Summary report on the SBSTA–IPCC special event: Unpacking the new scientific knowledge and key findings in the IPCC Special Report on Global Warming of 1.5 °C

Katowice, Poland, 4 December 2018

Note by the Chairs of the SBSTA and the IPCC

16 May 2019

I. Introduction

A. Background

1. The Conference of the Parties (COP), at its twenty-first session in Paris (December 2015), invited the Intergovernmental Panel on Climate Change (IPCC) to provide a special report in 2018 on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways.[1]

2. The IPCC, in response to the invitation by the COP, produced a special report entitled: *"Global Warming of 1.5 °C, an IPCC special report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty."*

3. The special report was prepared by 91 authors from forty countries, 133 contributing authors and over a thousand one hundred reviewers contributed to the process. The report contains more than 6,000 scientific references and 42,000 review comments were considered.

4. The special report's Summary for Policymakers (SPM) was approved by the IPCC plenary on 8 October 2018 at the closing of its forty-eighth session, held in Incheon, the Republic of Korea.[2]

B. General objective and approach for the special event

5. The special event was organized by Mr. Paul Watkinson, the Chair of the SBSTA, and Mr. Hoesung Lee, the Chair of the IPCC, with the objective of generating a better understanding of the key scientific findings of the report through an open exchange of views between Parties and IPCC experts to unpack the new scientific concepts and definitions used in the special report. It also served as an opportunity to identify research gaps and clarify uncertainties associated with specific findings.

6. In the lead up to the special event, the Chairs of the SBSTA and the IPCC issued an information note[3] which recalled the structure of the special report and that of the SPM, and indicated the further publications under preparation in the coming years in the sixth assessment cycle of the IPCC, which would be ready in time for the first global stocktake under the Paris Agreement in 2023.

7. The agenda of the special event was structured around the four sections of the SPM:

(a) Understanding global warming of 1.5 °C;

(b) Projected climate change, potential impacts and associated risks;

(c) Emission pathways and system transitions consistent with 1.5 °C global warming;

(d) Strengthening the global response in the context of sustainable development and efforts to eradicate poverty.

[1] Decision 1/CP.21, paragraph 21.

[2] Decision IPCC-XLVIII-5, Acceptance of the actions taken at the First Joint Session of Working Groups I, II and III. See also page 7 of the draft report of forty-eight session of the IPCC, at https://www.ipcc.ch/site/assets/uploads/2019/01/050420190534-Doc4REPT.P48.pdf.

[3] Available at https://unfccc.int/sites/default/files/resource/Information%20Note_SBSTA_IPCC%20special%20event.pdf.

II. Summary of proceedings of the special event

8. The special event was held on 4 December 2018 (15:00–18:00 p.m.) at the Plenary Mazowsze, International Conference Centre in Katowice, Poland, and was chaired jointly by the SBSTA and IPCC Chairs.[4] To increase accessibility, the special event was also available by webcast[5].

9. The event was organised as a fact-finding exchange of views between IPCC experts and Parties. The Co-Chairs of the IPCC Working Groups gave presentations that focused on the four sections outlined in paragraph 7 above.

10. The IPCC Co-Chairs of Working Groups I and II presented on "Understanding global warming of 1.5 °C" and "Projected climate change, potential impacts and associated risks". The Co-Chairs of Working Groups II and III presented on "Emission pathways and system transitions consistent with 1.5 °C global warming" and "Strengthening the global response in the context of sustainable development and efforts to eradicate poverty".

11. At the opening, the Chair of the SBSTA, welcomed all the participants to the special event and introduced the panel. He reminded participants on the objective of the special event (see paragraph 6 above). Mr. Watkinson underscored the **importance of science** as vital in helping the world to understand the seriousness, causes and impacts of climate change, and in addressing the uncertainties and gaps in climate change knowledge, which would help the world move forward. He commended the **IPCC** for the critical role it was playing as a **trusted provider of the best available science**. The SBSTA Chair explained that the discussion would be organized in two rounds, with a first opportunity for discussion following a first group of presentations (Understanding global warming of 1.5 °C and Projected climate change, potential impacts and associated risks), and again following a second group of presentations (Emission pathways and system transitions consistent with 1.5 °C global warming and Strengthening the global response in the context of sustainable development and efforts to eradicate poverty).

