

The effectiveness of the IPCC communication: a survey of (mainly) UK-based users*

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*This report forms part of the Joint Programming Initiative (JPI) AR5 in Europe project, which analyses how the IPCC's Fifth Assessment Report informs policymaking with the aim to improve the knowledge exchange between the IPCC and decision-making in areas such as adaptation, mitigation, and sustainable development. It includes several European countries, with a particular focus on Norway, Poland, Spain and the UK. The full report of the JPI project will be available in 2016.

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Executive summary including recommendations

The IPCC's Assessment Reports (ARs) are widely regarded as the most important and authoritative publications on a global scale which summarise the state of knowledge about climate science, its real and potential impacts, and the possibilities of mitigation. As one of the interviewees for this study expressed it, they are 'the equivalent of the King James Bible on climate change'.

The AR5 was no exception to this rule. Its four components (the three Working Group reports and a Synthesis Report) were published between September 2013 and November 2014. They received considerable attention from the media and policy makers around the world.

However, questions have been frequently raised about the effectiveness of the IPCC's communication work by governments, outside organisations, academics and other interested parties. In 2012, the IPCC launched a new communication strategy. Three key elements of this were:

- The primary target audiences of the communications efforts of the IPCC are governments and policy-makers at all levels (including the UNFCCC).
- Broader audiences, such as the UN, IPCC observer organizations, the scientific community, the education sector, non-governmental organizations (NGOs), the business sector and the wider public, also have an interest in the work and assessments of the IPCC. While these are not primary audiences of the IPCC communications efforts, the IPCC should look for ways to ensure that information is available and accessible for these audiences.
- While the IPCC itself does not produce derivative products aimed at specific audiences, it may engage with organizations that take elements of IPCC assessments and communicate them in more audience-specific formats. However, such products must not be considered joint productions or in any way products of the IPCC.

This study focuses on how the primary target audience and four other sections of the IPCC's broader audience viewed the communication of the IPCC 2013/4 reports. These are government and policy makers; the business sector; NGOs; the (higher) education sector and the media (as representatives of the wider public).

In each of the five sectors semi-structured interviews were conducted with between 5 and 7 representatives, giving a total of 30 interviewees, the vast majority from the UK. The interviewees met most or all of the following criteria: a) they knew about the IPCC reports b) had direct experience of using them for their work, c) were involved in the general communication of climate science and d) had views on the IPCC reports and how they could be better communicated to their sector.

We chose to focus on three key broad areas of questioning – the usefulness of the IPCC reports, their language and clarity, and recommendations for the future. All interviewees were also asked for any 'big picture' thoughts on the IPCC communication efforts in general and, where possible, about the use of up-to-date digital technology and the use of specialists to make the reports more readable.

Results from the interviewees were supplemented by points publicly raised by governments to the IPCC to improve its communications, and in published critiques of the IPCC. A limited amount of other expert opinion was also sought.

Of the huge volume of views expressed, ten broad areas were highlighted for greater discussion, and recommendations attached to each of them:

1. **The readability of the SPMs:** The Summary for Policymakers (SPMs) are high quality science reports used for many different purposes from policy formation to awareness raising. The general view of the interviewees is that they are low quality communication tools, where the language and figures are difficult, complex and too scientific for policy makers. Much more attention needs to be paid to the clarity and accessibility of the language used for policy makers and other non-expert audiences. Scientific jargon, which can include words which mean different things to scientists compared to a general audience, needs to be taken out.

2. **Headline statements:** The WG1 team released a 2-page summary of headline statements at the same time as the SPM. This practice should be adopted for all high-level documents of the IPCC, including all WG reports and one-off special studies. The headline statements would also go a long way to meet the requirement from many interviewees for a 'summary of the summary', or in other words a two-page summary of the SPMs, released at the same time as the SPM. Scientific jargon needs to be taken out of the 2-page summary, as in point 1.

Any summary document does not have to follow the chapter structure of the overall WG reports, and headline statements are not needed from each chapter. Policy makers would benefit more from key messages and cross-cutting themes which draw on various chapters. The importance of what policy makers need to know should take preference of what is scientifically interesting.

3. **More user involvement in scoping reports:** the IPCC should consider seriously the UK government's recommendation for more user consultation to gain more insight into how the IPCC might better tailor its products to user needs. Policy makers and other sectors like businesses could have more input into the scoping of the reports to help ensure that policy concerns are flagged more clearly in the final reports, and that IPCC reports would better inform decision making. This would fit with a general approach to communications that is more interactive and engaging rather than top-down.

Within this context, there is a general recognition that more targeted reports are needed for certain regions of the world such as South Asia or Africa. Perhaps as a trial with a regional report, the IPCC could conduct a process by which it engages with its report end users from the outset to help co-design the structure and language used throughout the report development.

4. **Derivative Products:** These have proved very successful. More derivative products should be targeted at specific and different sectors, such as cities. They need not have the official endorsement of the IPCC, but it could be highlighted that individual IPCC authors contributed to the reports. The challenge is to adapt the IPCC process to allow more deployment of IPCC authors to work with reports and summaries for targeted sectors, perhaps instead of devoting so much effort

to mammoth-size WG reports. The IPCC should provide some accreditation and recognition to authors and universities for participating in this manner, in the same way as it does for the WG reports.

5. **The importance of outreach work:** Linked to points 3) and 4) above is the importance of outreach work and events (i.e. presenting the report in different countries to various audiences). These allow the authors to present and discuss the reports in their own words. There are still challenges in ensuring authors present the information in an audience-friendly way. But feedback suggests it can be a highly effective way of communicating the IPCC science when authors draw on their own expertise and scientific rigour to communicate the findings clearly to local or sector-specific audiences. However, outreach is expensive in terms of labour and money, both organizing the events and funding authors and other participants. More resources directed to this area of work would be helpful.

6. **The use of specialist writers:** There are advantages and risks in bringing in specialist writers. However, the overwhelming weight of opinion from the interviewees is that a) specialist writers/communicators should be introduced early as part of the writing and reviewing process; b) the right people exist who know and respect the primacy of the science; c) the right procedures and safeguards can be put in place to ensure the appropriate clarity of roles for such writers; and d) that the scientists and governments have the final sign-off. Several interviewees also stressed that employing public relations companies was not a recommended path.

7. **Metrics to assess the effectiveness of the IPCC work:** Much more can be done to set up more sophisticated metrics to assess the effectiveness of the IPCC reports, including communication. These could a) include more sophisticated media measurements, b) track the formal uptake by governments of the reports, c) assess with more rigour and robust criteria its impact on key policy making fora both nationally and internationally, and d) select key groups of policy makers or other target audiences to test and monitor the effectiveness of its communication in a more systematic way. If the IPCC is unable to do this itself, an outside organisation should be contracted to do it with clear guidelines from the IPCC.

8. **The use of digital technology, new media, and graphics:** The world in which communication now takes place is changing at a rapid pace. For younger generations in particular, traditional media platforms like newspapers and television are being replaced by digital and social media. The IPCC needs a digital communication strategy. Good graphics are also essential to the effective communication of the information found in the SPMs and WG reports. However, at the moment many of them are too cluttered with too much information. Graphic designers and data visualisation experts, who have some background in, or knowledge, of the basics of climate science, should be brought in early into the writing and review process.

9. **Learning from other reports:** There are now a large number of reports on climate science and its relevance to policy makers which are published every year. Some, like the 2014 US Climate Assessment Report, have been widely praised for the way they were communicated. Others, like the Risky Business Report, have reached a target audience successfully. Despite the different contexts in which these reports are published, much can be learnt from exchanging and pooling

good practice. The IPCC communications team needs to draw more heavily and in a systematic way on the experiences gained from the dissemination of other reports. The online presentation of the SYR modelled on the US Climate Assessment Report is a good start.

There is also a strong argument for ensuring that the IPCC draws the appropriate lessons from the previous assessment cycle, which some observers have seen as the IPCC's 'missing (learning) loop'. It is important to draw lessons from the whole process of how other reports are produced, and not just how they are communicated through the end product (the WG and Synthesis reports).

10. **Budgets and resources:** The IPCC has a budget of several hundred thousand pounds for its communication work, which has not always been spent. It may not be the best use of IPCC funds to substantially increase its permanent media staff as demands on them peak mostly at the time of publications. However, a strong case can be made for increasing selected funding for staff members dedicated to outreach work; another is building an online and social media strategy. More resources are also desirable for graphics development, pooling good practice, and developing better metrics.

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The AR5 in Europe project analyses how the IPCC's Fifth Assessment Report informs policymaking with the aim to improve the knowledge exchange between the IPCC and decision-making in areas such as adaptation, mitigation, and sustainable development.

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Candice Howarth, a Senior Research Fellow at the Global Sustainability Institute at Anglia Ruskin University, Cambridge carried out the research and interviews with local policy makers, and wrote them up into chapter 4.1 (case study 1). She also provided other helpful inputs.

Susan Hassol from Climate Communication drew on her 25 years of experience as a science writer and communicator to offer huge inputs of wisdom. Many of her insights have been incorporated into the recommendations.

Other interviewees such as Michael Williams, Chief of Communications and Public Affairs at the World Meteorological Organisation (WMO), and Richard Black, former BBC environment correspondent, provided helpful context.

All errors of fact and judgement are the author's.

1. Introduction

The publication of the Fifth Assessment Reports (AR5) by the Intergovernmental Panel on Climate Change (IPCC) starting in September 2013 offers a unique opportunity to assess the effectiveness of the IPCC's communication strategy and its implementation. The Assessment Reports have been published every five or six years since 1988, and are widely regarded as the most important and authoritative publications on a global scale which summarise the state of knowledge about climate science, its real and potential impacts, and the possibilities of mitigation. As one of the interviewees for this study expressed it, they are 'the equivalent of the King James Bible on climate change'.

They are the culmination of work by several hundred climate scientists around the world. They consist of three working group (WG) reports, consisting of WG1, *The Physical Science Basis* (published on 27 Sept. 2013); WG2, *Impacts, Adaptation and Vulnerability* (31 Mar. 2014); and WG3, *Mitigation of Climate Change* (13 Apr. 2014). A Synthesis Report (SYR) was released on 2 November 2014.

The IPCC publishes and highlights the extraordinary efforts of the scientists involved in assembling these reports. So for example, the WG2 reports involved 308 scientists from 70 countries around the world, and more than 50,000 comments on the text. WG1 and WG3 boast similar numbers, and in the case of WG1, the authors 'reviewed more than 9,200 scientific publications and 2-million gigabytes of data from climate models'.

These sorts of figures are very impressive and help to establish the robustness and credibility of the science, and the international intellectual effort behind the consensus view. However, what the IPCC does not parade with the same rigour is the number of professional staff employed by the IPCC on communicating their results – one head of communications and media relations, supported by one or two colleagues.

Starting in late 2009, a considerable amount of adverse publicity about the behaviour of a small number of climate scientists (in what the media dubbed 'Climategate') and the media attention to a small number of errors in the AR4 reports prompted the IPCC to commission a report by the InterAcademy Council (IAC) of its reviews and processes.¹ In October 2010, the IAC published its results which included a recommendation that the IPCC 'should complete and implement a communications strategy that emphasizes transparency, rapid and thoughtful responses, and relevance to stakeholders, and that includes guidelines about who can speak on behalf of IPCC and how to represent the organization appropriately'.²

The recommendation stemmed in part from a recognition that the IPCC had 'come under severe criticism for the manner in which it has communicated with the media and public. The lack of an

¹ Painter, J. (2014). *Disaster Averted? Television Coverage of the 2013/14 IPCC's Climate Change Reports*. Oxford, England: RISJ.

² InterAcademy Council, *Review of the IPCC*, Aug. 2010, p. xv.

ongoing media-relations capacity and comprehensive communications strategy has unnecessarily placed the IPCC's reputation at risk and contributed to a decline in public trust of climate science.'³

A review of the IPCC communications efforts led to a new strategy made public in June 2012. The key points about audiences were the following:⁴

- The primary target audiences of the communications efforts of the IPCC are governments and policy-makers at all levels (including the UNFCCC).
- Broader audiences, such as the UN, IPCC observer organizations, the scientific community, the education sector, non-governmental organizations (NGOs), the business sector and the wider public, also have an interest in the work and assessments of the IPCC. While these are not primary audiences of the IPCC communications efforts, the IPCC should look for ways to ensure that information is available and accessible for these audiences. <emphasis added>
- While the IPCC itself does not produce derivative products aimed at specific audiences, it may engage with organizations that take elements of IPCC assessments and communicate them in more audience-specific formats. However, such products must not be considered joint productions or in any way products of the IPCC.
- IPCC audiences are truly global in extent and are therefore very diverse. In its communications and outreach activities, the IPCC will take the specific context of different countries into account, which may require tailor-made outreach activities. For instance, this reflects an understanding that the communications needs of developing countries may be different to those of developed countries.

This study focuses on how the primary and the broader audiences viewed the communication of the IPCC 2013/4 reports. It chose one primary sector and four other sectors:

1. Government and policy makers
2. The business sector
3. NGOs
4. The (higher) education sector
5. The media (as representatives of the wider public)

We are aware that the category of 'government and policy makers' includes a wide range of types of policy makers from negotiators within the UN process, politicians, civil servants, local decision makers and planners, to representatives of bilateral and multilateral agencies. We focused on three case studies – local policy makers in East Anglia, UK; a broad range of policy makers in developing countries reached by the work of the network organisation, CDKN; and the experience of a FCO adviser to the government in the UK. We did not interview more government representatives as their official views are recorded at length in the submissions to the IPCC review process and the meeting held in Nairobi in February 2015.⁵ Likewise, we did not interview representatives of the

³ *ibid*, p. 62.

⁴ https://www.ipcc.ch/meetings/session35/IAC_CommunicationStrategy.pdf

⁵ Available via http://www.ipcc.ch/apps/eventmanager/documents/27/030220150347-p41_inf01_gov_comments_ref_options_paper.pdf

scientific community as they are the most likely to understand and speak the language of the IPCC reports.

In each of the five sectors we carried out semi-structured interviews with between 5 and 7 representatives, giving a total of 30 interviewees, the vast majority from the UK. A list can be found at the end of each section of chapter 4. The format was a mixture of face-to-face and telephone interviews.

It is of course of supreme importance how the interviewees were chosen in order to gauge the extent to which their views were representative of the wider sector. In each of the sections of chapter 4, we lay out why they were chosen, but in general we opted for interviewees who met most or all of the following criteria: a) knew about the IPCC reports b) had direct experience of using them for their work, c) were involved in the general communication of climate science and d) had views on the IPCC reports and how they could be better communicated to their sector. It is important to stress that although they represent a wide variety of views and experiences, most were very appreciative of, and sympathetic to, the IPCC and its work.

We also chose to focus on three key areas of questioning – the usefulness of the reports, their language and clarity, and recommendations for the future:

1. Usefulness

- To what extent did you use the 2013/4 IPCC reports to inform your work?
- Which of the IPCC ‘products’ were the most useful and relevant for your work (press release, SPM, FAQs, website, press conference, factsheets, or other products)?
- If you produced your own material based on the IPCC reports, in what ways did you rely on the IPCC material, and how much did you have to change it?

2. Language and clarity

- Would you say that there was a clear dominant message or narrative from the IPCC reports?
- How highly did you rate the clarity of the key findings?
- How would you rate the language used in SPMs and other IPCC products for simplicity, clarity and accessibility?

3. Recommendations

- In general, what two or three recommendations would you make to improve the communication of the IPCC reports in the future?

All interviewees were also asked for any ‘big picture’ thoughts on the IPCC communication efforts in general. In addition, where possible, they were asked about the two key recommendations to emerge from the Nairobi meeting on ‘making the reports more user-friendly’.⁶ These were:

- Ensure that up-to-date digital technology is used to share and disseminate information;
- Seek advice from various specialists to make IPCC reports more readable.

⁶ IPCC press release, ‘IPCC takes decisions on future work’, 27 Feb 2015.

This last recommendation has prompted considerable discussion about how and when specialists should be introduced into the IPCC writing and review process, and what sort of specialists they should be.

It is also worth stressing that as we concentrated on the process and methods of communicating the reports, we did not dedicate a lot of time asking for a critique of the content of the scientific reports, although some interviewees were keen to express an opinion on this issue too.

Before giving a summary of the results of the interviews broken down by sector in chapter 4, we briefly review in chapter 2 some of the literature about the ways of assessing the effectiveness of communication. Here it is of particular importance to note that the IPCC does not at the moment have the resources to apply in a sustained and rigorous fashion the metrics often used in other sectors to evaluate their communication efforts. At the time of writing, a limited monitoring of media coverage is the only metric it has. In chapter 3, we summarise what the IPCC produced around the three WG and Synthesis Reports, what other research has concluded about IPCC communication, and the view from Jonathan Lynn, the IPCC head of communications and media relations.

Chapter 5 pulls together some of the main points found in the interviews in Chapter 4 and places them in the wider context of the existing literature and debates about the IPCC communication challenge.

Inevitably, this report is to a certain extent a snapshot of views mostly from the UK, but a snapshot nevertheless that is robust in the scope and focus of the interviews. In essence, it is designed to raise a series of important discussion points that should be interrogated and discussed further in support of the efforts by the IPCC to improve its communication work in the future.

2. How to assess effectiveness in climate change communication

An extensive body of academic articles and practice-based literature now exists on the general area of the effectiveness of climate change communication (Whitmarsh, O'Neill & Lorenzoni, 2011; Moser, 2010), and more specific areas such as the effective communication of the uncertainties around climate science. (Patt and Weber 2014) A 2014 special commission set up by the University College of London (UCL) and formed of scientists from different disciplines to examine climate change communication recommended the establishment of a new professional body in part to adapt the way in which scientists communicate with the general public and policy makers. Amongst its policy recommendations was that 'climate scientists should discard the "linear model" of "truth speaks to power" and participate actively in the "co-production" of policy formulations and decision-making'. (Rapley et al., 2014)

There is also a growing recognition from top politicians and their advisors that scientists need to think just as much about how to communicate their science as about the science itself. For example, Sir Mark Walport, the current UK government's chief government adviser, has gone on the record several times stressing that 'the science is not finished until it is communicated'. (Hickman, 2015)

An overview paper by one of the world's leading experts on climate communication, Susanne Moser, included a helpful checklist of the basic questions that have to be addressed for a full understanding of the challenges and opportunities for effective communication: (Moser 2010, p. 37)

- the aim or scope of the communication – information giving, awareness and concern raising, or response prompting (engagement and/or behaviour change);
- the target audience (policymakers, general public, special interest groups and so on);
- the framing of the issue (including language);
- the key messages, including how the information conveyed can be made most useful and accessible;
- the messengers (IPCC authors, other scientists, NGOs, the media etc.);
- the modes and channels of communication (written, verbal, non-verbal).

Moser stresses the importance of recognizing the interdependence of these various elements in order to be effective, and that all of these elements are affected by contextual factors that influence climate change communication. These include non-climate issues which compete for attention, create barriers to public engagement or make it easier for people to act on the information they receive. One key contextual factor is the media, which is undergoing rapid changes in many countries including the digital disruption from online and social media and the loss (in some countries) of specialist science and environment reporters.

Moser is not the only expert to draw on academic literature to help communicators around climate change. Brigitte Nerlich et al. (2010) draw on the pioneering work by Professor Brian Wynne to stress the importance of going beyond communication strategies which imply it is generally the public which needs to be informed by experts, which 'in itself is not a good perspective from which to begin dialogue. There is often a wish to transmit, educate and inform the public rather than an opportunity to transform decisions and commitments on both sides'. (p.106)

She and other scholars have stressed the importance of the cultural values of audiences as being a powerful shaper of audience responses. A helpful overview of the interdisciplinary research which highlights the powerful role that human values play in shaping individuals' engagement with environmental issues can be found in a recent paper by Adam Corner and colleagues. (Corner, Markowitz & Pidgeon, 2014) The paper reviews academic and 'gray' literature from civil society organisations which explores the role of human values (and the closely related concept of cultural worldviews) in public engagement with climate change and how public messages about climate change should be framed.

Finally, Susan Hassol has drawn on her rich experience as a senior science writer and communication expert on all three US National Climate Assessments, the Arctic Climate Impact Assessment, and the FAQs for IPCC AR4 WG1 to offer some key points about communicating major science reports. In a talk at the American Geophysical Union (AGU) fall 2014 meeting, Hassol focused on her experience of the 2014 US Climate Assessment Report, which in effect summarised her views on best practice for effective communication:⁷

- Communication should be integrated from the outset, and not added at the end; in other words, it should be an integrated iterative process based on a series of conversations, and not sequential (where the scientists hand over the science report to communicators once it is finished).
- Language issues – take out all jargon, and also take out words that mean different things to a general audience such as 'enhanced', which to a scientist means 'increased' (as in 'enhanced greenhouse effect') but to the general public means 'improved'.
- Summarise and synthesise long reports, and include cross-cutting findings that come from different parts of the report. A highlights document should include 'traceability' (where the statements come from in the long report).
- Make sure there are very clear graphics, which are 'as simple as possible but no simpler', and broadcast-ready graphics.
- A first-class web development team is essential, who know how to promote the 'shareability' of parts of the report on social networks.
- Carry out media training for the main authors focusing on simple, clear, main take-home messages with the big overarching themes ('it's happening now', 'it's affecting Americans', and 'we can do something about it').
- End with hope (there are things we can do to tackle this problem).

⁷ https://virtualoptions.agu.org/media/ED22A-03.+Climate+LiteracyA+Effective+Responses+and+Solutions+through+Best+Practices+in+Communication%2C+Partnerships%2C+and+Networks+II%2C+Presented+By+Susan+Hassol/0_14hg4ikl

This body of research is relevant to any evaluation of the effectiveness of the IPCC communication work. Starting with a good understanding of the information needs of its different target audiences is clearly paramount, as is the language used, the key messages and the modes of communication.

