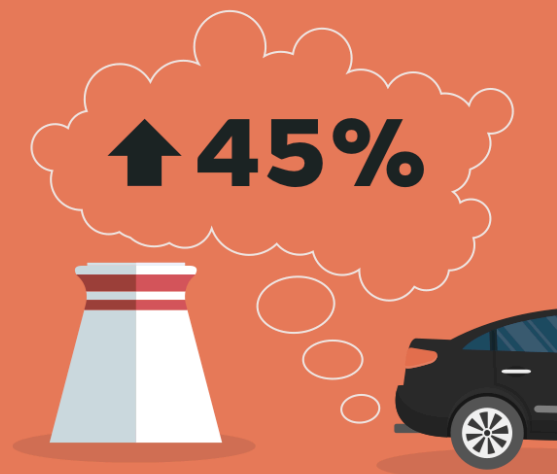
Ocean

2016 annual average sea level was the highest in the satellite altimetry record (1993–present), rising to 82 mm above the 1993 average.
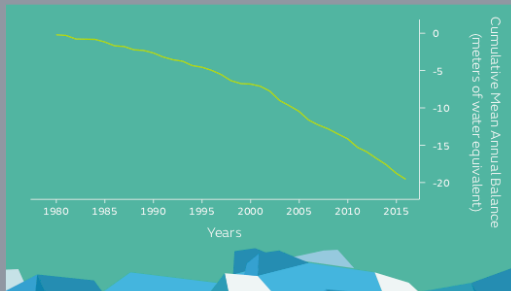
Global mean sea level change 1993 - Jun 2017

1960s   **2006-2015**

CARBON   CARBON

The rate of carbon uptake from the atmosphere by the ocean has more than doubled since the 1960s.

ATMOSPHERE 1%
CONTINENTS 3%

OCEAN 93%

ICE 3%
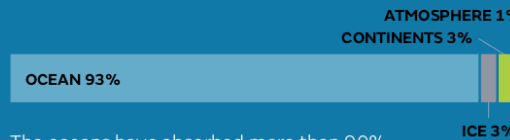
The oceans have absorbed more than 90% of the excess energy coming into the earth system due to increasing levels of greenhouse gases.

Ice

Glaciers have lost ice for the 37th successive year*

*Based on 41 reference glaciers

↓13.3% per decade

The summer minimum Arctic sea ice extent decreased by 13.3% per decade from 1979 to 2016*

*Relative to the 1981 to 2010 average extent of 6.38 million km2

Weather

More than 150 studies have been carried out looking at whether human influence on the climate contributed to specific extreme weather events.

Almost all studies related to extreme heat indicate human influence. This is consistent with IPCC AR5 findings that it is very likely human influence has contributed to observed global scale changes in the frequency and intensity of daily temperature extremes since the mid-20th century.

A smaller but increasing number detect a human influence in rainfall extremes. This is consistent with IPCC AR5 findings that it is likely anthropogenic influences have affected the global water cycle since 1960.

You can read more about how extremes have changed in our briefing note on extremes.

Available from:

https://www.metoffice.gov.uk/binaries/content/assets/mohippo/pdf/climate/cop23/our_changing_world-global_indicators_final_v1.0.pdf
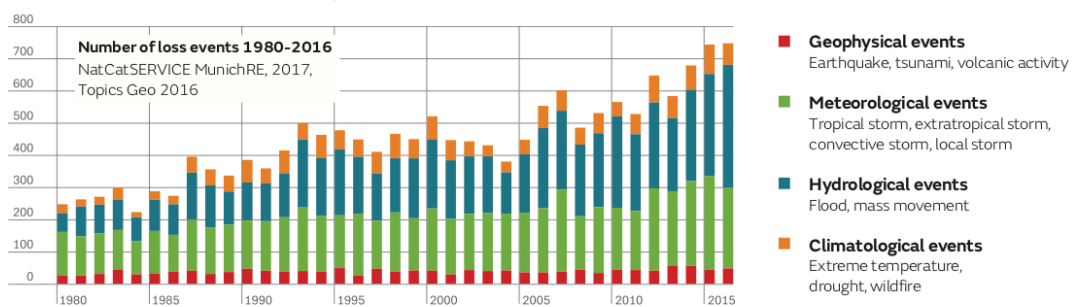
Met Office

Observed changes in extremes

Huge cost of weather and climate extremes

Extreme weather and climate events can inflict huge human and financial costs on society. In 2016, overall worldwide losses from meteorological, hydrological or climatological disasters amounted to US$ 127bn, with 2016 being the fifth-costliest year for insured losses since 1980[1]. In the USA alone, there have already been 15 events with damages of at least US$ 1bn in 2017*, resulting in the deaths of 282 people. Loss estimates for hurricanes Maria, Irma and Harvey range from US$ 15bn to US$ 55bn each[2].

Are extremes becoming more frequent?

Number of loss events 1980-2016
NatCatSERVICE MunichRE, 2017, Topics Geo 2016

■ **Geophysical events**
Earthquake, tsunami, volcanic activity

■ **Meteorological events**
Tropical storm, extratropical storm, convective storm, local storm

■ **Hydrological events**
Flood, mass movement

■ **Climatological events**
Extreme temperature, drought, wildfire

The number of extreme events which cause loss in any given year is affected by both changing human factors, such as growing population and increasing infrastructure, as well as natural variability of the climate.