12. A trailer on the special report, entitled "What Matters" was presented.[6] The video was tied to the four concepts of the SPM and reflected the three general guiding questions of the 2018 Talanoa Dialogue:

(a) Limiting warming to 1.5 °C is not geophysically impossible – where are we now?

(b) Climate change is affecting the whole world – what difference does 1.5 °C make?

(c) Transformative system change in all sectors is required – how do we get there?

(d) Ethical and fair transitions can achieve sustainable development and poverty eradication –where do we want to go?

13. The video highlighted that limiting global warming to 1.5 °C required political will to accelerate transition and ended with the message: *Every action matters, Every bit of warming matters, Every year matters, Every choice matters*.

14. The IPCC Chair gave an overview of the context of the report, indicating that the report was the result of three years of intensive work in response to the invitation Parties extended to the IPCC in Paris, France, in 2015. Mr. Lee explained that the report:

(a) Contained information about what science knew about the **impacts of global warming of 1.5 ºC**; the **emissions pathways** required; and the **differences in terms of both action and impacts between warming of 1.5 ºC and 2 ºC or higher**, framed in the context of **sustainable development and eradication of poverty**;

(b) Introduced the concept of **climate resilient development pathways**, which were the trajectories that strengthened sustainable development and therefore, eradicated poverty, while addressing the threat of climate change through ambitious mitigation and adaptation;

(c) Considered **fair and equitable transitions**, paying specific attention to those most vulnerable to climate risks and most exposed to climate policies;

(d) Addressed the phenomena of **temperature overshoot**, where temperature temporally exceeds a specified level of global warming, **creating the need for CO_2 removal**.

[4] Available at https://unfccc.int/event/sbsta-ipcc-special-event-unpacking-the-new-scientific-knowledge-and-key-findings-in-the-ipcc-special.

[5] The webcast can be viewed at https://unfccc-cop24.streamworld.de/webcast/sbsta-ipcc-special-event-unpacking-the-new-scienti.

[6] Available at https://www.youtube.com/watch?v=rVjp3TO_juI.

15. On the topic of **CO_2 removal technologies**, Mr. Lee noted that they might also be used to balance continuing emissions to achieve net zero greenhouse gas emissions, which was necessary to stay within a carbon budget. He stated that some of these technologies could have implications for food security, ecosystems and biodiversity and concluded that while the use of some CO_2 removal technologies might be unavoidable, the safer and faster emissions are reduced, the less we would need to rely on CO_2 removal.

16. The IPCC Chair outlined the key findings of the report as follows:

(a) Climate change is **already affecting** people, ecosystems and livelihoods all around the world;

(b) Limiting warming to 1.5 °C **is not impossible** but would require unprecedented transformation in all aspects of society;

(c) There are **clear benefits** to keeping warming to 1.5 °C rather than 2 °C or higher;

(d) Limiting warming to 1.5 °C could go **hand-in-hand with achieving other global goals**.

17. As a summary, the IPCC Chair recalled that *every bit of warming matters, every year matters and every choice matters*. He concluded his opening remarks by noting that this was the first IPCC report to be prepared jointly by all three working groups[7], which demonstrated the cross disciplinary nature of the report and had contributed to strengthening the collaboration between the working groups.

18. Mr. Lee announced that while this special event would focus on highlighting mostly new knowledge from the report, there would be an extensive programme of events at COP 24, including at the IPCC-WMO pavilion, to examine in more detail the chapters of the report. The IPCC Chair also reminded participants that the report was available on the IPCC website.