The need for systematic testing of the usefulness of the products is also of supreme importance. Moser has argued that common metrics such as printed pamphlets delivered, media hits, or website surveys are helpful but not sufficient. Opinion surveys before and after events such as Al Gore's film *An Inconvenient Truth* can also be helpful in measuring any changes in public attitudes. But these metrics fall short of a careful examination of effective communication. To measure this more robustly, close monitoring of the responsiveness to the changing needs of different target audiences is necessary. Constant testing, monitoring, updating and evaluation with the target audience are the best methods.

As mentioned in the Introduction, the only metric that the IPCC comms team currently uses is one that measures mentions of the IPCC in the media, where they divide the articles into three categories: 'good' (meaning broadly in favour of the IPCC), 'bad' or 'neutral' (according to the language used). According to one leading IPCC author who receives a daily summary of news articles, the articles chosen are 'very eclectic and unbalanced' and the categories 'unusually crude'.

There may be lessons that could be learnt from the work of non-profit organisations like the investigative journalism organisation, ProPublica, which has won two Pulitzer prizes. Because of the pressure from major funders to measure the impact of their investment, the organisation has invested considerable intellectual effort into conceptualising and assessing impact. (Tofel, no date) It now makes use of multiple internal and external reports in charting the possible impact of its journalism. One of these is called the Tracking Report which records not only each story published, but also the instances of official actions influenced by each story (such as statements by public officials or agencies or the announcement of some sort of policy reviews), opportunities for change (such as legislative hearings, an administrative study or the appointment of a commission) and the change that has resulted. These tracker reports last over periods of several months, and in some cases years. Each ProPublica board meeting contains an Impact Report based mainly on the Tracking Reports since the last meeting.

Admittedly, it is easier for a journalism organisation to monitor its impact by such metrics, but the IPCC could a) make use of much more sophisticated media measurements, b) track the formal uptake by governments of the reports, c) assess with more rigour and robust criteria its impact on key policy making fora both nationally and internationally, and d) select key groups of policy makers or other target audiences to test and monitor the effectiveness of its communication in a more systematic way.

3. An overview of the IPCC communication work

3.1 Context

As already mentioned in the Introduction, the IPCC re-examined its whole communication strategy starting in 2010 partly as a result of a perceived reputation loss from a slow communication response to criticisms or questioning of its work and some of its findings. Building on the recommendations of the InterAcademy Council in August 2010, the IPCC published a comprehensive Communications Strategy in 2012. In addition to identifying its primary and secondary audiences listed earlier, the strategy mentioned two key communication goals: (Hickman, 2015)

- To communicate its assessment findings and methodologies, by providing clear and balanced information on climate change, including scientific uncertainties, without compromising accuracy;
- To explain the way the IPCC works, select its authors and reviewers, and produces its reports and other products. This will promote the understanding of the reports and underpin its reputation as a credible, transparent, balanced and authoritative scientific body.

A new head of communications and media relations, Jonathan Lynn, a former Reuters journalist of 32 years' experience, was appointed in November 2011. He was able to call on the support of one or two colleagues, whose status was sometimes voluntary, sometimes paid. As described in section 4.3, his appointment led to considerable improvement in the professionalization of the IPCC communications operation, particularly in the areas of responding quickly to questions from members of the traditional media. In some cases, members of the Technical Support Units, which exist mainly to support for the work of the WGs, also provide support on the communication of the reports, although this varied between the different practices of the co-chairs of each WG report.

It was decided not to beef up the number of staff members of the IPCC comms team around the time of the release of the WG and Synthesis reports, when there would be a significant rise in media and other interest. Instead, the comms team agreed to external help from a variety of other organisations to help in the media work, working under a Memorandum of Understanding with the UN Foundation, who provided a total of about eight additional people. Lynn himself is of the view that this 'model' worked successfully for the media coverage, and could work for the future. (See section 3.4 and conclusions below)

According to IPCC figures⁸, the IPCC had a total budget of about £850,000 allocated to 'communication activities' in 2014, of which just over half (£430,000) was spent, leaving £420,000 in the bank. However, according to IPCC sources, the budget was overspent on outreach activities in 2015.

In addition, the UN Foundation worked with the public relations company Havas (backed by a large donation from the Villum Foundation in Denmark) to carry out media training for IPCC authors and other activities. The IPCC also did its own training with the support of the company, Escott Hunt.

⁸ http://www.ipcc.ch/apps/eventmanager/documents/27/050220151113-p41_doc11_trust_fund_programme_and_budget.pdf

IPCC authors are also involved in an extensive series of outreach activities to communicate the IPCC findings to governments, the media, the business community and NGOs. Notable amongst these activities are the structured policy dialogues with negotiators and interested parties within the UNFCCC process, which often take place at the COP and sub-COP meetings. Full details of the IPCC outreach work can be found on its website.⁹

3.2 Main products

The Summary for Policymakers, or SPM, is the main way the IPCC has summarised and communicated its conclusions. This is arrived at by a team from each WG reducing their full report down to a summary document, which is then further refined by and ‘unanimously accepted’ by government representatives from around the world. In other words, the SPMs are the result of a political negotiation. In addition, a Synthesis (SYR) report brings together the findings of each WG report into one publication. As we shall see in section 4.3 and 4.4, the world’s media and other organisations like NGOs mostly work from the SPMs to report on the IPCC’s findings and then disseminate them to a wide variety of audiences.

These SPMs are still long by the standards of most summaries of reports. All of them contained more than 30 pages. In the case of WG1, the important pieces of information were highlighted in brown boxes and bold text. Also, the highlighted boxes were drawn together into a 2-page document of 19 headline statements. The WG1 team, including the Technical Support Unit, developed and wrote them at the same time as it developed the SPM. The result was they emerged organically from the text and there was little controversy around them in the approval process. Because of the success of the WGI headline statements, governments encouraged WG2 and WG3 to develop them too. But because they were added late in the process rather than emerging naturally from the SPM it was clear that they would give rise to lengthy discussion and they were dropped in the approval plenary. On the other hand they were produced successfully for the Synthesis Report.

The SPMs normally follow the underlying chapter structure of the full reports (the exception is WGII). There is a tacit acknowledgement that they are not a full account of the science, as a Technical Summary is also provided. At the time of the launches, the full chapters of the WG reports on which the SPMs are based were not normally available. (WGI and III released the full report a couple of days after the SPM in the form of its final draft, with disclaimers saying it would be changed for layout and copyediting. WGII released it on the same day as the SPM.)

A press release was also provided on the day of the launches. Details of the launch dates and locations, plus details of the main messages found in the press releases and the SPMs, can be found in Painter 2014 (pp. 19-26). The AR5 was the first time the IPCC issued its own press release for an assessment report - it had been handled by UNEP/WMO for AR4. (However, the IPCC did issue its own press releases in this cycle for the two special reports SRREN and SREX).

Journalists who did not attend the actual press launch could follow the proceedings via a live webcast (later posted on the IPCC website), and some questions were taken to the panel of IPCC

⁹ http://www.ipcc.ch/news_and_events/news_and_events.shtml

authors and others via this method. Dozens of interviews were also arranged with IPCC authors before and around the times of the launches, particularly for WG2. In some countries, such as Norway, the USA, and the UK, local meetings were organised by research centres, NGOs, or science media centres at which climate scientists were on hand to answer questions from journalists.

Professional science writers worked on a set of Frequently Asked Questions for WG1 and WG2. These were included when the Technical Summary volume was published, between the SPM and the chapters.

Videos and other material were made available on the IPCC website. Minor attempts were made to use new and social media to disseminate the reports. An IPCC Youtube channel and various social media accounts were set up. Some tweets using the IPCC hashtag were also sent out, although these were limited in number.

The IPCC 2012 communication strategy recommended the use of ‘derivative products’ aimed at specific audiences. The essential idea is that the IPCC can work with organisations that take parts of the WG reports and communicate them in formats that work for those audiences. However, the IPCC is at pains to stress that these products are not the work of the IPCC or to be considered joint productions. Nor can they officially endorse these products. Notable examples of the derivative products were i) those produced by the Cambridge Institute for Sustainability Leadership (CISL) under the *Climate Change: Implications for Business* project, which were aimed at eleven business sectors in the UK. These are discussed at length in section 4.2; ii) the reports produced by the Climate Development and Knowledge Network (CDKN) for four different regions or sets of developing countries, where IPCC authors had a major role in guiding the reports but where the IPCC imprimatur was absent. These are discussed in section 4.1.2; and iii) the reports produced by Climate Nexus, which are mentioned in section 4.4.

3.3 The view from the IPCC Secretariat

In an interview for this research, Jonathan Lynn gave valuable context and insight both into the work of the IPCC and the challenges for the future. He himself focuses mainly on media work, but stresses the importance of helping the processes by which the IPCC can reach key target groups in a more effective way. His observations and suggestions provide essential context for the discussion and points that emerge from the chapters that follow. His ten key points were the following:

1. The ‘model’ of a small core team of IPCC staffers (himself and one or two others) working with about eight people from outside organisations ‘worked well’ for the media coverage of AR5 and in his view, is the way forward.
2. In general he was happy with amount and tenor of media coverage, although he recognises the difference in the amount of coverage in the media in different countries. India is a particular challenge.
3. There is a general acceptance that the material the IPCC produces is not always suitable enough for key sectors. So derivative products are very important – CISL and CDKN reports and one by Plan

International for kids are good examples, in his view. There is a strong need to find a way of getting more IPCC author involvement, even though the IPCC cannot formally endorse them.

4. The absence of sufficient regionally-focused material is a problem, but not much can be done about it in the absence of more research on some geographic regions (such as Africa).

5. Outreach work and events (i.e. presenting the report in different countries to various audiences) are extremely valuable because they allow the authors to present and discuss the science in their own words. There are still challenges in asking authors to use comprehensible slides and not to talk in jargon, but when it works it's a highly effective way of communicating the science by people who know exactly what they are talking about and don't stray from the scientific rigour. However, outreach is very expensive in terms of labour and money, both organizing the events and funding authors and sometimes other participants.

6. The absence of proper metrics to measure the effectiveness of communication efforts is recognised. There is a strong need for other metrics, particularly with policy makers.

7. When and how to bring in specialist writers is difficult, as is the question of what sort of specialist writers. But whoever it is, science writers and/or graphic designers, they should be involved from the start. If such people can be built into the teams early on, so that the scientists are working with them, and see them as equals from the start, then it could be done – even for the SPMs. What does not work is bringing someone in at the end of the process.

One idea is that someone both with a solid background in science and with good science writing skills forms part of the chapter teams. He or she could be one of the authors but also have an overview of the way the text is being written and expressed. (There is a precedent for this as someone from the TSU was working with WG3 authors). The process could be analogous to the way WG1 authors worked with headline statements early on - these went smoothly into the SPMs.

8. Many IPCC graphics have too much information in them, and are too complicated for a generalist audience. Some of the WG1 slides did work for policy makers, though. Better graphics are one of the best ways for making the reports more accessible.

9. The videos produced by the IPCC were seen as 'a great success' as the scientists got involved and helped to produce something scientifically robust.

10. Social media: more could be done at the time of the release of the reports, but it is not realistic to run a 24/7 social media operation as the IPCC only produces irregular reports. Besides the methodology reports by the Task Force on National Greenhouse Gas Inventories (TFI), there have been six over the last six years (the four components of the AR5 and two special reports).

Jonathan Lynn also highlighted some key challenges for the future:

- There is strong resistance from some IPCC authors and chairs to communication specialists as they fear that they will distort the science or have too much influence. (For example, Jonathan himself is not normally allowed into the lead authors' meeting, but he was present in the discussion of the Synthesis report.)

- IPCC communication efforts are hampered in some way by the complicated UN procurement process – it is easier to work with outside organisations bringing their own funding and people.
- The time between the agreement on a final text and the press release always get squeezed so there is not enough time to rehearse and think over key messages.
- There is a need to get more IPCC authors involved with derivative products. The challenge is to build into the IPCC process more time for them to help with this and other outreach work.
- There is also a need for more media training for some of the authors, including how to simplify their presentations into understandable graphics. Two sorts of presentation would be one way forward – one for scientists and a lighter one for policy makers or non-specialists.
- A different approach to communications is taken by the three WG teams and leaders; there was not enough coordination between them to do things in similar ways, so this needs to improve.
- Much of the reports are written and produced too much by scientists for other scientists.
- There is a need to assess and improve the user-friendliness of the IPCC website for different sectors. At the time of writing, the Synthesis Report website was still a work in process.
- The 2014 US Climate Assessment was a good model for graphics – the IPCC used the same graphics designer for the Synthesis Report.

3.4 Critique of the IPCC communication work

Several of the points made by Jonathan Lynn are relevant for an appraisal of some of the criticisms that have come the IPCC's way in recent weeks, and cover many of the same areas touched upon by several of the interviewees in chapter 4. The key issues will be taken up again in the conclusions, but at this point it is worth briefly summarising some of the critiques written and published recently by observers of the IPCC communication work as they provide some of the context for comments by the interviewees.

A special edition of the academic journal, *Nature Climate Change*, in April 2015 included several critiques of the work of the IPCC and the communication of its reports. (NCC, April 2015) A commentary piece by the former BBC environment correspondent, Richard Black, asserted that the SPMs were ill-suited both for policy makers and the wider public, mainly because of the jargon-filled language used and the failure to distil the main conclusions into a two-page briefing 'of the type that world leaders are used to receiving from their aides'. (Black, 2015) Black included a series of summaries of simplicity and clarity (in his view) which would better serve the policy-making community. Black finished by making three recommendations about how to change the way each WG worked, one of which was that each WG should abandon the idea that the SPM must acknowledge every underlying chapter. This point will be taken up in the Conclusions.

In the same edition of *Nature Climate Change*, Leo Hickman, also a former journalist (at the Guardian) and now at Carbon Brief, made a powerful case for the IPCC to take more account of the way online and social media have revolutionised the way information is now communicated. (Hickman, 2015) He argued that although the IPCC had operated Twitter and Facebook accounts for

several years, neither provided ‘much in the way of reactive interaction with its audiences.’ He also quotes three examples of good practice by climate scientists.¹⁰ His three main recommendations, which would all involve considerable time and energy on the part of IPCC authors, are reproduced in section 4.4.

Saffron O’Neill and her colleagues at Exeter University concentrated on assessing the ten dominant frames used by the media in the USA and the UK when reporting AR5. (O’Neill, 2015) However, the article included the conclusion that the different newsworthiness of the three WG reports could have been in part due to the sequential release of the reports (leading to ‘climate fatigue’ on the part of journalists by the time of WG3), and the availability of a translation of technical writing into media narratives, in the case of WG1, but not in the case of the other reports.

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Several papers have focused on and criticised the language the IPCC has used to communicate uncertainty by using different ranges for certainty and confidence levels. (Budescu et al. 2009, 2014; Patt and Schrag, 2003) Of equal relevance to this study is a paper by Ralf Barkemeyer and colleagues, who carried out a linguistic analysis of the SPMs from 1990 to 2014 as well as related media coverage on the launch of IPCC assessment reports. (Barkemeyer et al., 2014) The paper found that the SPMs clearly stand out for very low readability scores (where an equivalent to a PhD level of understanding of climate science is needed), which have remained relatively constant despite the IPCC’s efforts to consolidate and readjust its communications policy. In contrast, clear changes over time and between countries can be identified in scientific and broadsheet newspaper coverage, with coverage on more recent reports generally becoming more readable and emotive.

A recent paper has also assessed how effectively the IPCC scientists addressed the issue of uncertainty when presenting the findings of the WG1 report at the press conference in Stockholm in September 2013. (Hollin and Pearce, 2015) The authors of the paper argue that the scientists fell into what they called the ‘IPCC’s certainty trap’, and inconsistencies led to confusion within the press conference and subsequent condemnation in the media.

Several papers and presentations which have formed part of the EU’s Joint Programming Initiative (JPI) on Climate (AR5 in Europe) project¹¹ have also directly or indirectly critiqued the IPCC communication work. For example, research carried out in Spain and Holland which involved interviews with policy makers suggested a low influence of the IPCC reports on local policy processes but high credibility and legitimacy (Spain), and that the SPMs were ‘a low quality communication

10 Hawkins, E., Edwards, T. & McNeall, D. *Nature Clim. Change* 4, 154–156 (2014); <http://www.realclimate.org>; <http://www.skepticalscience.com>; <https://twitter.com/richardabetts>.

¹¹ http://www.cicero.uio.no/webnews/index_e.aspx?id=12065

tool', where the language and figures were difficult, complex and too scientific for policy makers (Holland).

A paper written by Steve Yearley and colleagues (Yearley et al., 2014) for the same project showed that, contrary to what one would anticipate, little is known about the way the principal outputs from the IPCC process are taken up and used, even in countries – such as the UK and Norway – which are supportive of the IPCC's work.

In its abstract, the paper wrote that:

'The IPCC is committed to producing policy-relevant work, yet there are few studies or evaluations of how its work does inform or influence policy. We indicate also that this lack of attention to the practicalities of policy relevance extends to the IPCC itself, for there is little information on the extent to which IPCC documents' impact on policy is tracked. Nor is it clear how this information is fed forward into the process of review or the design of assessment cycles.'

On a related theme, two academics, David Viner and Candice Howarth, have criticised the IPCC for not including practitioner-based evidence, which they argue is 'fundamental to make the reports a relevant source of information for decision-making'. (Viner and Howarth, 2014) In the article, they recommend that the IPCC and other official assessment processes engage with practitioner communities by 'integrating them in the design, and writing, of assessments – in this way, the language, style and results can meet the needs of the end user'.

Finally, a report by the Oxford-based NGO COIN made seven recommendations for the IPCC in its communication with its secondary audiences, including 1) increasing the amount of resources for communication work and training of scientists, 2) embracing video content and social media, 3) showing the human face of the IPCC, 4) identifying a diverse range of partners, 5) telling human stories about climate change, 6) testing its output with different audiences, and 7) no more ARs, but rather starting with the needs of audiences, which would deliver science to order. (COIN 2014) Points 1) and 2) were considered 'easy', points 3) to 6) 'moderate' and point 7 'difficult'.

4.1 Governments and Policy Makers

Case Study 1 Local Policy Makers in the East of England, UK

1. Main Points

2. Recommendations

3. The Importance of Local Policy Makers

4. More details on main points

5. Additional quotes

6. List of interviewees

7. References

1. Main points

- IPCC reports are considered by local authorities to be very authoritative and grounded in evidence, and therefore provide the most reliable source of evidence on climate change.
- The reports, and particularly Working Group I, are rated highly in terms of clarity, and provide a stamp of endorsement on the evidence on climate change which is significant for their audience.
- The reports are frequently used to provide background to local policy making, such as climate change or environmental strategies. However, they rarely directly inform decision-making as the reports do not provide a useful local analysis of impacts and responses to climate change at the local level.
- The reports are used for internal and external communication purposes for which summary documents such as the Synthesis Report (SYR) 2-page summary are particularly useful.
- In general the SYR and Working Group (WG) SPMs are used the most frequently. The press releases, quotes from the report launches and FAQs are used on occasion.
- Often internal briefing documents are created to align with the interests and audiences local authorities deal with. On occasion alternative resources such as those provided by UKCIP and other local councils are used.
- The principal limitations observed about the IPCC reports are the inaccessibility of the language to non-expert audiences and the lack of evidence showcasing new impacts or innovative solutions that are not already being used locally.

2. Recommendations

2-page summaries of reports

- **Content:** The IPCC reports are exceptionally valuable. However, more summary documents are needed, no more than 2 pages with information on specific impacts (e.g. temperature, rainfall, sea level rise) to enable quick and accessible information to inform decision making at short notice.
- **Language:** When it comes to practical decision making and looking at informing decision making in national and local government, the reports need to be more readable and accessible.
- **Targeted/audience specific:** Talking to policy makers at different levels about how useful they find the reports and what different people's needs are would be useful.
- **Clarity of credibility:** More clarity is needed on the credibility of the reports, with more information on the number of governments involved and the nature of the peer review process (in terms of papers written that are referenced in the report as well as the IPCC report writing process itself).
- **Context:** The general public is more concerned about what the likely impacts will be and what they need to do about it.
- **Length:** Interviewees praised the SYR summary and recommends the IPCC continue down this route. Shorter summaries with key statistics and facts would be very useful in writing the local council's climate change strategy as this would save a lot of time and resources.

Making it local

- **Local focus:** For Local Authorities, the reports need to be broken to specific messages each Local Authority could use to help inform decision making on local transformations to a low carbon economy. On occasion, the way in which the IPCC frames climate change as global means it can be dismissed at the local level.
- **Spokesperson/Champion:** Having someone or something that can communicate concisely the key messages of the reports would be 'incredibly useful'. It would be helpful to have a network of local champions, affiliated in some way to the IPCC, who demonstrate the relevance of the IPCC reports and global climate change to the local area.
- **Local policy relevance:** Any additional support on how the IPCC can help evidence-based policy making, particularly resources that are produced to help communicate the message, would be very helpful.
- **Intermediaries/translators:** The role of intermediary/translator organisations is very important in helping to communicate the key findings from the IPCC reports. Adopting a country-level approach would be useful to enable more use of the content of the reports, particularly looking at impacts and adaptation.

The role of digital technology

- **Regular updates:** Consistent updates on a regular basis, via social media, would enable faster access to up to date knowledge in the field and stimulate thinking on a day to day basis.
- **Target non expert audiences:** The use of digital means would be very helpful in making the reports more interactive for example through more infographics with more emphasis on clear graphs and data.
- **Increase navigation:** technology to help condense and break-up the reports and help navigate to specific themes in the reports.
- **Engagement with audiences:** the IPCC could consider setting up a series of webinars to communicate parts of the IPCC reports to different audiences following publication.