In addition, there is evidence that the frequency of some types of extremes have changed – particularly warm temperature extremes and heavy rainfall events. There has also been a decrease in cold extremes. There is some evidence of a human contribution to changes in tropical and extratropical storm activity. It is more likely than not that further changes will occur in the future in response to human influences.

What is the cause of changes in extremes?

The Intergovernmental Panel on Climate Change Fifth Assessment Report (2014) says changes in many extreme weather and climate events have been observed since about 1950. There is evidence of a human contribution to changes in temperature extremes, heavy rainfall events, and an increase in extreme high sea levels in a number of regions.

Attribution science is adding to this evidence all the time. This rapidly developing area of science looks to understand whether human influence on the climate contributed to extreme events by making them more likely or more severe.

Scientists have published more than 150 such studies looking at weather events around the world.

EXTREME HEAT	DROUGHT	EXTREME RAINFALL	TROPICAL STORMS AND HURRICANES
Almost all studies on extreme heat events indicate human influence.	About half the studies on drought show significant human influence.	A smaller but increasing number of studies on extreme rainfall detect a human signal.	The picture here is complex. There is strong evidence that increasing sea temperatures increase the intensity of tropical storms. Rising sea levels also increase the risk of coastal flooding. However, there may be an overall decrease in the global total number of tropical cyclones.

*as of October 2017 [1]NatCatSERVICE MunichRE, 2017, Topics Geo 2016 – Natural catastrophes 2016 – Analyses, assessments, positions
[2]NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2017). https://www.ncdc.noaa.gov/billions

Case studies

Climate change is altering the risk of some extreme events. Although a human influence can't be detected in all events, below are four examples of events with a clear human-induced change.


2016 Flooding in Louisiana, USA

A storm system over the US Gulf Coast region resulted in a three-day period of intense rainfall. An attribution study suggests the probability of an event, as in south Louisiana 2016, has increased by at least 40% due to human influence. What was an event with a return period of 100 years in the 20th century should now be expected to occur, on average, once every 70 years or less. This trend is expected to continue over the 21st century. **Van der Wiel et al 2017**


2013 Summer heatwave, China

Summer 2013 was the hottest on record in Eastern China. Economic losses associated with the accompanying drought have been estimated at ¥59 bn (£6.9 bn). Research indicates the increasing frequency of extreme summer heat in Eastern China is primarily attributable to human greenhouse gas emissions. Heat of this magnitude is estimated to be about a 1-in-30-year event averaged over the 1955–2013 period, but this became about a 1-in-5 year event in the context of 2013 alone. By 2024 it is projected that at least 50% of summers will be as hot as the 2013 summer. **Sun et al 2014**
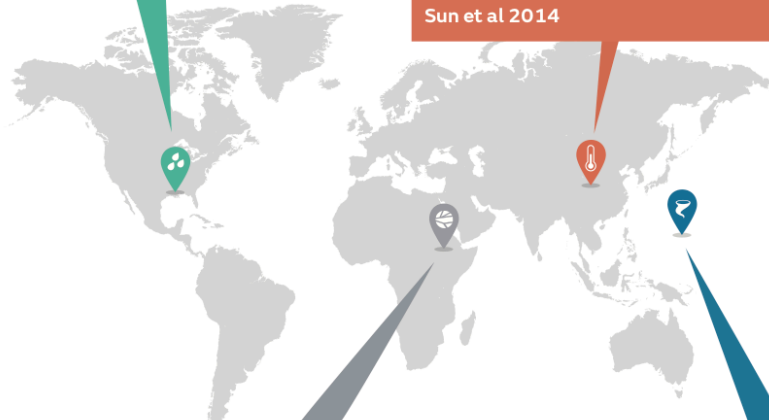
2014 Drought, East-Africa

Human caused warming contributed to the 2014 East African drought by increasing temperatures and increasing the temperature difference between western and central Pacific sea surface temperature, reducing rainfall, evapotranspirationand soil moisture. **Funk et al 2015**
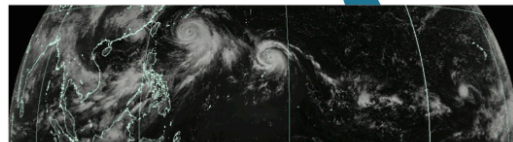
2015 Cyclone activity, Western North Pacific

2015 saw extremely high levels of tropical cyclone activity in the Western North Pacific. This was found to be mainly caused by sea surface warming in the eastern and central Pacific, with human influence largely increasing the odds of this event. **Zhang et al 2016**

Funk, C., Shukla, S., Hoell, A. and Livneh, B., 2015. Assessing the contributions of East African and west Pacific warming to the 2014 boreal spring East African drought. Bulletin of the American Meteorological Society, 96(12), pp.S77-S82.

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Sun, Y., Zhang, X., Zwiers, F.W., Song, L., Wan, H., Hu, T., Yin, H. and Ren, G., 2014. Rapid increase in the risk of extreme summer heat in Eastern China. Nature Climate Change, 4(12), p.1082.

Zhang, W., Vecchi, G.A., Murakami, H., Delworth, T.L., Paffendorf, K., Jia, L., Villarini, G., Gudgel, R., Zeng, F. and Yang, X., 2016. Influences of natural variability and anthropogenic forcing on the extreme 2015 accumulated cyclone energy in the Western North Pacific. Bulletin of the American Meteorological Society, 97(12), pp.S131-S135.

Available from:

https://www.metoffice.gov.uk/binaries/content/assets/mohippo/pdf/climate/cop23/observed_changes_in_extremes_final_v1.0.pdf