19. Ms. Patricia Espinosa, the UNFCCC Executive Secretary, **congratulated and thanked the IPCC**, the scientists and all the people involved in the production of the report. She stated that the report would serve as a landmark in advancing collective understanding on critical issues. Ms. Espinosa noted that the report underscored how little time we have left to limit the temperature rise and emphasized the importance of taking immediate action as the consequences of inaction or delayed action will have far-reaching negative impacts to the world. To show the impact the special report and the Paris Agreement were already having beyond the UNFCCC process, the Executive Secretary used the example of an oil and gas company in Norway, Equinor, which had aligned its programmes to the goal of limiting temperature to 1.5 °C.

20. Furthermore, the Executive Secretary underlined the overall **importance of science** as the provider of the foundation that supports the work under the UNFCCC. In her closing remarks, she emphasized that base on the special report, it was still possible to limit global warming at 1.5 °C. She stated that the IPCC has delivered what Parties requested in Paris and it was now the responsibility of Parties to take adequate and timely action. Ms. Espinosa described the special report as a clarion call for urgent action and that it should already help Parties, in Katowice, move forward in at least three important areas:

(a) Finalize the Paris Agreement work programme;

(b) Conclude the preparatory phase of the Talanoa Dialogue and launch its political phase;

(c) Reinforce the high-level global climate action agenda, which underlines that addressing climate change requires multilateral efforts by both Parties and non-Party stakeholders.

III. Summary of the discussion

A. Presentations by experts to unpack the new scientific knowledge and key findings

1. Understanding global warming of 1.5 °C

21. Mr. Panmao Zhai, the Co-Chair of WG I, opened this session with a presentation on understanding global warming of 1.5 °C.

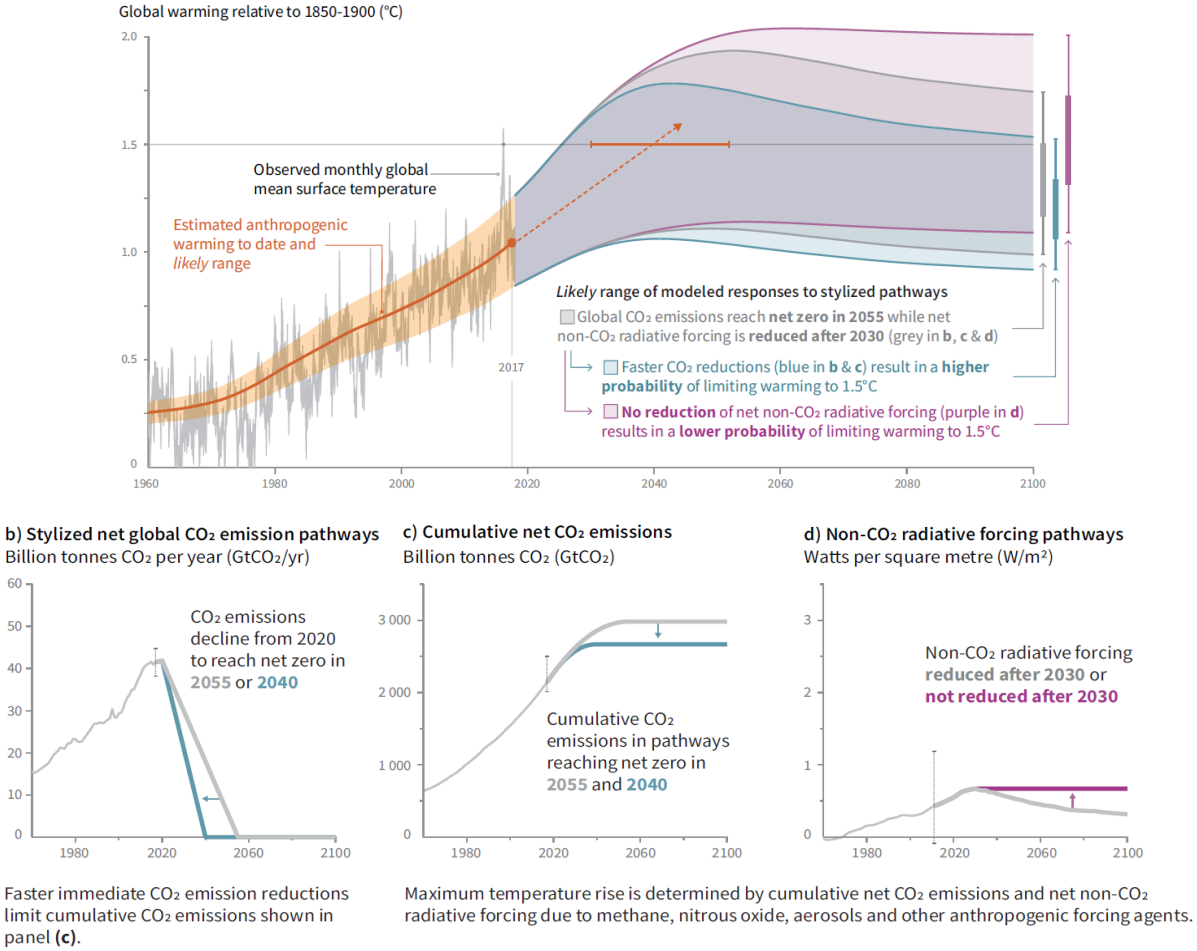
22. He started the presentation by pointing out that human activities have already caused approximately 1 °C (likely range 0.8–1.2 °C) of global warming since preindustrial times (ref. 1850–1900), and impacts have already been observed on ecosystems, people and their livelihood. He underlined that there has been a disproportionately