The role of communication specialists

- **Slight scepticism** about the use of communication specialists as it can be a massive challenge to ensure the scientific message is not lost in the process of translation.

3. The importance of local policy makers

The challenges which have arisen in the adoption and implementation of international and national plans of action to tackle climate change have led to an increase in locally-based initiatives often linked with and demonstrating co-benefits to environmental, economic and social policies (Bedsworth and Hanak, 2013). Responses to climate change in terms of both mitigation and adaptation occur at the local level and are needed to achieve national and EU 2030 Energy and climate targets. In addition, local decision and policy makers have a deep understanding of the impacts of climate change locally, including how local stakeholders, communities and structures respond and the role they play in driving solutions for effective low carbon transformations (Vogel and Henstra, 2015).

In considering how to design policy responses to climate adaptation, 'upscaling' through the use of local case study analysis is increasingly seen as a useful evidence-base to develop public policy solutions grounded in contextual research (Larsen et al., 2012). Local policy makers are on the 'front line' of local implementation of climate change solutions and therefore contribute to developing locally-based nationally-impactful solutions to climate change (Argyriou et al., 2012). They rely on certain types of data such as rainfall, temperature and sea level rise to inform decision-making on issues ranging from energy efficiency, economic development and community wellbeing and growth, making them important climate change information users and obvious audiences of the IPCC reports.

For this study, seven local policy representatives mostly from the East of England region in the UK which is vulnerable to numerous impacts of climate change including sea level rise, were interviewed to provide a representation of the different types of roles that exist at the local policy level: councillors, climate change officers, developers of local climate change and environment strategies and local government agencies. Interviewees were approached based on their role in shaping climate change policy and decision making as well as their knowledge and use of the IPCC reports in informing their decisions. Interviewees' experience and knowledge of climate change varied with some new to the issue and others having experience in engaging with academic and science literature to inform their decision making.

4. More details on main points

The use of IPCC reports: The IPCC reports are frequently used to provide background to local policy making, such as climate change or environmental strategies, and to assess alignment with national climate data (from UKCIP). The reports are considered by local authorities to be very authoritative and are perceived as a necessary and useful evidence base highlighting key data on sea level rise, temperature and rainfall.

However, as interviewees require data to inform their local decision making, the IPCC reports are not particularly useful in communicating the local impacts and dimension of climate change.

'As a partnership, obviously we keep abreast of latest developments in the science and the IPCC reports we recognise completely as being the most authoritative source of information on the latest scientific findings.' (LP1)

'I think that the IPCC, for my audience, is very authoritative. It captures a lot of media attention, so from that point of view it's a very significant document. (...) It's more about the profile and the authority of the IPCC, which is significant for my audience.' (LP3)

Internal and external communication: The IPCC reports are the most authoritative accounts of the science. Some councils distil the reports, particularly the SYR by creating short locally-relevant summaries of each WG report to give a local flavour and context of the reports, and disseminate these through local engagement activities with the public, business. They use the IPCC outputs for their own internal and external communication purposes and particularly value summary documents such as the SYR 2-page summary.

Translating climate change narrative to a local context: The key headline messages from the IPCC reports are often translated via the production of Briefing Notes on each of the WG reports as well as webinars on each of the reports (the latter proving very popular). Often communicating the IPCC reports is aimed at two audiences: internal senior managers and staff as well as external facing staff - for the Environment Agency for example, this is mainly through the 'Climate Ready' programme. For this, the IPCC reports are not the only resource used: a combination of IPCC reports as well as briefing materials provided by DECC are used to inform their Briefing Notes and framed more to a UK context. However, other resources provided by the IPCC for AR4 for example have been used historically (since publication, not necessarily around the launch), particularly the graphs and images. Interviewees predict a similar gradual usage over time.

However, the use of the IPCC reports is dependent on local policy priorities with one of the interviewees admitting to not consulting the IPCC AR5 reports to inform their decision making as their current council priority focus was very much on energy efficiency. However, the IPCC reports are recognised as grounded in evidence and therefore provide the most reliable source of evidence on climate change. In the past they have relied on the IPCC reports as an evidence base to develop the National Indicators on climate change adaptation and mitigation. They do consult the IPCC reports, and particularly the SPMs, in mapping the effects of climate change locally. In developing their own materials they are very conscious about not changing facts and figures from the original reports as they are aware how easily these can be misconstrued.

'Certainly it's very influential in terms of the international negotiating process. In terms of the impact and adaptation side of things it's less influential because the research already exists. Impact and adaptation is more local - we tend to know about the research because it's happened in the UK already. In a way that's putting a stamp of endorsement on it rather than stating new findings. That's it on the modelling side. I think it does influence future modelling, and on the impact and adaptation side it's much more about authority and making the case, and then awareness raising.' (LP3)

As a reference to develop environment and climate change strategies: The IPCC reports have been used as a reference (in the introduction) for the Environmental Strategy for Norwich City Council to provide a general picture about climate change. They would mainly use the WG or SPM reports as well as some of the quotes around the launch of the reports, but this is only as a generic high level account of climate change. In terms of evidence, they tend to draw on resources produced by other councils and national data, more than the IPCC. The IPCC reports are used to reinforce the importance of a measure/initiative the council is doing or to justify more investment.

'When I was part of the ERDF funding programme from Europe, one of the objectives included climate change, and there was some opportunity to use the data from the report in the setting up of the programme. (...) It was maybe limited in terms of what it actually eventually provided. I used the IPCC stuff as a reference point (...). The projects that the programme might support needed to be justified in terms of what it would be delivering in its outcomes. Admittedly lots of the data was contextual setting but it was useful in that basis' (LP5)

'I looked at reports from the IPCC in drafting the [council's climate change] strategy back in 2012 but at a high level really to set out in summary what the evidence was around how climate was changing globally. What I essentially tried to do was translate that to a regional and local setting and therefore the things that the council needed to do. I suppose it informed the strategy at a fairly high level but there were a lot of other things that I drew on.' (LP6)

As a basis for decision making: The IPCC reports are used to inform decision making for some interviewees for example as an 'introduction in the City Council environment strategy' (LP4), they are considered 'a prompt for conversations around the subject' (LP1) and the main messages are 'distilled for the sort of types of audiences that we engage with' (LP1). They are considered to be a valuable resource to 'reinforce the importance of a certain measure that the city council is doing, or something that we think they should be doing. For example, if we want to argue that they should put more money into the environmental strategy, that's maybe when something like the IPCC report would come up' (LP4). They have been particularly useful in some cases when advocating for more action on the climate change agenda, particularly in context where one particular party may be trying to encourage another to demonstrate more leadership:

'Mainly arguing with the other parties, and trying to argue our case when it comes to what officers are writing in their reports. Then from there, officers take over, and they do the outward facing material. Unfortunately, especially as an opposition, you have very little input. We try to point towards scientific papers and ... How far they take that up, is really up to them. Our communication isn't much about the details. It's much more about actions that people can take.' (LP4)

However, interviewees emphasise the importance of targeting the content of the IPCC to specific audiences and that in the case of local policymakers, if the content of the IPCC report does not align with the needs of the audiences, then they will not be used or will need to be translated.

'My audience here is councillors, political leaders, and also directors and leaders of our sections, whose focus is upon clients-based financial savings and their own day-to-day business. It's always difficult to come across with something such as climate change and how that actually affects their day-to-day business.' (LP2)

'Over a longer period of time it has more influence on decision-making. For example, I work with the UKCIP on the UK projections, and do a lot about thinking how we incorporate those corporate international modelling efforts into the next set of projections. A lot of what we're doing is thinking about what is the worst case for sea level rise, and finding time to incorporate that brand of modelling output. I think the AR5 process as a whole, or thinking internationally about getting to the best science, is really important.' (LP3)

Limitations: For a minority of the interviewees, the language in the IPCC reports is perceived as inaccessible, heavy and dense and *'could be plainer'* (LP1) although the language in AR5 is an improvement on AR4. This is accepted as being a reflection of the evidence base covered and the different audiences of the report for the IPCC in comparison to local policy makers, who are more likely to engage with local businesses, community groups, stakeholders, internal staff on issues such as domestic energy efficiency, business services on offer etc. This suggests that many of those interviewed saw it as their role to translate the content to make it more accessible to internal staff who were unlikely to consult the reports themselves.

'We didn't change any of the findings but perhaps the wording sometimes. I know that the wording is designed to be accessible. As accessible as possible within the context that it's released in but we still find that we sometimes have to put things in slightly plainer language without changing any of the essential messages clearly. We're not attempting to interpret it. We are presenting it as it is of course because of what it is, where it's come from but then sometimes, the language just needs to be softened a little bit.' (LP1)

An emerging observation from each of the interviewees is that, while it provides the baseline and highly influences the context within which local policy making may be shaped, it *'doesn't tell us anything we didn't already know that's required to make those sorts of decisions'* (LP7). The data and evidence (for example on temperature) are useful to inform local policies such as *'housing and how housing and retrofitting energy efficiency with housing would be critical in projects going forward'* (LP5), and so through its various products, provides an array of resources to refer to where needed.

'We know we've got to do a lot more in terms of carbon reduction. We know we've got to prepare for a changing climate in terms of water resources, flood protection, all those sorts of things, which are the bread and butter of what I do. It's useful background information to give us the encouragement that we're doing the right things in the right places, but it's so high level compared to what we're doing on a day-to-day basis in towns and villages in people's homes and farm land in Suffolk. It is background more than anything else.' (LP7)

Which IPCC products are used? The IPCC WG reports are used at a high level to set out the evidence of climate change globally, and then translated to the local level for the design of locally-focused

strategies (particularly relevant to towns and households). The SPMs as well as the SYR are most commonly used with a little use of the IPCC websites and fact sheets (mainly on what the IPCC is). The summaries in particular are used for background and to give encouragement that they are doing the right things in the right places. In addition to the SPMs, press coverage and quotes from the reports are useful salient points which add weight to the reasons for their policies.

'The Synthesis report would have been the most useful because it just brings everything together and we are you know, a public facing partnership and we run projects across the sectors of domestic energy efficiency, business resource efficiency, and increasingly community energy. So we don't really interact with academic institutions and we don't provide specialist technical services. So the detailed findings in WG1, 2 and 3, that's more information than we can actually use in our day to day work.' (LP1)

Generally the IPCC reports are seen as the authority on climate change and provide the evidence base to inform background for local policy making as well as a useful tool for wider stakeholder engagement with some of the IPCC resources used and shared. The WG reports themselves are widely used, although not on a regular basis, as well as the SYR, with *'its own easy to read summary, accessible summary (...) a hugely useful tool for us'* (LP1). In addition the IPCC website, briefings, quotes from the launches and 2-page summaries are also considered valuable.

The headline findings are considered to be very useful as some of the details of the reports (e.g. detailed scenarios) can be in technical language which is not always suitable for their audience and requires a level of translation and detailed explanation.

Interviewees used additional resources to complement the IPCC findings and to address some of the language and accessibility issues highlighted, particularly briefings provided by DECC. It is interesting to note that the IPCC resources are used on a continuous basis, not just around the launch of the reports; this is true for AR4 where LP3 *'used a lot of the images and diagrams that they make available alongside the report. Historically I have used that kind of material, but I haven't with the AR5 yet'*.

'Case studies examples of work and the impact of severe weather on communities and businesses, (...) anecdotal evidence from business owners, land owners, farmers of how things have changed in their lifetime and why they've taken the action that they've taken. That's often really helpful. It's much less scientific than the IPCC information. We have got some resources in terms of (...) data produced by the Environment Agency. (...). Lots of evidence relating to the science as well, relating to the practicalities of taking the action. The things we need to do to combat and adapt to climate change are sensible measures in themselves. Lots of the arguments persuading people to do things differently aren't based on the science. It's much more of a gut reaction and very local economic argument.' (LP7)

Language, accessibility and clarity: Generally, IPCC reports are rated highly in terms of clarity, are considered to be high profile and providing a stamp of endorsement on the evidence on climate change which is significant for their audience. Overall there is a clear dominant message and headline findings in the reports, particularly on the evidence of climate change, impacts and human agency which can help when thinking about local policy.

'It's very useful in the clear sort of headline findings but then a lot of the detail of the report is sometimes couched in quite technical language; paraphrasing or explaining to a less informed audience was part of my role in the council and because it's the IPCC's role is to review a wide range of studies carried out by researchers across the world it summarizes things in a way that it's very likely, or highly likely that "x" will happen. Some of the things are quite general and then others relate to specific scenarios that are quite difficult to unpack, so I suppose the official answer is yes, I do find myself either interpreting or explaining a lot of the messages in the report rather than quoting directly. I suppose it would be more helpful to me trying to communicate to council, schools, average members of the public in Cambridge, if those things were expressed in slightly more layman's terms with more concrete figures about the changing climate or rising sea levels or and that sort of thing.' (LP6)

When it comes to going into the detail of the reports however, it becomes a lot more difficult to follow and is less accessible. In terms of language, they are perceived as 'heavy' and as a result of this it is expected that the reports are not widely read. If the aim is to reach a wider audience then the reports need to be much clearer. The Suffolk Climate Change Partnership for example engages with different audiences on impacts at a local level and what people can do, and in that (local) context, the IPCC reports are not as useful for that audience and purpose in mind. This is when internal briefings and translation of the reports is necessary. However, it is important to note that in general interviewees have seen an improvement in the language in the IPCC reports, particularly around more certainty of anthropogenic change and impacts and managing uncertainty future changes. In addition the IPCC is 'talking to all countries' (LP3) and so national government briefings from DECC helped translate the global picture to a national context.

'Part of the reason I had to change languages is because of the nature of my audience as opposed to the audience of the IPCC. The environment agency is very England centric, and also very focused on only certain impacts. In some things, part of the language change that I had to make was to reflect my specific audience, just to be a bit fairer.' (LP3)

The messages are clear for most of the interviewees when it comes to adaptation to impacts and mitigation. However, most interviewees who engage with the IPCC reports are used to reading scientific reports about climate change, and hence it is felt that non-expert audiences would be unable to comprehend the content as well. It is viewed as useful to have different likelihood terminologies, and snapshots of examples of impacts (temperature, rainfall etc.) are seen as very accessible. However, it is still found to some degree to be heavily research focused. There is a slight discomfort around communicating terms such as 'very likely', and percentages are deemed much easier to communicate. The graphs in the reports in particular helped make the reports more accessible to visualise the data and demonstrate the changes clearly.

Most of the people employed to use the IPCC reports, and indeed those that were interviewed had experience of working with scientific data, academic research or indeed the IPCC reports themselves through education (e.g. an MSc in Climate Change) which meant that they felt they were equipped to understand the content of the IPCC reports and adapt that to their work. There was widespread

agreement that for those without a similar background, the reports were less accessible and resources such as the SYR and its summary were of most use.

5. Additional quotes

Recommendations - 2 page summaries

'The fact that the Synthesis report came with those one or two pages ... a two page summary of essential messages and I think that's absolutely critical. So I think that's the approach that I'd recommend (...) an easy reference for what the reports are. Where they've come from. To make it clear how credible they are. To give an understanding to general audience of the significance of these reports. How many governments have signed up to them and perhaps an idea of the peer review process which goes into the production of the papers which formed the back bone of the summaries, so that people can get a feel for the context and I think that we're constantly bombarded as the general public with findings from papers as they come along and then appreciation of just how many different papers have gone into these summaries.' (LP1)

'A double-sider that might have changes of rainfall, changes of temperature, because the summary notes that I've been in receipt of before are still 40 pages. That makes it quite hard to read. When you're in the position like mine, which is interested and has a lot of background in relation to climate change, but isn't the premise of my job, you need to have quick, accessible information that you can go to in between meetings or I don't know. Maybe your lunch break or at the end of the day when you're in a position when you can do a bit of reading. Having a 100 page document or a 50 page document means you really have to be vested in that subject matter, and it has to be essential to your work. Taking that aside, if you had a double sider and you wanted to read that as part of a different piece of work that would inform that, that would be much better.' (LP5)

'Shorter summaries of the reports that had the broad headline findings and supported by some key kind of statistics and facts that would be very useful to me in writing the council's climate change strategy... I suppose it is about how the information could be presented for generalist policy makers like me rather than specialists.' (LP6)

Recommendations - making it local

'If you wanted to make it easier for local authorities for example, I really think it needs to be broken down a lot more into what specific messages local authorities can take from it.' (LP4)

'Very local experience is that because it's announced at an international level that makes it easier to dismiss locally, "That's just something that they're talking about in some foreign country miles away. It doesn't really affect us."' (LP7)

'Having some sort of local champion who is championing that message with examples that mean something to people living in this locality is something that would really help me. I think a network of local champions, people of standing that are saying, "This international announcement, these reports, have relevance to us here in Suffolk because X, Y, and Z." That's something that I think would certainly bring more residents to the information locally.' (LP7)

'We've invited UK-based contribute in authors to come in and give a webinar series on each of the reports. Those have been incredibly popular with staff.' (LP3)

'I'm a bridge between what is quite a dense rich document, and something that is suitable for my audience.' (LP3)

'Any material that is produced that is trustworthy and can be passed on, that we can use to communicate the message, is really helpful' (LP4)

Recommendations - the role of digital technology

'I definitely think the use of digital technology could work wonders for them because ... When you download the report in its entirety it's just massive, and it's a massive turn off to anybody who's job is ... Digital technology is great for breaking things up and helping navigate people to the right things that they have to read.' (LP3)

'Hardly anyone outside of academic circles will open them. So they're not accessible documents but the general public could have a means of making them more accessible - interactive technology and digital technology would be a huge leap forward for the IPCC.' (LP1)

'You have a video that could be just a short briefing that local politicians could watch. I think it's more about having something accessible or someone who's willing to come around and quickly talk us through the update. We are quite willing if it is really offered. I think we are quite willing to give briefings and learn about these things. (...). We get hundreds of press releases about everything. Really the offer to have something, a 20 minute video or something, that we can show at the beginning of a session, I think something like that could be helpful.' (LP4)

'There needs to be consistent updates to stuff. There's no point having a report every three to four year or every year. It's almost like ... We rely on social media these days, so it's almost like new pieces of information that come out, new pieces of analysis could be put in a synopsis and put out on social media so you can access that quite quickly, and it'll stimulate thinking on a day-to-day basis.' (LP5)

'Charts and graphics in the report, (...) if it's possible to make those sort of more interactive by digital means, I think that would be really helpful and I think also maybe presenting some of the information more in terms of info graphics rather than large amounts of text might help, and I suppose if the IPCC is looking to move some more to the digital platforms then perhaps that makes that easier to achieve.' (LP6)

Recommendations - the role of communications specialists

'It's all a matter of which audience you're wishing to hit... If you're going to have specialists' comments, you're then going to be looking at just focusing, perhaps upon various channels of expertise, aren't you? So, which sectors do you look at? And do you get your agricultural experts in to do their piece? I feel that the outcome needs to be more focused... Maybe that could be useful, but you'd need to choose the sectors which you wanted the experts to comment' (LP2)

'Talking to the policy makers at the different levels about how useful they find the report and actually those sorts of things and trying to develop products that meet different people's needs. I think it would be very helpful. I recognize that I'm working in a particular context in a district council and

maybe you're working in a government department or an engineer might have very different needs and I think that they probably need a range of approaches to help inform policy at different geographical levels and within different organizations.' (LP6)

'Even communication specialists, I have a little bit of a love-hate thing with my phone communication specialist, in that you sent things often it comes back completely reworded and scientifically wrong. I think that is a massive challenge. I think it's okay to produce outputs that are for a more technical audience. I think there is a place for that. I could think of additional products where there's more effort put in by communication specialists to make them more user-friendly and accessible. You have to accept that you lose something by doing that so you would want to do that for the whole process.' (LP3)

'... They could employ communication specialists throughout the process rather than just at the end. If you have embedded the common heap on the writing group all the way through, then you might not have that dichotomy between communication and technical access. They would've been part of the process and learning throughout the process. They may as well do that, I don't know, but you certainly don't hear about that. The focus is always on the science, and perhaps there's more effort to be put into how communications is incorporated from the beginning.' (LP3)

What gets used

'The background stuff in relation to general temperature rises and sea level rises and other things like that were quite useful. It was the graphs really that were being presented as part of the report.' (LP5)

'I've been looking at the Synthesis report... Broadly it is something that I'm referring to when I'm developing the new strategy as well.' (LP6)

'I went to the reports themselves, and as I say, in combination with the briefing material (...), these were the things that I used. I did actually have drafts of the IPCC reports which meant that I could be prepared for publication day. Then I only went to the final published report to check that what I prepared in advance was still in fact okay.' (LP3)

'I might quote from some of those summaries and then the language that's now being used and the very helpful highlighting of those key statements in the summaries has been useful in that you can go and quite easily pick those salient points out and drop them as quotes from IPCC into the forward and headers of some of the documents that we might produce on a regular basis, that add weight to the reason why we're doing what we're doing.' (LP7)

'I used quotes from the launch where all the main leaders had a quote on how important the report and the process were. We would maybe use something like that in a debate for example. That's probably when we would use, not press releases, but you can get the speeches of the launches. That's something I've had a look at' (LP4)

'IPCC website - I have looked at some of the fact sheets but primarily the ones that explain what the IPCC is, who and what it's methods are, and what the process it follows has been just to help me understand where it fits in the climate change policy field.' (LP6)

The language of the reports

'If these reports are going to outreach to the main stream audience, then they really do need to come with much plainer language' (LP1)

'It's always very difficult, presenting a technical subject in language that can be understood by the layman (...) and I think it's found a very good middle ground. The layout (...), the presentation of it all (...) it's a lot easier to find the bits you need' (LP2)

'I personally don't feel entirely comfortable with the formulation of very likely, this whole ... I'd feel more comfortable with a percentage because I think it's much stronger, but then I know that the public might not understand it as well. Personally, I feel the wording around the certainty percentage, or ... If you have a 90% certainty or a 99%, I think the very likely is a little bit weaker to me compared to numbers, but that's me personally, I think.' (LP4)

'I think it was the graphs actually. I think it was the accessibility of being able to see the data in a graph.' (LP5)

'I think the overall methods are very clear. I think the headline findings are very clear. It helped me to look at the press reporting on some of the reports because that expressed it in more general language than the slightly scientific language in the IPCC report. (...) It's when you dive down into the detail of the report (...). It's much more difficult to follow.' (LP6)

'In the summaries it feels less scientific. It feels more accessible, and it feels more directly related to people's lives, which when we're dealing with ordinary residents of Suffolk, when we're dealing with Councilor representatives and the people of Suffolk at different levels, then that's absolutely crucial. Whilst the science is obviously incredibly vigorous and well researched, it's quite dry and boring to be able to go into the detail of that with people. If you've got clear, concise statements that are easily accessible and understandable by the man in the street, and give a clear message that feels like it impacts on their day-to-day life, then they're useful in helping you make an argument about why you're doing something.' (LP7)

6. List of Interviewees

Local Policy 1 (LP1): David Walton, Suffolk Climate Change Partnership

LP2: Paul Hinsley, Essex County Council

LP3: Molly Anderson, Environment Agency, Climate Ready

LP4: Sandra Boegelein, Norwich City Council

LP5: Michelle Burdett, North Norfolk Council

LP6: David Kidston, Cambridge City Council

LP7: Matt Hullis, Suffolk County Council

4.1 Governments and Policy Makers

Case Study 2 - Policy makers in developing countries

Main points

- The CDKN 'model' of having ring-fenced financing for the project and having 'absolutely terrific' IPCC authors working with the CDKN research teams in an individual capacity worked particularly well.
- The national policy dialogues held in different countries created demand for similar, more devolved work outside of the capitals (especially in the case of India and Pakistan)
- The IPCC reports are 'getting better' in terms of clarity in comparison with AR4, although there is still some way to go; the Synthesis Report is to be highly commended.
- There were not enough relevant case studies for a particular sub-region (of Asia for example) which would have brought an issue alive to an audience.
- As a result, the CDKN authors did rely almost exclusively on the AR5 reports, but occasionally included other information in text boxes on a particular point that came from their own sources or another report.
- The IPCC's production of short videos on the key findings was a good development.

Recommendations

- There is a huge demand for more information at the regional and sub-regional level, not just amongst governments and policy makers, but amongst the business sector and civil society too.
- Having more than two IPCC authors to call on would have been helpful to spread the load of advice in preparing the derivative reports.
- More consistency was needed between the three WG reports, particularly on the issue of the decarbonisation pathways and the mixing and matching of Carbon, CO₂ and CO₂ equivalents in calculations of the carbon budget.
- It would be good to have available on the IPCC website short individual news clips which people could use in their own communications.

This case study is based on the experience of the alliance of organisations known as the Climate Development and Knowledge Network (CDKN). They work in more than 70 low and middle income countries in Asia, Africa and Latin America, and have more intensive engagement in about 13 of them.

From July to December 2014, they organised a series of policy dialogues with key policy makers in several developing countries based on the information found in the IPCC AR5 reports, so that the latest climate science could be better incorporated into decision-making. They also produced four regional reports which distilled the key messages of AR5 for three different geographical regions (Africa, South Asia, and Latin America) and one generic group of countries (Small Island States). So for example, the report 'What's in it for Africa?' was a 79-page report based on WG1-3, which was reduced to 35-pages in an executive summary.

Alongside these reports, CDKN presented a 'Media Toolkit', a bundle of resources available for education and reporting purposes to encourage understanding of the AR5 reports. Details can be found here: <http://cdkn.org/ar5-toolkit/>. The site included infographics, presentation slides and shareable images.

Key features of the CDKN work were:

- AR5 authors could speak directly to policy makers in the policy dialogues.
- These dialogues included representatives of different sectors in different countries, including Environment Ministries, Planning Ministries, bilateral and multilateral agencies, the president's office, international and national NGOs, and think tanks and research institutes.
- Journalists were also targeted as a sub-group for training sessions.
- The authors of the CDKN reports were able to work closely with two IPCC authors working in an individual but professional capacity (see below for details*)
- CDKN had access to early drafts of the AR5 reports which allowed them to start work in preparing materials before the actual launch date of the individual reports.
- Their work was funded by an outside organisation, in this case DFID (the Department for International Development in the UK).
- CDKN could draw on their experience of doing a similar job with the 2012 IPCC SREX report on extreme weather events.
- The creation of their own infographics (with an outside designer) that used IPCC raw data, summarised different trends and were downloadable from the CDKN site, were particularly successful.

* Although there were several authors of the four reports CDKN produced, two IPCC authors made substantive contributions: Yacob Mulugetta of the University of Surrey and Maarten van Aalst of the Red Cross Red Crescent Climate Centre. Dr Mulugetta is a Coordinating Lead Author of the Fifth Assessment's Working Group III report (chapter on energy systems) and member of the core writing team of the *Synthesis Report*. Dr van Aalst is a Lead Author of the Fifth Assessment's Working Group II report (chapter on regional context) and *Technical Summary*. He was also a Coordinating Lead Author of the IPCC's *Special Report on Managing the Risks of Extreme Events and Disasters to*

Advance Climate Change Adaptation (SREX, chapter on determinants of risk), and member of the core writing team of the *SREX Summary for Policymakers*.

Selected quotes from Mairi Dupar, Global Public Affairs Coordinator at CDKN and project leader for the CDKN derivative reports and outreach work:

On regional-level case studies:

'The AR5 will have a message like there are increasingly more integrated adaptation-mitigation-development approaches by governments around the world, increasingly in Asia. But then it won't really give you that many case studies from the Asian region. The region is so massive and the example it might give you in its little box is from Vietnam or Fiji and you're doing all your outreach in South Asia and you're thinking "Gosh, how am I going to illustrate that? The example from Fiji isn't going to fly for all these policy makers in Delhi". So, we did include more material in our tool box, if we had a really illuminating case study that makes exactly the point. It would obviously be great if the AR5 itself could give all the supporting material.'

On clarity:

'I do want to go on the record as congratulating IPCC for improving over the last assessment. You can look at AR5, you can look at the policy maker summaries and you can feel to a certain degree perplexed by the technicality of some of the language, but it is improving assessment by assessment definitely. And they should get credit for that.'

On IPCC authors:

'Having Martin and Yacob <the two IPCC authors> on board, they were absolutely terrific and so supportive, constructive, and understood exactly what we were getting at in terms of communicability and yet very aware that there were certain lines that you couldn't cross in order to maintain scientific credibility.'

On infographics, the tool kit, and spreading the message

'One of the things that have been super successful from the CDKN project was our creation of infographics that summarised the different trends and were downloadable from the site. We've have lovely e-mails from users all over the world saying, "We downloaded your infographic on historic climate trends and future projections for Latin America. Now we're building it into the Mexican school syllabus". That's really great stuff. They say: "We're using your PowerPoint slides for staff all day training on AR5." So the possibilities that we've had to create these pieces of communication toolkit and use them to empower climate champions to go out and spread message has been really great.'

4.1 Governments and Policy Makers

Case Study 3 – the FCO in the UK

Main points

The usefulness of the WG reports:

- The reports are ‘incredibly useful and absolutely invaluable for my work – without them, I would have to read all the science papers that go into them.’
- The interviewee draws on the AR5 reports and other reports to write a 1-2 page summary with headline messages which goes to the minister and UK embassies. Some of his equivalents in other governments also write summaries of the AR5 reports (typically from the SPMs) for their ministers.
- He also relies on World Bank reports, the UNEP (‘Mind the Gap’) reports, Royal Society reports, and the reports written by the Potsdam Institute. Some of these are more helpful for understanding climate impacts and what needs to be avoided; they are also more readable and better edited.

Language:

- The use of risk language in the WG2 report was helpful, but the risk assessment concepts did not seem to have actually been applied to the substance.

Graphics:

- Some of the IPCC graphics could have presented the information (on the climate ‘pause’, for example) more clearly.

Key recommendation:

It would be better to start with the policy goal (for example preventing or reducing the risk of a worst possible case happening), and work backwards from the goal to the science that is relevant to it, rather than starting with the science, and trying to make it policy relevant. Or in other words, start with the question ‘what is it that we might want to avoid?’, and then work out the probability of that happening. That’s what is done for example in other areas such as terrorist attacks.

The Foreign and Commonwealth Office (FCO) is one of several UK ministries that pay considerable attention to the IPCC WG reports, along with DECC, Defra, and DFID. Climate Change has been a major policy priority for the FCO in recent years.

Simon Sharpe Head of Climate Risk Team at the Science, Innovation and Climate Department at the FCO, was the interviewee. He gave more context and explanation to his points above in the following ways:

- A different approach to climate science would be more useful in informing a risk assessment. Climate science results are typically presented in the form of prediction. In prediction, probability is the most important variable. Probability is usually fixed (corresponding to 'most likely') and graphs plot severity as a function of time. Nearly all of the graphs in the WG2 contribution to AR5 are in this format. However, in risk assessment it is the severity of impact that is most important. After a 'plausible worst case scenario' has been chosen, corresponding to a fixed point of severity, its probability is then considered. The corresponding approach for climate change would be to plot probability (of crossing a relevant threshold) as a function of time. AR5 WGII only contains one example of a probability / time graph (on destruction of coral reefs); this is a good example of clear assessment and communication of risk, and shows it can be done.
- Other non-IPCC graphics did a better job of separating out (the small slice that is) land, ice and atmosphere from the oceans, which explains how over the last decade heat has been transferred more efficiently to the deep oceans, offsetting much of the human-caused warming at the surface. See for example, <http://www.theguardian.com/environment/climate-consensus-97-per-cent/2013/sep/09/climate-change-arctic-sea-ice-delusions>)

Four examples were given of more relevant and detailed material 'of worst case scenarios' useful to politicians – the sea level rise we are already committed to according to different pathways; the heat stress effect on the human body; the risk to crop production of upper end temperature rises; and (more consistent) figures for (the upper end of) global temperature increases.

4.2 The Business Sector

1. Main Points
2. Recommendations
3. The Importance of the Business Sector
4. Briefings by the Cambridge Institute for Sustainability Leadership (CISL)
5. Other Reports on Climate Change
6. Relevant Quotes by Topic
 - 6.1 General Comments
 - 6.2 The Usefulness of the IPCC Reports
 - 6.3 Language and Clarity of Messages
 - 6.4 Recommendations
 - 6.5 CISL briefings
 - 6.6 Other issues
7. List of interviewees

1. Main points:

- The IPCC reports were seen as important and very authoritative. They were consulted by three of the four interviewees to support and inform their work within their companies. As one of the interviewees remarked, 'If the planet was your child, and you had all these reports, you sure as hell would do something about it'.
- Two of the interviewees used them as the basis for short briefings for their colleagues, bosses or clients. One of them relied on a 'derivative product', but the fourth hardly used them at all.
- The Synthesis Report and the SPMs were the main IPCC products which were read or consulted. The SPMs were mostly seen as being too long and too detailed, without enough specific information to help them understand what the implications or policy options might be for their business sector.
- In particular, there was not enough up-to-date and relevant information for investors and financial institutions, written in a language that would be meaningful to this sector.
- Several detailed examples were given of risk calculations, geographically-specific information, scenario planning, or financial risks that would be of use to different business sectors.
- Other reports on climate science or climate change were seen as good examples that were helpful to the business sector for the sort of information they contained (sector-specific), the language they used (business-friendly), and the shorter length of the summaries.
- All the interviewees were aware of the special reports ('derivative products') produced on the back of the IPCC reports as part of a joint initiative by the European Climate Foundation and the Cambridge Institute for Sustainability Leadership (CISL) in the UK, but they were used to differing degrees. However, those who did look at them praised the use of infographics and sector-specific information.

2. Recommendations:

- If the SPMs continue to be the most favoured information tool, then shorten them and make them less complicated.
- Another 'layer' of communication is probably needed for the business sector, the most useful being a short summary briefing of 1 - 5 pages, probably with infographics.
- The information needs to be made relevant to specific business sectors.
- There are some sectors, and in particular finance and investment, and tourism, where relevant and up-to-date information is lacking.
- The language of any additional briefings or reports and the concepts used in them need to be business-friendly. Risk language and concepts are generally useful, but perhaps not in the way they are used in the IPCC reports.
- IPCC communicators or their collaborators need to identify and target key influential figures in different markets and sectors who are known to be concerned about the implications of possible climate change impacts.
- Ensure more consistency between the Working Group reports, and in particular make sure that Working Group 3 was more related to the topics covered in Working Group 2.
- Digital technology: the right sort of infographic is seen as a very powerful way to draw business audiences into being 'carbon literates'.
- Specialist writers: The IPCC or their collaborators need to include in their teams a mix of experts in the particular sector they are targeting, who both know the relevant market and are good at communicating to it. In particular, invite some investment bankers, financiers, and pension planners.

Another option is to bring in more people from a business background within an academic institution. Their main task would be to write a 'business narrative' which could make the science come to life.

3. The importance of the business sector

The business sector is viewed as crucial to international efforts to reduce carbon emissions and set the world economy towards a more low-carbon path. Several commentators have observed that one central difference between the political context behind the Copenhagen summit in December 2009 and the forthcoming Paris summit at the end of 2015 has been the increasing presence of business voices in the climate change debate. A number of high-level meetings have been held specifically for business leaders on the subject of climate change, most notably Ban Ki-Moon's climate summit in New York in September 2014 and the UNESCO Paris meeting on business and climate in May 2015. The annual Davos meeting for business and political leaders held in January 2015 also had a large component of discussion about climate change built into it.

Several reports have been published in part or mainly aimed at the business sector, most notably the 2014 Risky Business Report in the USA, and the New Climate Economy Report in 2015. UNESCO, UNEP, the World Bank and the UNFCCC secretariat have all reached out to this sector. Several commentators and business leaders have noted a clear shift in business attitudes towards climate change in recent years. Paul Polman, the CEO of Unilever, notes that 175 CEOs were at the New York climate summit, 1,000 CEOs have signed up to the World Bank's call for a price on carbon, and 75% of major companies now report regularly on their carbon footprint.

Several fossil fuel companies, notably in the USA, remain resistant to the promotion of alternative renewables and to taking radical action on cutting emissions. It is indeed difficult to assess how many companies would be willing to embrace a low-carbon agenda. However, many would agree with the comments of one of the interviewees that awareness and desire to change amongst some important business leaders has increased:

'I start with the general premise that the role of business in climate change negotiations is finally being appreciated. People are waking up to the potential of business. Businesses are a little bit of a canary in the coal mine when it comes to climate change, as they are starting to see the impacts on their cost-base and supply chains. Many businesses now want a strong response on climate change, in contrast to the fossil fuel-dominated mood music seen in previous COP discussions where the business view was pretty one-sided in denying that climate change is happening. There is now a positive desire amongst business leaders to play a proactive role in supporting a strong outcome in the COP discussions.' **BS3**

Two representatives were interviewed from the finance and investment sector, and one each from the pharmaceutical and retail sectors. The key advantage was that all four were familiar with climate science and the implications for their companies and sectors – but this was also a limitation as their companies were not necessarily representative of their sectors in their belief in the need to address the energy and climate challenge. The four interviewees also worked in different parts of their companies, so their answers were clearly affected by what was needed in their particular job. Also they were all familiar with reports on climate science and the language and concepts typically used in them, whereas this would not be true of their colleagues. Finally, the different sectors are affected in different ways and to different degrees by climate change. As one of them expressed it, 'climate change is not an existential threat to the pharmaceutical sector as it is for the oil and gas

sector. Energy represents less than one per cent of our costs, so it is not a strategic or political threat. However, we want to be able to show we have a good corporate response to the challenge.'

Representatives of the following four companies were interviewed:

Aviva has a long history of leadership on responsible investment, and more recently has had a strong focus on the role public policy can play in shaping market behaviours in response to climate change. Aviva is one of the recognised leaders in this area within the financial markets.

GlaxoSmithKline has been successful in applying its supply chain engineering to achieve significant carbon reductions. It figures prominently on the Carbon Disclosure Project's FTSE 350 Climate Disclosure Leadership Index.

Marks and Spencer (M and S) is another sector leader due in part to its publication in 2007 of its sustainability plan known as 'Plan A', which unusually for that time was accompanied by specific targets and a five year plan. It has been an important leader in climate change and business debates in the UK and beyond.

Kepler Cheuvreux is a one of the largest independent European financial services companies specialising in advisory services and intermediation to the investment management industry. This includes long-term institutional pension funds. It gives prominence to the analysis of the economic impact of climate change on the investment community.

In addition, we looked at the short briefings written by HSBC for their clients on the basis of the IPCC reports. In 2007 HSBC set up the Centre for Climate Change Excellence whose aim is to analyse and communicate the long-term commercial consequences of climate change for the HSBC Group and its clients.

Semi-structured interviews included questions on the three key areas (usefulness, clarity of language and messages, and recommendations) and on their 'big picture' views on IPCC communications and their use of the derivative products written for different business sectors by the CISL.

4. Briefings by the Cambridge Institute for Sustainability Leadership (CISL)

All four interviewees mentioned the briefings produced by the Cambridge Institute for Sustainability Leadership (CISL). These thirteen briefings, usually of 16-pages in length, were deliberately aimed at eleven sector-specific businesses, namely [Agriculture](#), [Buildings](#), [Cities](#), [Defence](#), [Employment](#), [Energy](#), [Extractive & Primary Industries](#), [Finance & Investment](#), [Fisheries & Aquaculture](#), [Tourism](#) and [Transport](#). They are available at <http://www.cisl.cam.ac.uk/business-action/low-carbon-transformation/ipcc-briefings/climate-science>. The first, published before WG1 came out, explained what the IPCC is; one was published after WG1 and covered its contents; the remaining 11 were published after WG2 and WG3, and were sector-specific.

The eleven reports contained a one-page summary of the physical science (taken from WG1), the essential findings relating to the sector, and an infographic. In some cases, the reports were produced with the help of sector-specific partners such as [BPIE](#) (Buildings), [BSR](#) (Agriculture,

Transport and Primary and Extractive Industries), [ETUI](#) (Employment), [ICLEI](#) (Cities), [IIGCC](#), [UNEP FI](#) (Investors and Finance), [Institute for Environmental Security](#) (Defence), [Global Military Advisory Council on Climate Change](#) (Defence), [Sustainable Fisheries](#) (Fisheries) and the [World Energy Council](#) (Energy). Each was written by a writer familiar with the specialist field. All were reviewed both by subject specialists (in most cases, academics involved in AR5) and by business sector specialists – the idea being to ensure they were both accurate reflections of AR5 and written in such a way as to be relevant to the sector audience.

They are also important because:

- They are viewed by the IPCC comms team as a paradigmatic example of derivative products which worked ‘very well’ for a specific target sector.
- They are seen as a possible model for the future where the IPCC cannot formally endorse them, but can encourage them, support them and have some involvement in their content.
- They may also be used as a model for briefings provided for other target sectors, where key interest groups, scientists and science writers join forces to produce material of relevance to that sector.
- They were funded by an outside organisation.
- They were widely praised by scientists, corporate leaders, military strategists, financial analysts, and sustainability and conservation experts as a vital resource for companies wanting to plan for the future.
- Official tracking by the CISL project, involving customer feedback and download metrics, suggests that the reports were widely used by different businesses and other sectors.

All four interviewees were aware of the CISL briefings, but they varied in how much they used them. The representative of M and S in particular strongly praised the use of infographics.

‘They were useful because they had good infographics, they were sector-specific and they used a language that was appropriate for the business sector. We distributed the CISL infographics. They brought these reports to life, and were very powerful. And you can sneer a little bit and say, “Well, it’s not scientifically pure. It’s just a few pictures and a few facts and figures.” But, as an entry point into the IPCC process for most business leaders this is very effective and very powerful, not least because they were sector-specific. They thought about the impacts on tourism of food and mobility. That’s how business leaders see it. They don’t think generically as business leaders. They think of, “I run a food company. I run an airline. What does it mean to me?” **BS3**

However, the writers or consultants who turned the IPCC reports into the short briefings found this task difficult, even ‘immensely challenging’ in the words of one of them. The criticisms centred on four main areas:

- The sheer volume of general information made it difficult to sift it down to relevant pieces of information for specific sectors
- There was a lack of consistency between the three WG reports, for example the disproportionate amount of information given to some subjects in some of the reports compared to others

- Up-to-date or relevant information was lacking in some key areas (e.g. finance and tourism)
- Businesses kept asking the ‘so what?’ question, and wanted to have more solutions rather than understanding the assessments and options.

5. Other reports on climate change

All four interviewees mentioned other reports on climate science and climate change, which in some cases they thought were more helpful to the business sectors for the sort of information they contained (sector-specific), the language they used (business-friendly), and the shorter length of the summaries. The Risky Business report and the New Climate Economy report were both mentioned by two interviewees. For example, the first Risky Business Report (available at <http://riskybusiness.org/>) focuses on what climate change would mean for three key sectors of the US economy (agriculture, energy, and coastal property and infrastructure). Follow-up reports highlight the risks to industries in California and the mid-West. The New Climate Economy (<http://newclimateeconomy.report>) focused on three sectors - cities, land use and energy. Examples were mentioned too of specific reports written by companies such as Standard and Poor on the risks from climate change to a country’s ability to pay back its sovereign debt or by investment industry experts on the need for ‘Forceful Stewardship’ (the need for investors to use their voting rights to require companies to adopt business plans that enhance shareholder value and are consistent with the 2-degree warning).