[7] Working Group I assesses the physical science basis of climate change; Working Group II addresses impacts, adaptation and vulnerability; and Working Group III deals with the mitigation of climate change.

higher impact for the poor and the vulnerable and at the current pace of 0.2 °C per decade of global warming, 1.5 °C will be reached between 2030 and 2052.

23. Noting that there was still a window of action to limit warming to 1.5 °C, as past emissions alone were unlikely to cause warming of 1.5 °C, he highlighted that limiting global warming to 1.5 °C required both a net-zero CO_2 emission and a decline in non-CO_2 emissions, such as methane, nitrous oxide and aerosols. He emphasised that the earlier we act, the higher the probability to stabilise global warming.

Figure 1
Observed global temperature change and modelled responses to stylized anthropogenic emission and forcing pathways



Source: IPCC, 2018: Summary for Policymakers, IPCC Special Report on Global warming of 1.5 °C, figure 1. a. (GMST, grey line up to 2017, from the HadCRUT4, GISTEMP, Cowtan–Way, and NOAA datasets).

24. With regards to **regional patterns** of today's warming, Mr. Zhai indicated that most **land areas and the Artic were warming faster** than the global average, with warming stronger than in the ocean and that since the decade of 2006–2015, 20–40% of global population had already experienced a warming of 1.5 °C in at least one season.

2. Projected climate change, potential impacts and associated risks

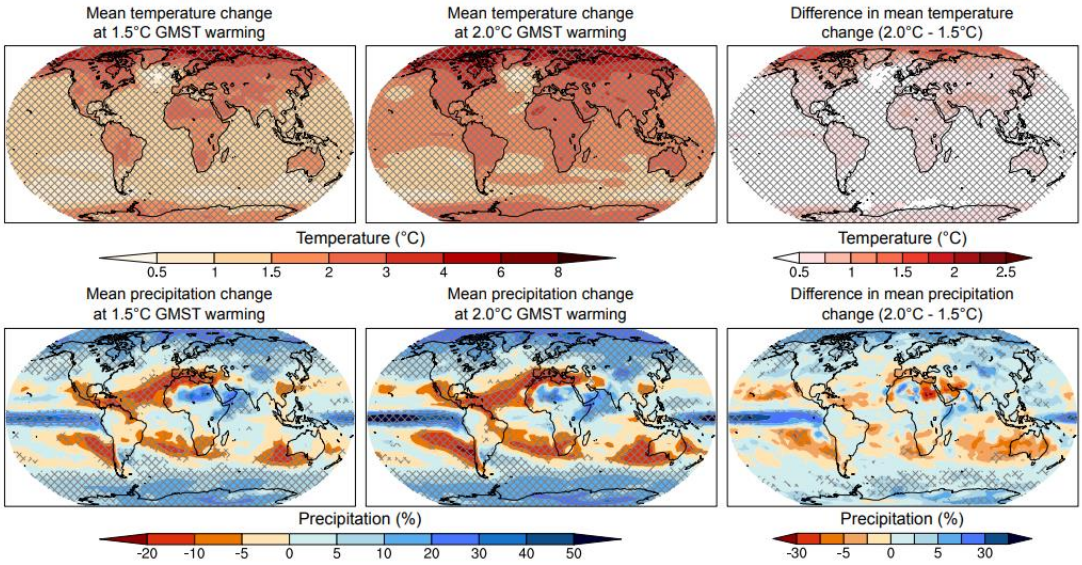
25. Ms. Valérie Masson-Delmotte, the Co-Chair of WG I, showcased the results of climate models illustrating the spatial patterns of changes in mean temperature and precipitation between warming of 1.5 and 2 °C (see figure 2 below), which projected:

(a) Robust differences in mean temperature over land and in ocean between pre-industrial, present day and global warming of 1.5 °C and between warming of 1.5 and 2 °C;

(b) More variations across the regions in terms of precipitation. She described the increased precipitation linked with warming in cold regions and the decrease in precipitation due to changes in atmospheric circulation in areas of Mediterranean climates, with major implications for drought and water stress;

(c) Significant differences in mean climate conditions for each half a degree of additional warming above present-day.

Figure 2
Spatial patterns of changes in mean temperature and precipitation



Source: IPCC, 2018: The Summary for Policymakers of the IPCC Special Report on Global Warming of 1.5°C (SPM Figure 3.3). Projected changes in mean temperature (top) and mean precipitation (bottom) at 1.5°C (left) and 2°C (middle) of global warming compared to the pre-industrial period (1861–1880), and the difference between 1.5°C and 2°C of global warming (right).

26. Ms. Masson-Delmotte further indicated that projected changes were even greater for extreme events. She outlined that for each half a degree of warming:

(a) The **number of hot days** was projected to increase over land and oceans, with the highest increase expected in the tropics for each additional half a degree of global warming. The temperatures during extreme hot days tended to increase by around 3 °C and 4 °C for global warming of 2 °C. The increase was even larger for temperature of **extreme cold nights**.

(b) **Extreme precipitation** was also projected to increase in several Northern hemisphere, high latitude and high elevation regions, Eastern Asia and Eastern North America for each additional half a degree of global warming, as a warmer atmosphere can hold more moisture. Extreme precipitation was also projected to increase between 1.5 and 2 °C, leading to an increase in the intensity of tropical cyclones;

(c) The risks from **drought and precipitation deficits** also increased between global warming of 1.5 and 2 °C in some regions.

27. The Co-Chair of WG I concluded that there were thus **clear differences in mean climate and extremes between a 1.5 and a 2 °C** warmer world. The projected changes in slow onset and fast onset hazards had been combined in the assessment with exposure and vulnerability to assess changes in climate related risks in a 1.5 versus a 2 °C warmer world. The **special report identified the emergence and onset of regional hot spots of climate change**.

28. Ms. Masson-Delmotte presented a few examples of emerging regional climate change hot spots and the difference with each additional half a degree of warming,[8] which included that:

(a) **Arctic land regions** were exposed to the **largest increases in temperature**, especially for cold extremes, with projected shifts of biomes in Tundra regions, degradation of permafrost and increased mortality of Boreal forest, with each additional half a degree of warming;

(b) **Alpine regions** were projected to experience **severe biome shifts** with each additional half degree of global warming;

(c) **Mediterranean region** was assessed to be a hot spot for increase in **extreme drought and increased water stress**, even at 1.5 °C of global warming;

[8] The difference in global sea level rise between 1.5 and 2 °C is addressed in paragraph 37 below.