One interviewee thought the IEA reports were more helpful to business. As he explained,

‘In my experience most investors are not spending much time on primary IPCC sources; what are more widely read are the IEA reports which are the benchmark for climate investment risk, although they are based on the science in the IPCC reports. For me, the IEA reports such as the World Energy Outlook are my other bible along with the IPCC reports.’ BS4

It is also worth stressing that some companies such as HSBC adapted the IPCC reports into their own (digestible and readable) briefings of about eight pages. These included four or five headline points from the IPCC reports, lots of graphics based on different sources, and a series of tables based on the general idea of ‘ten key things you need to know’.

6. Relevant quotes by topic

6.1 General comments on the IPCC and business:

‘We have to recognize that the whole IPCC system and COP system has been set up for policy makers, for scientists, and to a degree for NGOs. They are written very much to help policy makers make decisions - that is right and proper. It’s not ever been set up with business in mind, which therefore colours how we communicate the potential of business. We have been held back by the lack of business-friendly communication or useful communication tools. They don’t talk much about business values, and the creation or the destruction of them. So using the IPCC process we could find

better scenarios and better facts and figures that illustrate the likely impact from climate change for a food industry, the tourism industry, the fishing industry. That would then make it more obvious and easy for business to engage with.

I appreciate the IPCC is not party political. It's not trying to make everybody a carbon zealot. It's got to be very factual, down to earth. But I do think business leaders like tangibility, they like the facts and figures which they can get their heads round. But they also like opportunity to talk about risks and supply chains and cost basis. It will only take you so far. So, it also helps to talk about the opportunities of green growth, new market places for product services, and new green energy solutions.' BS3

6.2 Use of the IPCC reports

'We would normally use the Synthesis report and the executive summary, as we don't need the acres of detail. They <senior executives> don't want to read all the bricks' worth of data and information. They want to know it exists, and they want to know it's robust, but they are not going to read it.' BS1

'I don't really read them anymore. They are OK and important. But we have accepted the science, and we are more interested in what governments may sign up to in terms of helping us to invest in a low carbon future. We go more to the Carbon Disclosure Project <an assessment of companies carried out by PwC>, which does a score on us, and information from the Carbon Trust.' BS2

'I read the SPMs from the three reports that came out from the IPCC, and I had a reasonable layman's go at them. But in a very busy life, I'm constantly leaping to the question, "But what does this mean for M&S or for the sector that I'm in?" Because I'm professionally interested with a chemist's background, I can just about cling onto the science. I lumbered through to the end of them, which I probably didn't have to.' BS3

'I read the Synthesis Report, a very helpful and useful document. I read the exec summary which I find clear in terms of headline takeaways. It is seldom necessary to go beyond the exec summaries – the reports themselves are very chunky. The table and charts in the appendices are also useful. Climate science is a very difficult and technical topic to communicate to a non-specialist audience <so> I turn all the information into a 2-page summary which is digestible for my clients. In general, most investors would not spend too much time on the primary IPCC sources, but they – and I – use the IEA (International Energy Agency) reports a lot.' BS4

6.3. Language and clarity of messaging:

'I find the executive summaries well-written, comprehensible and digestible to an "educated audience", and particularly the Synthesis Report. The graphics and figures depicting the degree of complexity are good, but I have been following this area <of climate science>for ten years. It would be difficult for people new to this area.' BS4

6.4 Recommendations:

Summary briefings:

'A one-page summary that people know has got a series of six-foot-thick reports behind it is probably all you're realistically going to need.' **BS1**

'I work at the sustainability office of M&S, and so I as much as anybody else in the business world is expected to understand climate change and the implications for business. But, even I struggle with 30 pages, even the 30-page summary of the various 500 page reports. Businesses just do not operate in a world where they read even 30-page reports and the text and all the science. You never want to lose the depth and quality of the science in the IPCC process; you never should get rid of the 500-page reports and the 30-page summary – they are sacrosanct. But you also need a third tier of communication on top of it, which could be another summary.

We need 2-5 sides with a good infographic and written in a business-friendly language as opposed to just lifting chunks of paragraphs and try to butcher it all together. It needs almost to be written as a new document. That's the best way forward.' **BS3**

Making it relevant to specific sectors

'What they're missing is depth when it comes to how the information plays into the specific audiences that they are trying to influence. In particular, from an investor perspective, what is the *value at risk* associated with their various scenarios?

In other words we've got GDP estimates when it comes to things like the Stern Review, but no one's has then said that if it's going to be 20, 30, 40, 50 percent of GDP by 2050, then this means that people's pensions, savings and investments will be at this kind of risk. In the fund management world we talk about value at risk, and there isn't a value at risk assessment associated with climate change. The IPCC themselves should have a view on how a particular scenario maps out in the investment world and this is therefore why individuals should be concerned about their personal pension, their investments and savings because the practical, physical ramifications of such-and-such a scenario is pretty dire.

They're missing a massive trick to make the work that they do relevant even to investors. To make it relevant you have to say what it means in pounds, pence, and cents - not GDP because that's the flow of capital, but stock of capital, and assets management.

<Take the example of> sovereign debt: You could create scenarios that would extend the scenarios that exist into the world of investment and say these are the physical consequences for various asset classes. Countries that are particularly dependent on low-lying agriculture or a low-lying economic activity in order to be able to repay their debt would find it harder to repay their debt. Credit ratings will suffer as a consequence. The valuation will go down in all likelihood.

Take property investment in houses, commercial real estate like office blocks or large properties like the kind of things that you go to at Tesco's, or the logistics infrastructure that IKEA might use. That's the kind of property that large investors will look at. Some of that will be exposed to drought or flooding. If you have invested in infrastructure around ports and it is threatened by sea level rise, that's a big problem.' **BS1**

'<When targeting the business sector> do not try and lump all business leaders together. I think you should target a food leader or clothing leader or whatever it may be. So, the 'new climate economy' report was very good for a certain type of business leader like a Paul Polman <CEO of Unilever>. So even though Paul is from the food business sector, he is a much bigger thinker than that about the role and the future of business. But he is a-typical. For the Polmans of this world the new climate economy report works well, but for the average chief exec or director of a big business, the reports need to be slightly more sector specific.' **BS3**

'I'm looking for three things: mood music, specific risks and geographically relevant information. So the first thing I'm looking for is mood music. So I sat there thinking how much play <these reports receive> in the media, amongst my investors, the NGOs and opinion formers which affect my reputation. If an IPCC report comes out and says things are happening much quicker than expected, everybody needs to respond quicker, I'm thinking about mood music that says whatever M&S is doing on climate change, we need to just move it on faster. It's not telling us what to do but it's telling me the mood music.

The second thing I'm looking for is something a little bit more tangible, that starts to talk about specific risks, the likelihood of extreme weather events and supply and changing 10% more than they expected, fish stocks are going to drop by 20% - things that my business colleagues can connect with.

The third thing I'm looking for is probably something around geography. Realistically, however a big business is, there's always going to be certain geographic locations where they sell or they have supply chains that are more relevant than not. So I'm looking for what does it mean for Indian cotton production for example, particularly relevant for a clothing retail outlet like M&S. What does it mean for Kenya where we get an awful lot of flowers and beans from? Or what does it mean for the African coffee industry? So I'm looking for geographical risk.' **BS3**

'It's a tricky balance both to keep the <soundness of the> science and to break them down into digestible reports. But it would definitely be very useful to have something specific for the finance and investment sector.' **BS4**

Targeting key people in the business sector

'I think they need to match their messages to their key audiences and adopt them accordingly, and be quite strategic in the way they choose key people within the markets.

I think there are certain people within the markets that they need to make special effort to try and communicate with. I would imagine that the economists who work for brokers would be an important audience, so they need to understand who they are and then make sure that their

communications get to them. I would also say that the chief execs of some of the pension schemes, of the insurance companies, of the world's biggest sovereign wealth funds, they are a particularly influential bunch and completely ignored by what is the current IPCC communication strategy.

What I would envisage would be that the IPCC communications people should single out key people within the markets such as key asset owners, chief executives and the like for whatever communication that they can manage.' **BS1**

Infographics

'Some of the work that the CISL did with infographics on bringing the reports to life was very powerful. You can sneer a little bit and say, "Well, it's not scientifically pure. It's just a few pictures and a few facts and figures." But, as an entry point into the IPCC process for most business leaders it is very effective and very powerful. Things can be improved by just putting the icing on the cake and using those powerful infographics in a sector-specific way.

But I don't want just infographics. They serve a purpose, as the next point after the 30-page summary of the 500-page detailed report. They've all got to work together. But done right an infographic is a very powerful way to draw business audiences into being carbon literates.

Because realistically if you're the director of Women's Wear, who is utterly focused on women's fashion, it's a large-old leap to get to what this climate science means to me. I might be selling a few warmer jumpers in November or a few more macs in June but it's a bit of a leap. There is a more technical part of the business - our technical teams and our innovation teams will read a little bit more deeply. But basically for most business leaders, they need the infographics.' **BS3**

Specialist writers

'The IPCC should either employ an ex-investment banker to help write the briefings, or work with one investment bank. I'd recommend the former not the latter otherwise the others will see them as biased - somebody who's not just an ex-investment banker, but also someone who's good at communicating to the markets. In the IPCC communications team they need someone who's good at market communications, investment communications, and can tailor the message to those audiences accordingly. I'm not suggesting that they should co-brand them as Goldman Sachs, the City Group, or the HSBC.

If they really want to look into it, I'd be very happy to work with them on it and spend quite some time sitting down and saying look, this is what you really should say. This is how you should say it and these are the key institutions and the key individuals within them to whom you should address the reports. This is the key way of messaging the IPCC reports at the highest level.' **BS1**

'You might argue this <doing specialist reports> is all beyond the remit of the IPCC, which is fine. But the IPCC needs a satellite organization, a sister organization to which it then outsources the business narrative, and the business case to bring its science to life.'

'I still don't think it should be done by a consultancy. I think it needs to be done by a something like an Oxford <University> or Cambridge or Harvard or Yale or MIT. An institution that's got credibility,

is seen as neutral, is not seen as painting an overly pessimistic or optimistic view of the future. It's able to operate as a bridge between the scientists and the business leaders. There's no point in getting another bunch of policy makers in another organization to rewrite policy document for business leaders. There's no point in getting pure climate academics doing it either. I think you've got to have somebody from a business school involved or certainly somebody who is very business savvy from within that academic background. But I do think that the imprint of Oxford, or Cambridge or Harvard or Yale or Princeton, or whoever it may be, is very important in a very political world.'

BS3

Risk language

'The value at risk figure might be seven, eight trillion, let's say, of global capital markets which are at risk - the value at risk should the business-as-usual scenario pan out over the coming twenty, thirty years. That's not something they're currently looking at. It's something that they should look at in order to make their key findings of relevance to the investor audience.'

BS1

'I think <risk language> is good. And I think instinctively, those that want to avoid action are happy to plunge into this pool. It's all about probabilities and risks and it might happen, it might not, it's too complicated, I'm going to do nothing. I think business by and large is used to managing risk, business is all about risk. So I think business understands the concept that nothing's certain in life, that you investigate, it's a risk profile, and you push the boat out as far as you can. But I don't think the way that the IPCC documents are written is easy for a business leader to translate into business risk. It comes across as very dense statistical mathematics. It talks about the probability of this, that and the other. But by the time I've read to the 16th page of footnotes, I've lost the will to live.

It needs to be a little bit sharper in saying, "look guys, on balance, the likelihood of more extreme weather events in Eastern Africa where you're getting your food from is likely to be 20% higher by 2030." And I know that it's plus or minus 5, 10, 15%, of course I do, I live in that world. But you've just sharpened it up into something I understand.'

BS3

'Most of us are hard-wired for black and white outcomes so degrees of probability are difficult. I have to find out how hard and fast the recommendations are when they are presented as probabilities. I look at probable outcomes for different years.'

BS4

6.5 CISL products

'I'm aware of them. I did see them. They were good. The IPCC seems to have a very big and effective communications approach. If you were to align that with the CISL thinking and update the CISL thinking and include the value at risk and include scenarios that say this is why investors need to be concerned, then you should also target the "Bellwether industries". These are the people you want to be supporting the IPCC work.'

BS1

'We did not pore over CISL products, but we did look at them'.

BS2

'They were useful because they had good infographics, they were sector-specific and they used a language that was appropriate for the business sector. We distributed the CISL infographics. They brought these reports to life, and were very powerful. And you can sneer a little bit and say,

"Well, it's not scientifically pure. It's just a few pictures and a few facts and figures". But, as an entry point into the IPCC process for most business leaders this is very effective and very powerful, not least because they were sector-specific. They thought about the impacts on tourism of food and mobility. That's how business leaders see it. They don't think generically as business leaders. They think of, "I run a food company. I run an airline. What does it mean to me?" So, that's the first observation about how things can be improved by just putting the icing on the cake of using those powerful infographics in a sector-specific way.' BS3

'I am aware of the CISL reports but they are not something I turn to'. BS4

'It was immensely challenging translating the entire AR5 working group reports into short briefings. The main obstacles were:

- a) Different information and baselines all three working group reports
- b) Disproportion information per subject given in all the reports. As an example – there were two chapters on ocean impacts in working group 2 and almost nothing on mitigation on this subject in Working Group 3. Granted that some of the overall solutions are the same across topics– it was still very challenging synthesising bespoke and targeted subject summaries with an equal emphasis across topics. However, it was also recognised that the IPCC can only use what research is in the public domain.
- c) There was very little information on some subjects i.e. for investors and financial institutions. Considering this should have been a primary audience for the IPCC, experts in the field were left bewildered and disappointed by the lack of credible, up to date and relevant information in the specific field and the lack of information that was really on point and relevant to their work.
- d) Similar to the point above – many business and sector experts saw the information as too 'general', watered down (i.e. consensus numbers) and out of date to be of huge use to them. However, it was also recognised that the nature of the IPCC process with its cut-off dates for including research necessarily means that it is somewhat out-of-date.
- e) Trying to pull together consistent numbers across 6,000 pages of text was near impossible at times and then creating a relevant narrative from it.
- f) There is just too much information to be of use – no one can digest or use that much at a time and sifting through it took weeks of research time as well as tracking the numbers and sourcing.
- g) Making the science accurate in lay terms - always a challenge – was particularly challenging for some subjects as businesses kept asking – so what? What's the solution rather than understanding that these were assessments and options?
- h) The tourism report was seen as facile and too simplistic and way behind current trends and knowledge –it offered very little apparently that was new.

Recommendations for the future would be:

- Ensure there is consistency between the Working Group reports.
- Ensure you have a proper mix of writers on the job from all fields and ask businesses what areas of expertise they need covered - particularly get some investment bankers, financiers, and pension planners.
- Make sure the Summary for Policymakers is just that – get some decent infographics commissioned as part of the process and involve communication people and journalists earlier in the writing and process. Even the Summary for Policymakers is too complicated.

- It would be very helpful if Working Group 3 was in some way related to the topics covered in Working Group 2
- Do a basic comms 101 on AR6. Who is it for? What do they need to know? Who will read it?

BS5 and BS6

6.6 Other issues

Time span

‘One thing that you need to manage is that the time horizons of your average person working in the city, or any financial district, might be three to six to twelve months. Long-term in the city is three years. Until policy looks like it’s going to correct this problem, most people currently wouldn’t care, which is why you need to get to the clients, the end investor, and say, “By the way, your money and the way your money is currently being invested, the risks that you’re actually shoring up to your future retirement are pretty profound. You need to make sure that the way that you charge those that are supposed to be looking after your interests to do so, looks after your very long-term interests and ensure even the things like dirty coal isn’t being capitalized”.’ BS1

Scenario planning

‘From this scenario, the 2100 scenario, what is the consequence to the global economy financially speaking? They couldn’t begin to answer that. Then, secondly today what are you asking companies that would be exposed to these risks to do? What are your key things that you want the boards of those, of companies that might be in agriculture or logistics or supply chain sourcing or whatever?’

If you look at the changing water demand for irrigation and you happen to be a beverage company, what should your board be thinking about? What are your key messages? They weren’t able to answer that. I think the human dynamics of climate change is an interesting physical model. For it to be meaningful a company needs to be translated into what should boards do about it now? What would be good practice?’ BS1

7. List of interviewees

BS1 – Steve Waygood (Aviva Investments)

BS2 – Richard Pamerter (GlaxoSmithKlein)

BS3 – Mike Barry (Marks and Spencer)

BS4 – Mark Lewis (Kepler Cheuvreux)

BS5 – CISL researcher 1

BS6 – CISL researcher 2

4.3 The media

1. Main Findings

2. Recommendations

3. The Media context

4. Relevant Quotes by Topic

4.1 The usage of the IPCC reports

4.2 The clarity of language and intelligibility of the reports

4.3 The IPCC graphics

4.4 The use of specialist writers

4.5 Recommendations

4.6 Other issues

5. Interviewee Coding

6. References

1. Main Findings

- There was a general recognition that the IPCC communication team did a ‘professional’ job around the launch of the AR5 reports, particularly in comparison to 2007. The speed of response to requests, the logistical arrangements for the launches, and the setting up of interviews were all mentioned.
- The interviewees work mostly from the SPMs, backed up by the press releases. Some delve more deeply into the WG chapters, some do not.
- The lack of clarity of language in the SPMs is a major challenge for most, and the lack of one or two clear messages is an issue for some.
- All of them see it as their job to turn the language into something more understandable and digestible by their audiences while remaining true to the science. This they felt was achievable.
- Some words or phrases like ‘anthropogenic’, ‘mitigation’ and ‘climate model’ were not considered to be helpful.
- Most the IPCC graphics were seen to be too cluttered for use in the media.
- There were split views on the presence of NGOs helping the IPCC in its communication work and whether the IPCC comms team needed more of their own resources.

2. Recommendations

- All five interviewees were in agreement that it would have been helpful to have had a clear summary of how the AR5 report had taken on the AR4 reports, in terms of new information about the science – for example, changes in ranges for sea level rises and temperature increases.
- Some recommended bringing in specialist writers, whilst others thought it was their job to turn the reports and SPMs into language and narratives understandable by their audiences.
- Some recommended looking at the way the 2014 US Climate Assessment Report was communicated for any lessons that can be learnt about the clarity of language, messages and interactivity.
- Some recommended that the IPCC sessions discussing the reports should be made more open and transparent. A similar recommendation was made about the availability of the draft reports.
- One suggestion was to keep the chapters in the WG reports as they are, but put more effort into making the SPMs more readable; or to aim the technical summaries at the scientific community, and the SPMs at the policy makers and wider public.
- Amongst other suggestions was to avoid Sundays as a launch day; to give each report fewer and clearer headline statements; and to put the credits at the back and not the front of the reports.

3. The media context

We know from survey work that by far the most common source for information about science for the public in most countries is the media, whether it is traditional organisations like the BBC or more recent online-only media. For example, the 2014 study by Ipsos-Mori for the Department of Business Innovation and Skills (BIS 2014) found that 68% of the UK public surveyed first heard about scientific findings from television news and programmes, followed by 24% for all online sites, 23% for print newspapers, and 15% for radio news and programmes (the respondents were asked to name their first or second most commonly consulted source). Other sources came notably lower such as magazines and books (15%), friends and family (12%), science blogs (2%) and social networks (6%), although the last figure rose considerably for the 15-24 year-olds.

We also know that the media are often not only the most used but also the most trusted source of information on science, although the levels of trust can vary between platform, age group and country. (Painter 2014)

The 2013/14 AR5 reports attracted considerable media attention around the world. The charts by Boykoff et al., shows peaks in climate change coverage in the months they were published which suggests strong media interest.

http://sciencepolicy.colorado.edu/icecaps/research/media_coverage/uk/index.html) However, there is evidence of significant gaps in the coverage: for example there was very little mention of the IPCC reports on Chinese state television's evening news bulletins, and none on India's largest commercial channels (Painter 2014). There were important differences within Europe too where Polish television ignored the IPCC reports (Metode 2015), and significant variations between countries in the Global South, where print journalists in Bangladesh, China, Indonesia and Chile paid relatively little attention, whereas Brazilian journalists covered the reports extensively. (Palgrave chapter, 2015) UK broadcasters spent nearly five times more airtime reporting the IPCC reports than US broadcasters. (O'Neill 2015) Indeed, the prominence of the IPCC reports was particularly low in the US media in general. (ibid)

The number of journalists who registered to attend the press conferences for the first three WG reports was significant, particularly in comparison to the release of UN reports about other topics. These were 234 for WG1 (Stockholm), 223 for WG2 (Yokohama) and 143 for WG3 (Berlin). These figures were probably down compared to AR4, and according to anecdotal evidence, fewer Western journalists were present.

However, the volume of coverage still remained high for a climate science story in which, as many journalists pointed out, there was not much that was new compared to AR4. Figures for the UK suggest that coverage in nine national newspapers dropped from around 3,500 articles on climate change for the months in which the AR4 reports were released in 2007 compared to about 1,500 in 2013/14, a decrease of about 55%. Similar decreases were observed in Australia, but not in India. (Painter 2014, p. 46) The volume of coverage dropped progressively from WG1 to WG3, prompting analysis of the possible causes of the decline. (O'Neill 2015) The Synthesis Report also attracted significant attention, but again often less than WG1 and WG2. (Palgrave chapter)

The five interviewees all came from the English-language media. They were chosen as a) coming from highly respected legacy media organisations, b) for being some of the most prolific writers on

climate change, and c) for having considerable experience of covering IPCC reports. In recent years, the *Guardian* for example has enjoyed one of the largest teams of reporters and editors writing about climate change. The paper and online site has had a team of six full-time environment correspondents, two editors, a dedicated picture editor, and two production journalists, although this has been reduced in recent months. In part this was driven by the paper's emphasis on expanding its coverage of the environment on its website. In 2014, *the Guardian* published more stories than any other outlet, with at least 1,338 climate stories published – almost four per day. (<http://www.dailyclimate.org/tdc-newsroom/2015/01/climate-change-coverage-2014>)

According to the same study, Fiona Harvey of the *Guardian* was the most prolific writer on climate change in 2013, along with her colleague Suzanne Goldenberg. Alister Doyle from Reuters and Seth Borenstein from Associated Press are probably the best known and experienced agency reporters on climate change, whose stories are published and translated around the world. This is also the case with Justin Gillis of the *New York Times*. David Shukman is the science editor for the BBC which is very trusted by the UK population for its general and science news.