(d) In the **tropics**, the increased intensity, frequency, and duration of **hot extremes** was projected to **increase** heat **stress for livestock** and cause **reductions in crop yields and rainforest biomass**;

(e) For **South East Asia**, each additional half a degree of global warming was projected to **increase coastal flooding** risk, as well as **heavy precipitation intensity**. **Crop yields** were projected to be **strongly reduced** for warming between 1.5 and 2 °C and Asian monsoon changes were more uncertain for 1.5 to 2 °C of warming;

(f) In **West Africa** and the **Sahel region**, each half a degree of global warming was projected to strengthen **hot extremes and heat waves**, leading to **reduce suitable areas for maize and sorghum** production and increased undernutrition risk. West African monsoon changes were more uncertain for 1.5 to 2 °C of warming;

(g) In **Southern Africa**, each half a degree of global warming implied further **reductions in water availability** and **increases in hot extremes**, with high risks for associated mortality and undernutrition for communities reliant on dryland agriculture and livestock;

(h) For **Small islands**, **hot spots** of climate change, due to increased risk of **inundation**, **coastal flooding**, **fresh water stress**, number of **warm days and** persistent **heat stress**, which increased between today and global warming of 1.5 °C and further between 1.5 and 2 °C. They were exposed to the consequences of severe degradation of coral reefs, which may concern more than 70% of reefs at 1.5 °C, and most of them at 2 °C or more due to more intense and more frequent marine heat waves.

29. Mr. Hans-Otto Pörtner, Co-Chair of WG II, continued the presentation focusing on projected climate change impacts and associated risks and risk assessment, building on the notion that impacts are guiding ambition and choices in mitigation and adaptation.

30. Mr. Pörtner addressed the question: "where do we want to go?", in relation to the impacts of global warming at 1.5 °C compared to 2 °C and concluded that:

(a) There are **less impacts from extreme weather, where people live, for 1.5 than for 2 °C**. This translates to 10 million fewer people being exposed to the risk of rising seas, as well as coastal ecosystems. Over time between 2050, 2100 and 2300 the overall population exposed to sea level rise is increasing. The estimates for the year 2300 are showing to what extent there were less people affected by flooding at 1.5 °C compared to 2 °C;

(b) There is **lower impact on biodiversity and species at 1.5 °C compared to 2 °C** at the regional level and a smaller reduction in yields of maize, rice and wheat crop. For terrestrial biodiversity, of the 105,000 species studied, 6% of insects, 8% of plants and 4% of vertebrates are projected to lose over half of their climatically determined geographic range for global warming of 1.5 °C, half of the respective numbers at 2 °C. Looking at the ecosystem level, we can say that approximately 4% of the global land area are projected to undergo transformation of ecosystems, from one type to another at 1 °C of global warming compared with 13% at 2 °C.[9] This indicated that the area at risk is projected to be approximately 50% lower at 1.5 compared to 2 °C.

(c) At 1.5 compared to 2 °C, there is an expected reduction in the number of people both **exposed to climate-related risks** and **susceptible to poverty** by up to **several hundred million by 2050**. There is a **lower risk to fisheries** and livelihoods that depend on them at 1.5 compared to 2 °C;

(d) There was a **disproportionately higher risk for Arctic**, **dryland regions**, **small island developing States** and **least developed countries** already at 1.5 °C, but even more so at 2 °C. At 1.5 °C, there was a lower risk for human health, livelihoods, food security, water supply, human security and economic growth. A wide range of adaptation options are available and can reduce and be exploited to reduce climate risks and the adaptation needs are certainly less at 1.5 °C.

31. With regards to the risk assessments, Mr. Pörtner presented five **Reasons for Concern (RFCs)** and the impacts and risks associated with them (see figure 3.a below). He noted that some of the risk thresholds have been tightened from the 5th Assessment Report. He provided examples of when the risk transition happens for various systems:

(a) RFC1 and RFC 4 both had a biodiversity component. For RFC1, unique and threatened systems, in the case of Arctic sea ice ecosystem and coral reefs we already have impacts attributable to climate change at current global warming and the risk transition from moderate to high starts well below 1.5 °C (figure

[9] Consistent with earlier studies, illustrative numbers were adopted from one recent meta-study.

3.b). For RFC4, global aggregate impacts, the risk transition from moderate to high starts at somewhat higher temperatures (figure 3.a).

(b) For RFC2, the extreme weather events, the impacts on humans had already started in the present era. The risk transition from moderate to high would occur slightly below 1.5 °C.

(c) For RFC5, large-scale singular events, which for example encompass the degradation of the ice sheets and their consequences for sea level rise, we see the risk transition extending across quite a range of temperatures, indicating some degree of uncertainty in our current knowledge. Nevertheless, the risk transition becomes visible between 1.5 °C and 2 °C.

Figure 3.a
Impacts and risks associated with the Reasons for Concern (RFCs)

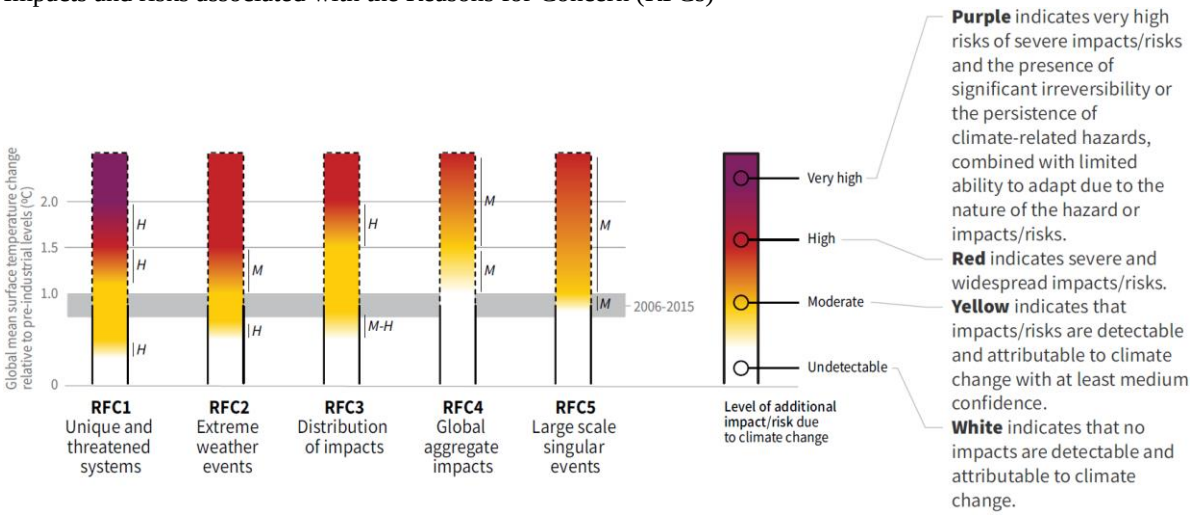
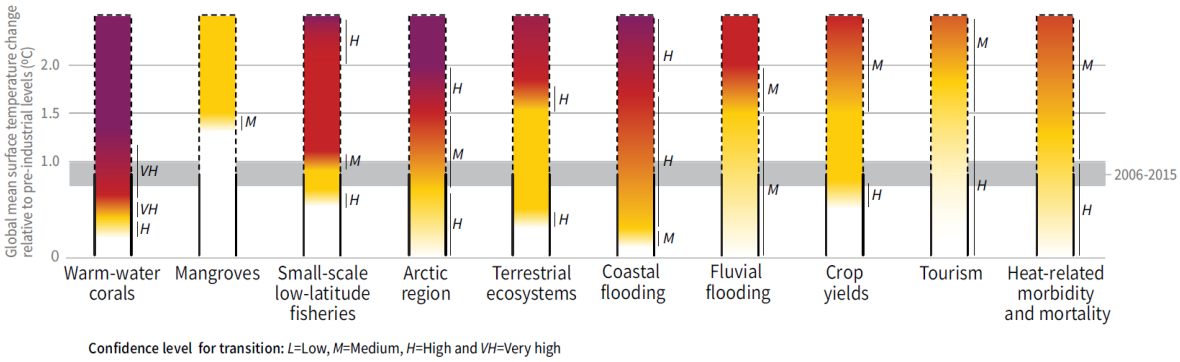