4. Relevant quotes by topic

4.1 The Usage of the IPCC Reports

'I covered the press launches, so obviously the SPMs are main document I work from. But the chapter reports all have good stories in them to cover, particularly WG2.' M1

'I work from the SPM. I've read a few of the subchapters, but not very many of them. The press releases work as a reality check – I often start with a press release and then go through the SPM.' M2

'I work from the SPMs but we have this crazy situation that except in the case of WG2, the SPM and the underlying reports are not released at the same time.' M3

'I work mostly from the SPMs, but they are not what they say they are on the tin.' M4

'We now do a wide variety of coverage, so we use different pieces of information at different times of the day. We had a live blog, which is much more a sort of news wire type process. Then later, by the time we've done the scene-setter piece, the immediate piece, and the reaction, now what we're talking about mid-afternoon is the definitive piece that's going to go in tomorrow's paper. This is when you stand back and say what the most important thing is? And you write it like that. We decided that the angle that we would take for that was the carbon budget. This whole idea was not a new one that came out with the IPCC, but the IPCC gave it a kind of imprimatur.

I thought the IPCC communication was fine for the process I was working with. We do a sort of précis of the SPM - You're picking out the top lines, titbits, for your readers. The process is that you pick out interesting titbits throughout the day, and then you save one big one for the end.

'I would work mostly from the SPM. But I would also definitely look at a press release, for several reasons. One is, it's simple and I want to see what it says. Another is that other media outlets will just write from the press release. Another reason is that the press release will go out somewhere, and go on a wire or whatever, and so the news editors back home will see some version of the press release, and they'll be on the phone going, "What is this? I see the top line is such-and-such," and you need an answer to that.' M5

4.2 The clarity of language/intelligibility

'It is possible to turn these reports into a language that most people will understand without harming the science. That's my job but the way the reports are written does make my job harder.

For example, I wrote a piece like a 'listicle' called 'UN panel: eight reasons to worry about global warming' which was based on what the IPCC bureaucratically calls RFCs (Reasons for Concern). So it shows it is possible to do it. Some scientists did not like it, but in general I receive very complaints from them about the way I interpret the science and use more accessibly language.' M1

'What they've done recently is to highlight their main findings and use bold text, which is a good change from what they had in 2007. On the other hand, they're still using words like 'anthropogenic' and 'mitigation'. The US national climate assessment doesn't use words like anthropogenic as far as I could tell.

The way that they're written still requires more than what your average policymaker, certainly what your average journalist, can understand.

It's quite difficult to quote even some of these headline findings as they are too long.

There might have to be an easier way of phrasing it to make it into a sentence that you could put into a newspaper or read out to somebody.' M2

'The language they use is publically indigestible. But it's my job to turn it something my readers can understand. I have never had a complaint from a scientist or policy maker for the way I have made the language more understandable or the way I have explained the science in a certain way.

The Risky Business Report and the US National Climate Assessment Report are good example of how to do comms well and use accessible language. They draw you in.' M3

'The intelligibility of the SPMs in 2013/4 was worse than those in 2007. This is partly because of the disparate nature of the different groups of scientists working on them. WG1 was slightly easier, but WG2 and WG3 were very difficult to understand.

It may be worthwhile for IPCC scientists to keep asking the question how they can make sense of their reports for the general public, for example their family members or school students.

‘Even the word ‘model’ is difficult – maybe ‘computer projections’ would be better. Confidence and likelihood levels are also difficult. We use phrases like ‘scientists are very or pretty sure that....’ M4

‘The language that the IPCC uses, you re-formulate quite a lot, depending on your readers. Something that’s quite significant, but would probably get overlooked, is that the <WG1> release happened on a Friday. Saturday readerships are completely different than weekday readerships. At the FT, it was especially striking. You had a business readership, but the FT is a completely different newspaper on a Saturday.

Even at The Guardian, the weekend readership is, for print, much bigger. They want a slightly different type of story. It’s a bit more of a leisurely read. They’ve got more time to digest things. You can be a little bit more discursive. It’s all a little bit more human interest as well. It’s a different feel to the story. It’s a different tempo. It’s a different way of talking to the reader.’ M5

4.3 The IPCC graphics

‘The graphs and the diagrams in the SPMs could be a lot simpler. They’re really overloaded with the information sometimes. Some of those ones are really great once you get the hang of what they’re about. But sometime you have to read half a page of text to understand what it is about.

My graphics colleagues do use some of the IPCC graphics straight like the pictures of temperatures warming up the planet. Those are good ones, but often they don’t use the other ones. The Burning Embers one in WG2 where you’ve got those fingers of temperatures rising is useful.’ M2

‘There’s too much going on in most of the IPCC graphics – we don’t use them as the visuals are shocking. There is not enough time between the release of the reports and air team to do our own, so it would be helpful to have some material under embargo as Science and Nature magazines do – even a day would help.’ M4

4.4 The use of specialist writers

‘The IPCC needs to look at the way the US Climate Assessment Report was written in clear language. They brought in a specialist science writer (Susan Hassel) early into the process. It would make sense for the IPCC to do something similar, even though I lose an advantage if they employ writers, as it’s my job!’ M1

'You run into all sorts of problems <with bringing in specialist writers>. People will ask 'is that a redaction of the SPM, or interpretation of the SPM? Is that going to be approved by all scientists? If it's not, then you will get sceptics who say, "Look, this is not official. This is spin. This has not been approved by all the scientists." You will inevitably get some scientists who have been in that room who say, "I don't agree with this interpretation".

'I think if they're going to do that, they should probably do that from the Synthesis report. You can say "Look, we were already synthesizing these reports so that they're more digestible for policy makers. Now, we're going to synthesize the synthesis," and do a sort of version that is just easier for policy makers to understand.

'You have to anticipate that everything the IPCC does has to take into account what happened with 'Climate-gate', and has to anticipate the repercussions that flow from it. You can't do anything that can be attacked as polishing or interpreting or spinning or tidying up.

The SPM that's agreed on by all the scientists has to be sort of sacrosanct. If you're going to do some other things around that, then you need to be clear that it's in some way outside the process, exactly what the methodology is, and who is doing it and who says what and who it's been OK'd by'. M5

4.5 Recommendations

Transparency

'The IPCC is not transparent and this does not help their relationship with the media and their strategy. Going back to 2007 AR4, the sessions are closed to the public and that is not the way to counter the conspiracy theorists. I had to stand outside the sessions and talk to the scientists. We need to show the open and frank discussions that go on.' M1

'The lack of transparency in the IPCC sessions is wrong – why not make them public?' M3

'Keep the chapters in the WG reports the way they are, and make the SPM more readable. The technical summaries could be the ones aimed at scientists, and the SPMs the ones for ordinary people and policy makers.' M1

Drafts:

'The drafts are always an issue for us because we're trying to get hold of these drafts along the way as journalists. These are, of course, quite difficult to get hold of because they're held very closely. The final draft of WG2 was leaked on a sceptics' website. That means us having to quote someone else as the source of this leak, which I think is embarrassing for the IPCC.

It would be helpful for them to be able to control this a bit better by making these documents publicly available right from the very start. Ideally the best thing would be that as each draft comes

out, just stick them on the website and make them publicly available. If it's a work in progress, say what draft it is, with a clear statement not to think this is a final product.' M2

'We don't want it to be sound bites, but we do want solid science that is well-written.'

'It would be helpful to have one or two clear headline statements for each of the WG reports.'

'Sundays: having shorter bulletins and few of the usual discussion programmes means there's even less room than normal for explanation, context or qualification. I'd bet that any broadcaster interested in the subject would vote for a weekday release.' M4

What's new in comparison to AR4

'It would have been helpful to summarise what was new compared to AR4. The issues around increasing certainty, ranges of temperature increases by 2100, and sea level rise - it would be nice to have that clearly.

For someone like me, I know and my sources will tell me. But it does make sense for the average reader. Here's what it was, and here's what it is now – that would help. They could present it in a chart.' M1

'One thing I don't like is the way that they never really make any reference in their text back to what their findings were before. They need to say that "We expect sea level rise to be this much now and, by the way, that's less or more than we expected, or it's a narrower range or a wider range." At one time in 2007, they looked at GDP losses, in terms of working how much it would cost. This time around, they talked about losses in consumption.

For example, sea level rise this time around was expressed as 26 to 82 centimetres in the period 2081 to 2100 relative to 1986 to 2005. That always strikes me as a very strange way of putting it because in the last decades of the century that they're referring to, average sea levels would be rising fastest if they do accelerate. They do at some point tell you what that will be over this century. Why not just put it as this century?

It's similar with all the temperature projections. Of course models change over a few years, and you can't just stick to the same models. You've got RCPs, representative concentration pathways, which are very different from the scenarios that were laid out in the AR4. <But> everything changes so much each time. It's very difficult to keep track. It would be nice to have some sort of reference inside the text to say what's different and how it's different or just simply why these are apples and pears now.' M2

'There is not enough focus on what is new for journalists compared to the previous reports'. M3

'It would be helpful to have a summary of how the science has changed since the AR4, and how the levels of uncertainty have changed too.' M4

'You go through the SPM line by line, and you're trying to see whether there are any numbers that are different from in the drafts. And compared to 2007, you're looking for differences, what has changed, because something changing is always a story, and staying the same is not. It would be quite helpful to point out more what were the significant changes.

They sometimes do provide a kind of comparator with previous assessment reports. They'll put it kind of in brackets in the text, or whatever, or they'll kind of mention it, whatever. I don't think they do that completely consistently, but they do it with some of the big numbers. I suspect they did it with 95% certainty, up from 90%. I'm pretty sure they did that.' M5

Other reports

'There are some good models for communication in the release of other reports such as the US Climate Assessment report. But the IPCC reports have to go through bureaucratic UN procedures which make them more difficult to communicate effectively'. M1 and M3

4.6 Other Issues

Organisation and responsiveness of communication team

'The comms team was a lot better this time around. Jonathan Lynn was a lot more helpful than previous planners. He'd come around with people like Jan Pascale. They travel around and explain things to journalists well in advance. The speed of response to inquiries was much better too. In general, the experience of 2013-14 was qualitatively very much better than 2007, in terms of logistics and accessibility. Also, one of the co-chairs was willing to talk about a leak on the record, which was a complete change from a few years ago when, if you got in touch about a leak, the scientist would still be unwilling to talk. You'd then have to seek comments from outsiders, such as climate experts at Greenpeace, the WWF or other NGOs.' M2

'The press conferences are hardly usable for normal broadcasters, but the availability of IPCC authors afterwards was very helpful' M4

'It was better organized, in the sense that the venue was very well organized. The preparation was very good, in that we all knew the drill. We'd been told the format of what would happen, and when we'd get the various papers and so on.

In terms of logistics it was better, knowing about getting in, having a press room, having the conference hall where everyone could sit and hear and talk, and there was room for everyone. There wasn't just one plug socket between 59 people. All of that went very smoothly, and then afterwards, there were opportunities to interview people and so on.' M5

Resources/working with NGOs for comms work

'This time the IPCC was more media friendly. They used some public communicators like the woman working with the UN Foundation – this really helped.' M1

'The NGOs working with the IPCC comms team were very helpful'. M2

'The work of the IPCC comms team was much better in terms of mechanics this time round but they still do not have enough resources' M3

'It's fine to have 'enablers' working with the IPCC, but not 'spinners'. It is our job to work with the IPCC findings and present them to our audiences.' M4

'For the size of what they do, and for a hugely important international organization, the IPCC has essentially got one person and an assistant. That's tiny, that's nothing. But for most of the year, for most of 4 years at a time, that's probably all they need. Jonathan <Lynn> and whoever else needs to turn up at the COPs and a few other meetings a year. They probably have to field a sort of steady stream of questions throughout the year. Why would you need a big media operation the whole time? I could totally see that. I can also see that if you are offered outside help from someone, then you might want to accept that help. But the IPCC is always going to be under attack. You've got to give the attackers as little ammunition as possible, and if you are seen to be allowing your press operations to be taken over by people or NGOs who have a vested interest in climate change, that could give ammunition to those attackers.' M5

The lay-out of reports

'I would change the entire introduction to the IPCC reports. You get this huge amount of credits at the beginning of the report - You have two pages or so with just names of all the authors. In the Synthesis report, the summary for policymakers, it's got two pages of names. There's a page of dedication to Steve Schneider, which is great, but it could've been at the end. It makes it rather imposing. You feel this is something for scientists, and not for normal people. It takes too long to get into messages of the report. Why not put the credits at the end?' M2

'Why do the SPMs have to reflect the chapter breakdown of the full reports? Why not just organise it by themes along the lines of 'this is what we have say about Arctic sea ice melt, this is what we have to say about oceans etc.'? M4

The 'Pause'

'The IPCC did not do a good job on the 'pause'. They needed more on it, perhaps a box; there is disagreement what causes it and how to handle - but don't downplay it'. M3

'They were slow to address the pause – they need to be more sensitive to what is being said in the wider world'. M4

Risk

'WG2 should take credit for categorising the challenge as one of risk. I did a whole story on that, and I think it can help.' M1

5. Interviewee Coding

Seth Borenstein, Science writer, Associated Press - M1

Alister Doyle, environment correspondent, Reuters – M2

Justin Gillis, New York Times - M3

David Shukman, BBC science editor – M4

Fiona Harvey, environment correspondent, the Guardian – M5

4.4 The NGO Sector

1. Main Points
2. Recommendations
3. The Importance of the NGO Sector
4. Relevant Quotes by Topic
 - 4.1 The importance of the IPCC Reports
 - 4.2 The usage of the Reports
 - 4.3 Language and clarity of the Reports
 - 4.4 Working with the media
 - 4.5 Working with specialist writers
 - 4.6 Recommendations
5. List of interviewees

1. Main Points

- The IPCC reports are absolutely central to the work of all the NGOs interviewed. They give a solid, trusted and authoritative scientific foundation for making the case for climate action.
- In the USA, they were seen as playing a pivotal role in establishing the credibility of the science.
- All of the NGOs did a lot of work around the release of the reports. Most of them produced their own material and briefings based on the reports, working mostly from the SPMs.
- The reports were seen to be written in a language not very accessible to the non-expert.
- The IPCC's work with the media was considered to be generally successful, with gaps in coverage in some countries.

2. Recommendations

- The IPCC science needs to be broken down to an accessible level that engages non-expert audiences, and further break it down to a regional, national and local level where it becomes relevant for these target audiences.
- There is a need for plainer, more digestible language in the SPMs which a non-expert audience can understand more easily. The exec summary (overview) of the 2014 US National Climate Assessment is seen as a model for clarity of language.
- A two-page summary, which was produced for WG1, could also be produced for the other reports at the time of the press conferences.
- The IPCC communications staff team needs to be given more resources and people.
- The IPCC should produce more, timely break-out reports in between the blockbuster AR reports which come out every five to six years.
- The IPCC should think clearly and urgently about how to work best with communication specialists, how to direct them, and when to bring them into the writing process.
- One strong suggestion is to bring them in early in the process, and look at the way they were brought into the production of the US National Climate Assessment of 2014.
- A detailed digital strategy needs to be developed to respond to the rapidly changing media world.
- IPCC authors and representatives should be available to engage more with social media, and receive training to that end. A published calendar of interactive events should cover a wide range of specialisms and areas within climate science.
- The timing and location of the press conferences need to be carefully chosen with more consideration for their suitability for media coverage and wider communications work.
- Careful thought needs to be given to the communication of scientific uncertainties. One suggestion is to start with what is known, rather than the uncertainties.

3. The importance of the NGO sector

One of the main ways the IPCC reports are disseminated to policy makers and the wider public is via the many NGOs who are active on climate change or related issues. They vary greatly in their aims and methods of working, but most are heavily involved in advocacy, campaigning and education. Several of them concentrate on working through and with the media, so there is an inevitable overlap with the findings found in section 4.3 of this report. All five NGOs selected for interviews used the IPCC AR5 reports extensively in their work.

Climate Nexus is one of the largest NGOs working on climate change from its base in the USA. It describes itself as ‘a strategic communications group dedicated to highlighting the wide-ranging impacts of climate change and clean energy solutions in the United States’. It works particularly with the media, other relevant NGOs and thought leaders. Many of its staff have a background in communications and media. It worked closely with the IPCC communications team in publicising the AR5 reports.

The Global Call for Climate Action (GCCA) is a diverse network of more than 450 non-profit organizations in more than 70 countries with a shared goal of aiming to keep the world safe from runaway climate change. It says it ‘harnesses the strengths of faith, development, science, environment, youth, labour, and other civil society organisations to mobilise citizens and galvanise public opinion in support of urgent climate action.’ Amongst its many partners are 350.org, Greenpeace, CARE, Christian Aid, Tearfund, WWF, Save the Children and Oxfam.

The Science Media Centre is a London-based, independent press office which aims to ensure that the public have access to the best scientific evidence and expertise through the news media when scientific issues are in the news. In particular, they work with journalists to provide them with information about science and its related disciplines, and with scientists, engineers and other experts in supporting them to engage with the media. They have produced several briefings on climate change in recent years, which is one of their priority areas.

Avaaz uses internet-based campaigning methods to take action on a number of global, national and regional issues, including climate change. Avaaz means ‘voice’ in several European, Middle Eastern and Asian languages. Launched in 2007 it now says it has more than 40 million members. It says that its ‘model of internet organising allows thousands of individual efforts, however small, to be rapidly combined into a powerful collective force’. It was one of the main organisers behind the September 2014 climate marches.

WWF is one of the largest international NGOs working on environmental issues. It says its ‘ultimate goal has always been “people living in harmony with nature” - so we're about respecting and valuing the natural world and finding ways to share the Earth's resources fairly’. It works extensively with communities, politicians and businesses to achieve its core aims, one of which is to reduce carbon emissions, shift energy policy and press for strong climate targets. It has official observer status at the IPCC plenary sessions.

4. Relevant Quotes by Topic

4.1 The importance of IPCC reports

'The IPCC AR5 report was absolutely central to the tectonic shift we are seeing in the United States and elsewhere around climate science. It was absolutely pivotal and it had to do with the scientists' efforts, the communicators' efforts, and the policy makers' efforts. It was central to our strategy to help turn the tide in the United States through the media. The big picture is that it was a huge success. You can actually see it all across the United States, <...> the debate about the science is nearly over now, and it's mostly because of the roll out of the IPCC reports over the course of six months.' NGO1

'The IPCC reports are very useful in that they

- create awareness and attention for climate change and the most important threats and opportunities (at a time when the issue is struggling to get the attention it deserves)
- give a solid and authoritative scientific foundation for making the case for climate action (moral, social, economic, and environmental)
- give additional leverage to hold governments accountable in our efforts to speed up the ongoing transition from fossils to renewables (as governments negotiate and endorse the summaries).' NGO2

4.2 The usage of the reports

'We produced our own material based on each of the reports. We highlighted the main findings, backed up by quotes from each of the reports.' NGO1

'We used the IPCC reports and turned them into a) a resource pack for our NGO network that broke down the findings, simplified them, and added public messaging later (WG1, WG2, WG3, SYR); b) a regional breakdown of the science to make the findings locally/nationally/regionally relevant for audiences (WG1, WG2, SYR); c) story telling - putting a face, name, story on the abstract science, to make it local, real, relevant, accessible, and engaging (WG2, WG3, SYR); We also used Facebook memes based on the story telling materials to make them shareable on social media platforms.'

NGO2

'We did a lot of work around the release of the three WG reports, but not so much the Synthesis Report. We did the least on WG3 – in fact, it felt to me that each time there was a new working group I halved the amount I did.'

For WG1, we did whatever was most useful for UK journalists, particularly the ones who couldn't be over in Stockholm. We had a panel of scientists about half of whom were IPCC contributors and the others were experts in their fields. They came here and watched the press conference, which we streamed from the host city to journalists here. Then the scientists took part in a Q&A with the journalists once that press conference had finished.

For WG2, we did a background briefing on UK climate impacts which was about the same topics which the IPCC would be reporting on and included some IPCC WG2 authors. This was before the IPCC launch but it wasn't an attempt to pre-empt them. It was to educate journalists who would be reporting on it with a focus on UK climate impacts. It was a splicing together of the main chapters in WG2 that would be of interest and addressed the questions that journalists wanted answers to, e.g. food production, flooding, and rainfall. We also held a press briefing before the release of the WG2 with the same focus. For WG3, we didn't do a briefing. I did a roundup of quotes.

You should ask the journalists how useful and clear the IPCC material was. We did not really use their material but we did rely on their timings to do work around the reports.' **NGO3**

'It can be really hard to sift through the reports and work out what you can grab or you can't grab <for campaigning purposes>. So if there's a geographical orientation, or a content area like a specific commodity or a territory, say oceans, which is easier to pick up and go with, that really helps. If they could present a closer relationship between the cause <of climate change> and the effect, that would be great. I feel like the coffee story that came in the <WG2>report was great - the Guardian led with it, and I thought it was super.'

'We read the exec summary which was good and it was helpful. Some good stats in there we could pull out and they pulled the top lines out very well. So they crunch the information well and the exec summary <SPM> was useful. But to be really honest with you, we would take our lead from the media and how they presented it and use that as our North Star. We did not look much at their other materials like the videos and other material they produced.' **NGO4**

'The reports themselves - and their SPM graphics, headline statements, etc. - were not particularly usable for our audiences. They were very useful for internal presentations to staff on key findings, but far too dense and technical to use with "lay" audiences. There was a lot of confusion about the IPCC's expressions of confidence. We also found ourselves having to produce internal documents/materials to explain key new findings or terms, such as BECCS, because the reports themselves did not explain them in a clear or succinct way. The videos that the IPCC produced for each working group and SYR were nicely done visually, but far too long and wonky to promote on social media, etc.' **NGO5**

4.3 Language and clarity of the reports

'The way we've established a relationship with the media is that we use clear, plain language. For the media and for policy makers and staff and thought leaders, we draw largely from the SPMs but we dive very deeply into the science itself to buttress the main point. Every single major message is supported by going as deep as we can go into the science. It's not easy but it's what we do. Then we come back out from it and try to make it all perfectly readable and understandable.'

We work from the basis of the SPMs, backed up by some of the science in the WG reports. It's easier for us to work from them and turn them into clear, plain language, as at Climate Nexus we're a whole bunch of senior communications pros and ex national media. We're all trained in doing that so it's not hard for us, and that's actually the reason why Climate Nexus was created in the first place by 7 foundations (which includes the Rockefeller Brothers Fund).' **NGO1**

'They are scientifically strong, but challenging for public communications. There is a need to break IPCC science down to an accessible level that engages non-expert audiences, further break it down to a regional, national and local level where it becomes relevant for audiences, and also package it in story formats that put a face and a voice on it so that it becomes real for people and resonates with them.'**NGO2**

'The exhaustion of the IPCC speakers probably colours the clarity of the messaging at least as much as anything else. You remember the press conference where they had literally been up all night. The chair of WG1 hadn't slept in two days or something. I think it lent it a sense of drama but it probably took away some clarity.' **NGO3**

'The reports could be a lot better in terms of ease of language, and you have to translate a lot. And they're talking to themselves often with the language that scientists use rather than talking to the wider community. Science doesn't have to be scientific in the way that it communicates. There are different ways of boiling it down to its essence. These are areas to improve on. But I also have an acceptance of the role that the IPCC plays in producing such an authoritative work of science.' **NGO4**

4.4 Working with the media

General:

'The IPCC communications team were better this time than the time before. Last time they really didn't have a comms team and it was quite clear, at least by this time around, that they needed one. What we were pleased with about that is that Jonathan <Lynn> was willing to come to us and meet journalists. There was more of an exchange and flow of information between the IPCC and the UK media than there had been in the past.'

'They've kept me informed about the stuff when I've needed to know it. It's been easy to get information out of them about things like embargoes and key findings.'

'I wish that the timing of the conference was a bit better geared to the media. What I would really like them to change is the fact that they end things on a Friday night. It doesn't really help anybody, even when it rolls over to Saturday morning. It's still absolutely the most useless time. It would be better if they went from Wednesday to Wednesday or something like that so the global media <can report it more widely>. That is one thing they really could change as the media reception of their work is as important as anything else.'

NGO3

'I think the choice of location to host the press conferences was just crazy because when they do not take place in an international media hub, it is very hard to deliver for broadcast media. I'd either go exotic in a location that has a clear climate orientation or go to a major media hub like London, Paris, or New York.'

'We look at the IPCC reports in terms of whether they hit enough front pages around the world. And they did. My top line thought is that these reports are being launched well; they're being well received, in some places they've got the coverage they deserve and some places they simply didn't. They've got to go and look at those gaps and how they can fill them. But given the tension that surrounds these reports, they did pretty well.'

NGO4

Social media:

Availability: the IPCC must be available online 24/7 to respond to queries and rebut misinformation. Practically, this could be achieved by developing a rota of IPCC co-chairs and lead authors who take charge of particular social media channels for short periods of time.

Training: IPCC representatives must receive social media training. Scientists are not trained communicators, and social media is a different beast from (the perhaps more familiar) legacy media. Nonetheless, some scientists and scientific organizations have proved themselves effective social media communicators, and this expertise is valuable to the scientific community as a whole. As well as training, scientists must receive support from their home institutions in undertaking these essential scientific responsibilities.

Engagement: IPCC representatives must actively engage in dialogue through Web 2.0 channels. It is not enough to publish IPCC reports online and then sit back and expect the wider world to read them in their entirety. A fully engaged and active IPCC Communications Strategy would see the IPCC scheduling regular interactive sessions on online platforms such as Google Hangouts, Reddit AMAs (ask me anything) and even its own website in which co-chairs and lead authors are available to field queries. A published calendar of such events could cover a wide range of specialisms and areas within climate science. These events should happen throughout the IPCC cycle, not just when a report is released.

NGO5 (adapted from NCC article)

Digital media:

'The media world has radically changed. Digital media, whether anybody likes it or not, is here to stay and anybody who doesn't recognize that isn't recognizing reality. The Guardian has seen its print readership shrink, whereas their digital imprint is huge. In fact its environmental coverage in digital form is the most widely read in the United States - more so than the New York Times and anybody else - because they've got a digital strategy that has worked on a global basis. Everybody who deals in the communication space understands that you must have a digital strategy that includes social media and non-traditional digital media, including blogs that are widely read and opinion pieces that are based in fact and science, and then the traditional media. Digital media is here to stay and drives lots and lots of conversations. You absolutely cannot ignore it.' NGO1

4.5 Working with specialist writers

'I would strongly encourage the leadership of the IPCC to trust their communications teams - trust that they are ultra-professional and know what they're doing. Do not simply think that keeping drafts from the communications professionals is somehow something you need to do, that you need to limit it just to the scientists. Actually, it's the reverse. The communications professionals are the ones who can help to head off potential problems long before they show up in final drafts.

There needs to be an iterative process between the communications professionals and policy professionals and scientists. That is healthy and good. I've been in big jobs at the National Science Foundation and the FDA and the White House and at every instance I've fought for the communications teams to be at the table while things are being discussed. It's always better and never hurtful.

The best communications professionals of the world have no interest in trying to co-op the science or corrupt it or change it and yet there is sometimes a feeling among scientists that that does happen. It actually doesn't happen.'

'Whenever possible, have pros translate complicated things. In this case, some professionals were available like the Climate Nexus staff, and we were able to help translate. We did massive background documents that were made widely available that helped explain WG1, WG2 and WG3 and then collaborated with other groups on a global basis. That outside help's not always going to be there so the IPCC should have access to those resources and should be able to direct those resources.'

'The perfect prototype <of a specialist writer> is Sue Hassol <who worked on the National Climate Assessment in the United States>. One of the reasons why the Assessment was hugely successful is that Sue is a professional communicator - she's trained scientists to talk all of her professional life. She was actually hired on contract to help draft the executive summary of the Assessment for the administration. The executive summary was so elegant. It was just brilliant. You want to have people like Sue involved sooner rather than later, no question.' NGO1

4.6 Recommendations

More resources for the IPCC Secretariat communications team

'The IPCC communication effort is woefully underfunded. Jonathan (Lynn) could have absolutely used more resources. They deserve more support institutionally. Private foundations and outside groups like ours came in to help their work – but it is a volunteer process and entirely too cumbersome. <..> Because it's volunteer and there are many, many players, it just makes it really hard to corral and collaborate across all those volunteers.' NGO1

More breakout reports:

'The special report on extreme weather and climate change, that pre-dated the IPCC AR5, was immensely helpful. We did a massive media roll out around that in the United States and it was really helpful as a scene setter for the AR5. <..> We would advocate the IPCC should do more of that, even if they're going to continue with their every five or six year structure. Somebody needs to come up with the resources to do timely breakout reports.' NGO1

Better communication of uncertainty

'One of the biggest problems with the IPCC and the reports – and it's endemic to the entire science community, not necessarily the IPCC – comes as a result of the nature of the science process, which looks to answer questions about what we don't know. All major science reports always lead with an entire narrative about what we don't know, endless discussion about what we don't know, and what we're uncertain about. Often that's what gets reported to the media and lay persons - which is that there are uncertainties, we don't know things

That is actually the exact opposite of what public communication is all about. Public communication is about what we do know, what we're confident in. That's the clash always between communicators and science and you see it big time in the IPCC process. It's just something that people need to recognize. The way you get around it is to skip to the conclusions, to what we do know and then we ask the scientists to go as far as they can in supporting that. We recognise where uncertainties remain and where they can't and that too needs to be communicated. But the communicators invert the process and start with what we do know and work backwards and then you come to the best resolution.' NGO1

More story telling

'They cannot have an advocacy message, but they can be human beings – without losing their credibility or their legitimacy. They can be fathers or grandfathers or mothers and grandmothers, and they can explain what the science means for their children and grandchildren. People watching an IPCC scientist on the BBC may respect the expert who explains the science to them, but they will connect and sympathize with the parent who is worried about their kids, because suddenly they can see themselves in this person and identify with the scientists.' NGO2

Targeting Audiences

‘Effective communication requires a clear understanding of who is your audience, and what drives these audiences, e.g. personal values, political dynamics, or career issues. You need to know your audience through literature or testing, in order to produce communications output that is tailored to meet the needs of these audiences which they can engage with. The IPCC needs to put its communications output into formats that are useful for the respective target audiences, e.g. heavy on text or strong on visuals, long/complex or short/simple, and shareable/actionable or not. It needs to fill these formats with language that is appropriate for the respective audiences, e.g. using frames that appeal to helpful values and using accessible and engaging language.’ **NGO2**

5. List of interviewees

NGO1 Jeff Nesbit, Climate Nexus

NGO2 Christian Teriete, the Global Call for Climate Action (GCCA)

NGO3 Tom Sheldon, Science Media Centre

NGO4 Sam Barratt, Avaaz

NGO5 Leo Hickman, WWF ((at the time of interview)

4.5 Higher Education Sector

1. Main Findings
2. Recommendations
3. The Higher Education Sector
4. Relevant Quotes by Topic
 - 4.1 The usage of the IPCC reports
 - 4.2 The language and clarity of the reports
 - 4.3 The IPCC graphics
 - 4.4 The use of other reports
 - 4.5 Recommendations
 - 4.6 Other issues
5. Interviewee Coding

1. Main Findings

- The IPCC reports are seen as comprehensive and authoritative.
- The full WG reports and the SPMs are both widely used by the interviewees in teaching climate science and its policy implications.
- They are either distributed or used in the form they are published or adapted to be more user-friendly for the students.
- The IPCC materials are often used successfully in conjunction with other reports on climate change.
- There are differing views on how much the students understand the language of the IPCC reports and SPMs, which is often closely related to the academic discipline they are from or most conversant with.
- There are also differing views on how useable the IPCC graphics are: some find them too cluttered or unclear, others find them easy to adapt.
- Interviewees could appreciate the advantages and disadvantages of having specialist writers working with the scientists.

2. Recommendations

- As there is a general recognition that the IPCC reports are not designed as a text book for students, and as most of the interviewees use the IPCC report alongside other reports, there is little demand for a specific IPCC product aimed at the education sector.
- However, there was some desire for a 'second stage' whereby expert writers adapt the material for specific student sectors.
- Some of the key concepts, such as a 'climate model' or 'earth systems model', 'radiative forcing', 'adaptive capacity', need to be explained more.
- The language is difficult for students or lecturers not familiar with the particular academic discipline behind each of the WG reports – it needs to be simplified in some way.
- Several said it would have been more useful to run the findings of WG1, WG2 and WG3 together and not publish them separately with a large time gap.

3. The higher education sector

The interviewees came from four UK universities (Exeter, Imperial College, LSE and Oxford), and from different academic disciplines. They teach students on a wide variety of courses with different backgrounds and exposure to climate science. Four of them taught undergraduate courses, and one helped to devise online courses for professional and interested parties. The responses to the interview questions were largely driven by this variety of disciplines, expertise and students. As a result, there were a large number of differing points and recommendations.

The interviewees were chosen because they used the IPCC reports extensively in their teaching. Their range of experience, backgrounds and student base can be seen from the following list:

Simon Dietz has been Co-Director of the Grantham Research Institute on Climate Change and the Environment Since March 2011. He is also Director of the Centre for Climate Change Economics and Policy and Associate Professor at the Department of Geography and Environment at the LSE. His research interests included decision-making under uncertainty, questions of equity/social justice within and between generations, the links between economic growth and the environment, and international environmental agreements. He teaches an MSc course on climate change, science, economics, and policy.

Lina Mercado is a lecturer in Physical Geography at Exeter University. She is a vegetation modeler, focusing on improving representation of plant physiological processes within earth system models in order to improve predictions of present and future land surface -climate interactions. She teaches a third year module named climate change and its impacts, as part of the Physical Geography programme.

Duncan Russel is an associate professor in environmental policy at Exeter University. His research and teaching interests include UK and European Environmental Policy, amongst others. He engages with policy makers in a number of ways, including providing written and oral evidence for parliamentary committees as an expert witness. He teaches two modules for third-year undergraduate politics students, called The Politics of Climate Change, and [The Politics, Policy and Practice of Sustainable Development](#).

Dunia Urrego has been a lecturer in Physical Geography at Exeter University since September 2013. She studies past environmental changes in the tropical and subtropical regions, with a focus on pollen and charcoal records from lake and marine sedimentary sequences to reconstruct environmental change over orbital and millennial timescales. She teaches two first year undergraduate modules - Study Skills, and Research Methods in Geography; contributes to the dissertation module for second and third year students; and convenes a third year module on tropical paleoecology and paleoclimatology.

Erik Van Sebille is an oceanographer at The Grantham Institute of Imperial College, but until recently taught at the University of New South Wales in Sydney, Australia. He was a guest lecturer on the science of climate change at the UCL Business School in Adelaide which ran a Master's degree in Resource Management which included a module on climate change. The students mostly had a

background in business. At Imperial College he is developing a class, The Science behind Climate Change, for the business school.

Peter Walton is a Knowledge Exchange fellow at the Environmental Change Institute at Oxford University. He is responsible for developing and supporting knowledge exchange opportunities with external stakeholders on behalf of the Oxford Climate Research Network. Much of his work is communicating the practical implications of climate change impacts to a wide range of audiences. He has helped to develop a range of learning (and e-learning) resources. He inherited the site *Climateeducation.net*, which is a global online education programme aimed at encouraging the sharing of high quality information about climate science and modelling. Its target audience is professionals and interested parties.

4. Relevant Quotes

4.1 The Usage of the IPCC reports

‘I teach a postgraduate course on climate change, science, economics, and policy, and the IPCC Assessment Reports are always a key resource for that teaching. The students can come from a wide range of backgrounds so they generally don’t know a lot about climate change beforehand.

The way we would do it, in teaching at least, is that we would quite often have the students read the SPM as a key pre-reading for a lecture or a core reading to come to an accompanying lecture. They would be directed to the technical summary for further optional or core reading. Very occasionally they might be directed to a specific chapter within the reports. We do not use the FAQs or other material.’

‘We generally give it to them in the form that the IPCC publishes it.’ **ES1**

‘We have used the IPCC report since the autumn of 2011 when we started teaching a third-year module named climate change and its impacts. We updated the course last year when the AR5 WG1 report was released.

The FAQ, the maps and the boxes with extra info were very useful as reading material for the students, as we have an assessed piece of work that needs using IPCC material for different regions. We mostly use WGI and WGII.

We produce our own lecture slides, and sometimes use figures from the individual papers and sometimes any useful illustrations from FAQ or SPM.’ **ES2**

‘I tend to use the IPCC WG1 chapters more as background information as to why it is important to understand past climate change; trying to put the projections for the next hundred years in context with the paleoclimate archives. How does that compare to the past four hundred thousand years in

terms of atmospheric CO2 temperatures? How does that the <hockey>stick line compare to the same graph if you go back several hundred thousands of years?' ES3

'We have to teach the module in quite small groups of about 30, and it's mostly discursive based where I send them to do specific exercises with a bit of lecture input from me. The IPCC reports come into that quite a lot, because we do climate change negotiation simulation. One group is the IPCC, who have to use the reports to devise their position in the negotiations. In other seminars they also have to go through the reports and for example, devise adaptation strategies based on the information.' ES4

'What I did was essentially go through the WG1 SPM with the students. "What does the science say?", "What do we know?", "Where are we going to?" and "What are the expectations?" I tried following the IPCC SPMs for most of it except for that I was missing a lot of background on what a climate model is. I needed to come up with my own material explaining this. It's hard to convey the message if you don't really understand what a climate model or an earth system model really is.

For WG1 the SPM worked well for my student cohort, who were business students. I didn't think I could expect them to be too critical of the pure science because they would just have no idea where it's coming from. What I did then with the business students was to get them to read the WG3 SPM for themselves, in groups, and discuss that much more.

The Ten Key Points or so – they were really nice, very short sentences which are very powerful.' ES5

'We had to update our material for the online site on the basis of the AR5 reports. We include a lot of material included on regional modelling, but it was a tortuous process to update the material on the site on the basis of the AR5 reports.

'In general, the AR5 reports are far too big for use in the education sector. In their current form, they cannot be structured for easy use by the education sector – it's probably not appropriate or possible.' ES6

4.2 The language and clarity of the reports

'The main reason for using the IPCC reports is that they are comprehensive and authoritative. It is not the easiest read. And it's not written like a textbook for students. That's not its purpose.

'Likelihood and confidence is not the problem because of course you can cross-reference to the explanation of those terms. It's more where there isn't a formalised convention about the choice of words.'

'I get occasional appeals for help to penetrate the text and understand what's really going on to tell them where to focus their reading and where not to focus their reading because of course the reports are voluminous. But for the most part I think they get along with it.' ES1

'Parts of the report are difficult to read for students, but the FAQ and boxes with info are quite clear and very illustrative.

Some of main sentences in the SPMs are quite hard to follow. We had a lecture from one of the scientists that was present when the SPM was written, and that was his point, that some messages are clearly written by scientists and then once the SPM gets agreed, it gets changed and some of it gets confusing and it's not anymore in the hands of the scientist to get the text so clear.' ES2

'I would say that <the third year students> are pretty good at understanding what the WG1 report means. Even with the first years, who use some of the SPMs to do an exercise on critical reading, I get the feeling that they understand what is said.

With some of the students I need to do a bit of prompting. But I wouldn't say that's specific to the IPCC, to be honest. I think that's the case for the scientific literature in general.' ES3

'If you're talking in a business school like mine, myself as an oceanographer talking to economists, you really have to think very, very carefully about language that you use. That was why I liked the SPM so much <compared to the actual chapter reports> because that was much more the language that my students would be comfortable with.

'The biggest example <of a problem> is the use of the word "uncertain". Within my field of research, it is perfectly normal to talk about uncertainty as if we mean the things that we don't know, but I've been told over and over again that uncertainty in a policy framework or in a business framework means something quite different. Uncertainty means things that we don't really have to deal with because we don't know them, so uncertainty really has a negative connotation. What I understand about it and what I've used in my teaching is that it's much better to go with "risk" rather than "uncertainty".' ES5

4.3 The IPCC graphics

'I use the original graphs. I don't redraw them, but I do highlight things on the graph, using the PowerPoint tools, to guide the students to look here or there, because sometimes they do have a lot of information. There are some graphs that I do find quite crowded and difficult to read. You need to look at them quite a bit. Others are fine.' ES3

'I like some of the pictorials – they are simple things that you can relate to. You can't play with them but you can see them and they're there and they're quite clear and it gives you that symbolic idea of

what's going on. I find some of the graphs and RCP type things are a little bit dull, and not necessarily easy to understand. I think the students struggle.' ES4

'I love the graphics. I think that students understood all the graphics. Of the slides I presented, at least 75% were just the graphics from the IPCC report. I did not find them too cluttered. They are sometimes a bit big on the number of subpanels. Some subpanels are more relevant than others. So they can be improved by thinking about not having eight, nine subpanels, which they sometimes have. The one about the carbon budget - it's a very, very good graphic. There's a lot of information in there but it's a strong message that comes out of the graphic.' ES5

'The graphics are not clear enough. For example, the material on Probabilistic Event Attribution (PEA) in chapter 10 of WG1 needed a lot of adapting to make it more accessible to a general audience. Standard undergraduates really struggle with the graphics of WG1, although WG2 was better.' ES6

4.4 The use of other reports

'We don't give them the IPCC reports as their only source. We would never recommend that that be the only thing they read. It usually has to be accompanied by something which is much more pedagogical, such as The Rough Guide to Climate Change.

From the point of view of an educator the IPCC reports are not perfect. But then we don't expect them to do the job as the textbook would do. For all of these areas there are textbook expositions anyway. And so it can sit nicely beside them.' ES1

'At the same time as we're using the IPCC material, we use other material on the physical science backgrounds to climate change. Often I will go to the original scientific papers that are cited in the IPCC or I would be familiar with certain authors that would produce similar or relevant information.' ES3

'We supplement the IPCC material with material from UKCIP, the IEA and DECC. I used some of the MET office tools for example. Some of the supplementary material I use is actually made by someone else's taking the IPCC material and making it more useful. I think there's a great tool on DECC where you can look at a clickable map and there are different symbols and it shows the stress on fisheries and other sectors. The way that my students work actually, they really like web-type interactivity.' ES4

'I used the NOAA State of the Climate report in addition to the IPCC reports. In Australia, the Bureau of Meteorology also had a State of the Climate report and I used that a lot, to make it a little bit more about Australia, to essentially take the message home a little bit more. State of the Climate is good because it's more up to date and it's annual. The question of how would you teach this module in four years, it would probably be based mostly on NOAA's State of the Climate.' ES5

4.5 Recommendations

'We don't need something that is specifically aimed at our sector because there are other textbooks out there already, and the IPCC reports are just part of the offer that we give to our students.' ES1

'Parts of the main report are not so friendly for non-experts. I found it hard to follow areas of science that are not within my area of expertise, so for students it is even harder. So my suggestion would be to try to make it clearer, but I understand that sometimes it is not so easy.' ES2

'I would say the writing style has to be improved. They tend to use a lot of commas and lots of substantive clauses, and also *caveats* in the same sentence. That makes it difficult to read. The fact that it's a very large document doesn't help. I don't know how many policymakers take the time to read such a thing. Even the SPMs could be more concise.' ES3

'Going forward I'd say the communication aspect is the most important because the science is very conclusive on the problem and the nature of the impacts. There are big gaps and there always will be, but there's now a sense of urgency needed. Of course no matter how well you communicate you won't get to navigate the politics, but better communication will help you deal with some of these more political aspects.' ES4

'I have learned that to talk effectively you have to talk about impacts. They need to be more up-front, even for education. It is very difficult to convey a message if you only keep on talking about 0.85 degrees warming, or another two degrees warming, and if you do so by the numbers. If you talk about 80 centimetres of sea level rise, faces in the classroom really went blank. When I was doing it, the WG1 was already out but the WG2 wasn't, so I could only talk about AR4 impacts and not AR5. It was quite problematic. That happened not only in our classroom but also more in our media engagements that we did when WG1 came out. There wasn't anything really about what people cares about in the SPM. From a teaching point of view or a communication point of view it would make more sense to provide the whole package in one go, and to provide the public and the students with what these numbers actually mean, rather than having to wait a few months or a year.

'I would recommend that maybe even in the SPMs, they should have text boxes. They work quite well in the main full report. Text boxes are the place to actually explain something that's not absolutely critical to the flow of the message, which you need to know if you really want to understand it.' ES5

'You need a two-tier process in which in the first stage the WG reports are written and produced, and in the second stage, they could be adapted for use by different education sectors. For example, it should be possible to work from the reports and explain what the key concepts are that need more explanation. You also need to have an understanding of WG1, WG2 and WG3 at the same time to understand the 'So what?' question. Finally, the graphics need to be simplified for teaching purposes aimed at most sectors.' ES6

4.6 Other issues

On the different WG Reports:

'Some of the charts in WG1 are extremely good. And some of the basic evidence collection is useful. You've got all of the models, all of the results together. WG2 is most problematic from my point of view. It seems to spend the most time clarifying terms and the least time discussing the actual evidence. WG3 is very helpful and very clear on things like emission scenarios and mitigation costs. I teach extensively from chapter six when asked questions about mitigation costs and all sorts of aspects of that. I find it to be very clear and well presented.' ES1

'I have looked at some of the mitigation parts, and some of the more social parts. I find them very difficult to read. But that maybe because they are not of my area of expertise (the Physical Science).' ES3

On specialist writers:

'I can see pros and cons of bringing in professional writers. I've seen it happen before and it can be a difficult experience both for the people involved in producing them but also for the intellectual integrity of the final text. It seems to me to be risky as it gives these people potentially quite a lot of power.' ES1

'It would be good and helpful to have specialist writers or communicators early in the writing process. They can actually get what the scientists ask and the scientists can ask them so, "I'm going to use this term - are you happy with that?"' ES4

5. Interviewee coding

Simon Dietz, Co-Director, Grantham Institute, LSE - ES1

Dunia Urrego, Lecturer in Physical Geography, Exeter University – ES2

Lina Mercado, Lecturer in Physical Geography, Exeter University – ES3

Duncan Russel, Associate Professor in Environmental Policy, Exeter University – ES4

Erik Van Sebille, Grantham Institute, Imperial College – taped interview – ES5

Peter Walton, Knowledge Exchange Research Fellow, Environmental Change Institute, Oxford University – ES6

5. Conclusions

What follows is an attempt to give a fair summary of the main findings and recommendations from the huge volume of material collected during the 30 interviews laid out in Chapter 4. Although there are many different views expressed in the different sections both within each sector and between them, some broad themes are common to all. Many of these chime with the recommendations from governments to improve the IPCC communication work mentioned in the Introduction.¹² Some of them also coincide with the priority areas mentioned by some of the leading candidates to be the new chair of the IPCC to succeed Dr Rajendra Pachauri¹³ in late 2015, and the issues raised by other authors and observers outlined in chapter 3.

More detailed recommendations for sectors such as the media or other UN organisations have been overlooked in favour of choosing the following ten broad areas:

- The readability of the SPMs
- Headline statements
- More user involvement in scoping reports
- Derivative products
- The importance of outreach work
- The use of specialist writers
- Metrics to assess effectiveness of the IPCC communication
- The use of graphics, digital technology and new media
- Learning from other reports
- Budgets and resources

Recommendations for each of these areas can be found in the executive summary.

1. The Readability of the SPMs

A strong finding from virtually all of the interviewees is that the SPMs are the main IPCC product that they use in their work. The common view is that these SPMs exhibit the main IPCC characteristics of being authoritative, trusted, credible and legitimate. However, it is also a commonly-held view that the SPMs are not easily readable or digestible by the non-expert consumer. In short, it was felt they were written by scientists for other scientists. This view was eloquently captured by one of the interviewees who argued that the SPMs were ‘high quality science’, but ‘a low quality

¹² Available via http://www.ipcc.ch/apps/eventmanager/documents/27/030220150347-p41_inf01_gov_comments_ref_options_paper.pdf

¹³ See Jean-Pascal van Ypersele, ‘Climate Politics: Does the IPCC have a future?’, Guardian 16 March 2015; The Carbon Brief Interview: Jean-Pascal van Ypersele, Carbon Brief, 9 April 2015; The Carbon Brief Interview: Thomas Stocker, Carbon Brief 28 May 2015; The Carbon Brief Interview: Prof Chris Field, Carbon Brief, 10 July 2015.

communication tool', where the language and figures were difficult, complex and too scientific for policy makers.

Many interviewees stressed that more attention needed to be paid to the clarity and accessibility of the language used in the SPMs. Scientific jargon could be easily avoided, they argued. Several examples of clearer language used in other reports on climate science which remained true to the science were given – the US National Climate Assessment Report of 2014 was one that was mentioned several times.

Susan Hassol, who worked as senior science writer and communications consultant on that report, and her colleague Richard Somerville, have highlighted not only words or phrases that are scientific jargon but also ones which mean different things to a general audience than to scientists, such as 'enhance', 'positive feedback' and 'uncertainty'.¹⁴ She, like others, also argues that the confidence and likelihood language used by the IPCC does not work well for most audiences, as i) it can make it sound like the scientists don't know anything, and ii) there is a lot of academic research suggesting that people underestimate the risks when such language is used. (Budescu et al., 2009 and 2014)

Moreover, a number of the journalist interviewees pointed out that they changed the language of the SPMs to make it more readable but rarely received criticism from the science community for distorting the science. As mentioned in chapter 3, the former BBC environment correspondent Richard Black gave clear examples of how the SPMs could relatively easily be turned into something clearer, more readable and more digestible.

2. **Headline Statements**

The practice adopted by the WG1 team of writing two pages of headline statements was widely praised. These were designed to capture the essence of the scientific findings in a succinct and jargon-free way to a wide range of readers. These were approved by governments at the same stage as the SPMs. This practice was adopted for the Synthesis Report but not for the WG2 and WG3, even though they were encouraged to do so by governments. Crucially, the process of shaping the results into communicable units was started early so that the IPCC authors and review teams were able to review them as the chapters and SPMs developed. As Jonathan Lynn explained, in the case of WG2 and WG3 they were added late in the process rather than emerging naturally from the SPM, so it was clear that they would give rise to lengthy discussion and were dropped.

There are two indicators of the success of this model. The keywords from the WG1 headline statement document did appear in print articles, suggesting that this IPCC presentation format may have helped to increase the volume of reporting on WG1. (O'Neill et al, 2015, p. 382) Secondly, according to the co-chair of WG1, Thomas Stocker, headline statements generated by this process have made it textually into the decision documents of the international climate negotiations. (Nature 11 Sep 2014) Moreover, Michael Williams, head of the communications at the WMO has used them extensively in his education and outreach work.

¹⁴ Somerville R. and Hassol S. 'Communicating the science of climate change', *Physics Today*, October 2011, available at <https://www.climatecommunication.org/wp-content/uploads/2011/10/Somerville-Hassol-Physics-Today-2011.pdf>.

This practice should be adopted for all high-level documents of the IPCC, including all WG reports and one-off special studies. The headline statements would also go a long way to meet the requirement from many interviewees for a 'summary of the summary', or in other words a two-page summary of the SPMs, released at the same time as the SPM. Scientific jargon needs to be taken out of the 2-page summary, as in point 1.

A related issue mentioned by several interviewees was that a summary document does not have to follow the chapter structure of the overall WG reports, and headline statements are not needed from each chapter. (For example, this was not the case for WG2.) Policy makers do not divide a science report in the same way a scientist might, and they would probably benefit more from cross-cutting themes and key messages that draw on various chapters. The importance of what policy makers need to know should take preference of what is scientifically interesting.

3. More user involvement in scoping reports

The IPCC's guiding principle is that their reports should be policy-relevant, but not policy-prescriptive. From our interviews with a variety of policy makers, it is clear that the SPMs are very useful as the basis for top civil servants to brief ministers as the essential background for policy decisions. However, it is of note that some interviewees thought that other reports they read and consulted were regarded as more policy relevant, such as the UNEP 'Mind the Gap' report, the annual World Energy Outlook reports from the IEA, and the New Climate Economy report.

In this context, the IPCC should consider seriously the UK government's recommendation for more 'user consultation to gain more insight into how the IPCC might better tailor its products to user needs'. The IPCC could conduct a process by which it engages with its report end users from the outset to help co-design the scoping, structure and language used throughout the report development. This would ensure the final products would align with the requirements and needs of end users such as governments and business sectors and ensure the content of the IPCC reports would better inform decision making.

This approach could follow the recommendations made on requirements for policy formulations and decision-making described in Section 3.4, and simultaneously follow the suggestion from the FCO in Section 4.1 to start with a policy goal (for example preventing or reducing the risk of a worst possible case happening), and work backwards from the goal to the science that is relevant to it, rather than starting with the science, and trying to make it policy relevant.

Within this context, it has been widely recognised that more targeted reports are needed for certain regions of the world such as South Asia or Africa. Such targeted reports would be a good testing ground for a fuller involvement of relevant policy makers to help design the structure and language used throughout the report development. This would fit with a general approach to communications that is more interactive and engaging rather than top-down.

For policy makers at the local level in advanced economies, the WG reports need to provide more relevant, summarised, digestible and incorporate information showcasing new impacts or innovative solutions that are already being used locally. Whilst WG1 is particularly used as a way of making the case for action on climate change, WG2 and WG3 in their current form do not provide sufficiently

granular information that can robustly inform decision making on climate change at the local level. As a result local authorities in the UK have turned to other national resources to support this.

4. Derivative Products

Derivative products differ from targeted IPCC reports in that they are produced by outside organisations for targeted audiences without the official endorsement or imprimatur of the IPCC. As outlined in chapter 4, successful examples of these products were those produced by the Cambridge Institute for Sustainability Leadership (CISL) for different business sectors, and the reports produced by CDKN for four different regions or sets of developing countries.

As the researchers and writers observed, a considerable amount of ‘heavy lifting’ was required to work from the SPMs and WG chapters to turn them into material and reports usable and understandable by the relevant target sectors.

The example of CDKN reports is particularly helpful as two IPCC authors were heavily involved in an unofficial capacity to help ensure the scientific solidity of the reports. As Jonathan Lynn stresses, ‘there is a need to get more IPCC authors involved with derivative products. The challenge is to build into the IPCC process more time for them to help with this and other outreach work.’

The challenge is to adapt the IPCC process to allow more deployment of IPCC authors to work with reports and summaries for targeted sectors, perhaps instead of devoting so much effort into the WG reports. The authors need to be ‘rewarded’ or ‘recognised’ by their host universities for doing such work, just as much as contributing to the WG reports.

More derivative products could be targeted at different sectors, such as cities. They need not have the official endorsement of the IPCC, but it could be highlighted that individual IPCC authors contributed to the reports.

5. The importance of outreach work

Linked to points 3) and 4) above is the importance of outreach work and events (i.e. presenting the report in different countries to various audiences). These allow the authors to present and discuss the reports in their own words. As outlined in chapter 3, IPCC authors already dedicate a considerable amount of effort to taking their reports around different countries. But more could be done in the future, while recognising that outreach work is expensive in terms of labour and money, both organizing the events and funding authors and other participants. More resources directed to this area of work would be helpful.

There are still challenges in ensuring authors present the information in an audience-friendly way. But feedback suggests it can be a highly effective way of communicating the IPCC science when authors draw on their own expertise and scientific rigour to communicate the findings clearly to local or sector-specific audiences.

6. Specialist writers

As mentioned in chapter 1, the meeting of governments held in Nairobi in January 2015 to review the future direction of IPCC work recommended that the IPCC should ‘seek advice from various specialists to make the IPCC reports more readable.’

The recommendation has already prompted considerable discussion about how and when specialists should be introduced into the IPCC writing and review process, and what sort of specialists they should be.

As several observers have pointed out, there is an existing community of social scientists, communication experts and former specialist journalists who have the relevant expertise in this area. Their involvement would undoubtedly help to extend the reach and impact of the reports by making them more readable and digestible.

There are various options for what type of specialists they could be – members of the science community with proven writing skills, former journalists with experience of writing about climate science, or more general communication experts acting in an advisory capacity or a sounding board.

There is less uncertainty about when to bring them in. The successful model of writing headline statements involved considering the ‘end product’ at an early stage. So if specialist writers are to be used, they need to be introduced early in the writing and review process, and not at the approval stage.

The interviewees in this study saw many advantages but also some disadvantages of bringing in specialist writers. One clear advantage is that their presence should reduce the need for government press offices, and many others, having to perform an ‘extra translation service’ which turns the IPCC headline statements into their own statements in press releases and other communication work.

Some of the journalists for example recommended bringing in specialist writers whilst others felt it was their job to turn the reports and SPMs into language and messages understandable by their audiences. Most of the NGO representatives welcomed their introduction, whereas some Local Policy Makers felt it was a major challenge to ensure the scientific message was not lost in the process of ‘translation’. Members of the business community welcomed such writers, but more into the products designed for them. One of the representatives of the education sector, who has experience of bringing in such writers, pointed out the risks to the intellectual integrity of the final text and of giving over too much power to them over the final product.

For this to happen, there are several obstacles to overcome – there are those within the IPCC process who value the primacy of scientific accuracy and comprehensiveness over simplicity and readability. There is already a clash within the corpus of IPCC authors and co-chairs between those who recognise the importance of speaking with one voice and simple messages, and those who felt outside interference was unwelcome.

However, the overwhelming weight of opinion from the interviewees is that a) specialist writers/communicators should be introduced early as part of the writing and reviewing process; b) the right people exist who know and respect the primacy of the science; c) the right procedures and safeguards can be put in place to ensure the appropriate clarity of roles for such writers; and d) that the scientists and governments have the final sign-off.

Several interviewees also stressed that employing public relations companies was not a recommended path as a) they tend to be introduced at the end when specialist writers need to be incorporated from the start, b) many of them are not going to have the rich experience of writers,

journalists or communicators who are steeped in the science and the (effective) language of climate science and climate change communication and c) they may be tempted to give primacy to 'good' messaging at the expense of the basic science.

7. Metrics

There is a general recognition both from IPCC authors and staff that much more can be done to set up more sophisticated metrics to assess the effectiveness of the IPCC reports, including communication. Very little is done at present to track the pick-up of the IPCC reports in international bodies meeting which decide on climate change or in national, regional or local governments. Evidence at the moment is anecdotal as to what policy makers used or did not use, how they used it, and in what way it was useful. Little is known about the way the principal outputs from the IPCC process are taken up and used, even in countries – such as the UK and Norway – which are supportive of the IPCC's work.

This report is a small step in that direction, but such research could be done much more systematically.

Likewise, the media monitoring is rudimentary. As suggested in this report, there are precedents for setting up helpful media metrics. There is also a body of academics in the USA and elsewhere who have experience of doing effective and focused survey work with policy makers. If the IPCC is unable to do this itself, it should be possible to contract an outside organisation with clear guidelines from the IPCC comms team as to how to carry out this research on its behalf on a regular and sustained basis.

The IPCC could a) make use of much more sophisticated media measurements, b) track the formal uptake by governments of the reports, c) assess with more rigour and robust criteria its impact on key policy making fora both nationally and internationally, and d) select key groups of policy makers or other target audiences to test and monitor the effectiveness of its communication in a more systematic way.

8. The use of graphics, digital technology and new media: There was a general recognition from the interviewees that graphics should be central to the communication of the information found in the SPMs and WG reports. As one interviewee from the business sector expressed it, the right sort of info-graphic was seen as a powerful way of drawing business audiences into being 'carbon literates'. However, there was also a general feeling that many of the IPCC graphics were too cluttered with too much information, which often took some deciphering. It may be that two versions of some of the graphics are needed, one for scientists assessing the science and another for those aiming for clarity of key messages.

Individual graphics that were mentioned as being helpful were the 'Burning Embers' in WG2 and the Carbon Budget in WG1. Info-graphics in other reports such as the 2014 US Climate Assessment Report, or those found in the media were regarded by some interviewees as clearer examples of good graphics. It is also of note that many of the derivative products included graphics based on the SPMs which the users felt worked well. The interviewees from the media said the IPCC graphics were not on the whole transferable for use by their organisations.

Good graphic designers are much sought after in the media at the moment, and many media organisations are devoting considerable resources to improving the digital representation of information on their websites and other platforms. This means the standard of graphics are improving at a fast rate, as are the expectations of the users.

However, it is of utmost importance that the graphic designers also have some background in, or knowledge, of the basics of climate science.

Better graphics, or info-graphics, is part of the urgent need to pay considerable attention to the rapidly changing nature of digital technology, new media and new platforms, which have revolutionised the way people consume information. To give just one indicator of this, social media are now considered more important than print as a source of news in seven of the twelve countries surveyed in the 2015 Reuters Institute Digital News Report. (RISJ 2015) In the other five, younger generations are moving away rapidly from traditional media platforms.

As mentioned in chapter 1, governments have already recommended that the IPCC ‘ensure that up-to-date digital technology is used to share and disseminate information.’ Unsurprisingly, several interviewees stressed the importance of a revamped social and online media strategy for the IPCC. For example, local policy makers pointed out three immediate advantages: consistent updates on a regular basis, via social media, would enable faster access to up to date knowledge in the field; the use of digital means would be very helpful in making the reports more interactive for example through more info-graphics with more emphasis on clear graphs and data; and technology could help condense and break-up the reports and help navigate to specific themes in the reports. Greater interactivity on the IPCC website was also mentioned by interviewees from the education sector who stressed how students find this a very good learning method.

Leo Hickman, formerly from WWF and the Guardian, has laid out the case for more availability, more training and more engagement from IPCC authors on social media channels. There has been some push back on this idea because of the demands on the time and energy on the part of IPCC authors. However, careful consideration needs to be paid to how much resources the IPCC comms team should dedicate to implementing a new digital strategy themselves, rather than have to rely on the individual actions of IPCC co-chairs or authors.

9. Learning from other reports

The interviewees mentioned a large number of reports which are now published on climate science and the implications for policy at the international, regional and national level. The list is long but prominent are those written by NOAA, IEA, UNEP ‘Mind the Gap’, World Bank, the Royal Society, and the Potsdam Institute. Ad hoc recent reports which have attracted a lot of attention have been the 2014 US National Climate Assessment Report, Risky Business, and the New Climate Economy. Often these were quoted by the interviewees as being better edited and more readable than the IPCC SPMs. (see for example, the experience of the business sector interviewees in 4.2)

Of course the context in which these reports are produced are very different to the IPCC process where every line of the SPM is the result of political approval process by governments. However, as Susan Hassol says, ‘the challenges of writing an IPCC SPM are clearly different to those of writing the

US Climate Assessment Report. However, there are clear similarities as well – the US report had to go through several rounds of review and was a tough process. Lots of changes had to be made to accommodate different points of view from the scientists.’

There is a strong need to draw together and pool good practice on communication experiences and techniques from other climate science reports. Despite the different contexts in which these reports are published, much can be learnt from exchanging good and bad practice. The online presentation of the SYR modelled on the US National Climate Assessment Report is a good start: <http://ar5-syr.ipcc.ch/index.php>

There is also a strong argument for ensuring that the IPCC draws the appropriate lessons from the previous assessment cycle, which some observers have seen as the IPCC's ‘missing (learning) loop’. It is important to draw lessons from the whole process of how other reports are produced, and not just how they are communicated through the end product (the WG and Synthesis reports).

10. Budgets and resources

Unsurprisingly, several of the interviewees brought up the issue of the appropriate level of resources, including staff members, for the IPCC communication team. *Prima facie*, it is hard not to make the case that probably the most important international report on climate science needs more than one staffer (backed up by one or two colleagues), particularly when compared to the enormous amount of person-hours spent on writing and publishing the voluminous WG reports and SPMs. As mentioned in chapter 3, the IPCC has a budget of several hundred thousand pounds for its communication work, which has not always been spent.

However, there are a number of issues to take into consideration. First, there is a huge spike in activity around the time of the release of reports, but there are considerable periods of down time. This is one of the arguments used in favour of bringing in ad hoc outside help around the release of the reports. Secondly, there are well-known but not well-publicised obstacles to governments voting in favour of significant increases in funding for communication work. Scandinavian governments and other European governments may be strongly in favour, but Gulf States may be strongly opposed.

As mentioned above, a strong case can be made for increasing funding for IPCC staff members dedicated to outreach work, and building an online and social media strategy. More resources can also be earmarked for graphics development, pooling good practice, and developing better metrics.

6. General Reading

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IPCC Working Group Three Summary for Policymakers (IPCC 2014);
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