Figure 3.b
Impacts and risks for selected natural, managed and human systems



Source: IPCC, 2018: The Summary for Policymakers of the IPCC Special Report on Global Warming of 1.5°C (SPM Figure 2). The risk assessments are presented as "Burning ember diagrams", which illustrate the implications of global warming for people, economies and ecosystems at different levels in an integrated way (figure 3.a) and for individual sectors (SPM figure 3.b). Note that some of the risk thresholds in (a) have come down to lower temperatures since AR5.

32. The Co-Chair of WG II then proceeded to discussing **risk assessments for selected sectors** stating that some were already in the high-risk range and the transition to very high risk for several others is happening around 1.5 °C (see figure 3.b above). Several examples were identified:

(a) Warm water corals are already in the high-risk area, with the transition to very high risk happening below 1.5 °C;

(b) For both the small-scale low latitude fisheries and the Arctic region, the risk transition started below 1.5 °C;

(c) Heat-related morbidity and mortality of humans has already started in some places and risk would increase to high levels between 1.5 and 2 °C.

33. Mr. Pörtner noted that there was **overall less loss and damage at 1.5 °C compared to 2 °C** and that the risk transitions needed to be considered. He provided some details on:

(a) Warm water coral reefs, which are under various pressures and moving from healthy coral reefs to bleached when exposed to high temperatures and may not recover if the heatwave last too long, turning the system into a completely different one with corals vanished and the reef structure overgrown by algae. He emphasised that even if the warming was limited to 1.5 °C, there is a high risk of losing 70 to 90% of the coral reefs and their services to humankind, such as coastal protection and maintaining biodiversity for fisheries;

(b) the impact of unabated climate change on marine biodiversity, which would be exacerbated and could result in mimicking of situations, such as the mass extinctions during earth history, when biodiversity was largely diminished especially at tropical latitudes;

(c) Ice-free Arctic, which according to projections, would occur once in 100 years at 1.5 °C compared to once in 10 years at 2 °C.

34. Mr. Pörtner highlighted that ambitious emissions reductions would: have co-benefits for human health; reduce the need to use bioenergy with carbon capture and storage (BECCS) and thereby reduce the competition for land; improve food security for humankind; allow and give room for ecosystem restoration and carbon storage in soil and biomass; and support biodiversity conservation.

35. He concluded by underlining that for minimising impacts and associated risks, *"every bit of warming matters, each year matters and each choice matters"*.

3. Summary of discussions on understanding global warming of 1.5 °C and projected climate change, potential impacts and associated risks

36. Responding to a question about the difference in the **impacts on food production for limiting global warming at 1.5 °C compared to 2 °C**, Mr. Pörtner said that:

(a) Regional impacts on food production, such as on crops and livestock, are different and both extreme temperatures and water shortages synergistically have an impact, a conclusion supported by a system's understanding;

(b) The impact of a heatwave reaching where the upper thermal threshold of an organism will be exacerbated if combined with water shortages,;

(c) Extreme precipitation would also contribute to such damage and there was a clear progressive exacerbation between 1.5 °C and 2 °C;

(d) For livestock, like for humans, heat fatigue would set in before mortality kicks in.

37. Several participants raised questions on **sea level rise**, noting that impacts of sea level rise, would continue beyond 2100 even if the global warming was limited to 1.5 °C or well below 2 °C. Ms. Masson-Delmotte explained that sea level rise was caused by increase in ocean temperatures and the melting of the glaciers and ice sheets. She repeated that even at 1.5 °C, there would be approximately 100 million people exposed to sea level risks and that based on assessments made with the limited existing literature, limiting warming to 1.5 °C compared to 2 °C could **avoid approximately 10 cm of sea level rise by 2100** and avoid exposure of 10 million people.

38. A participant, citing an unexpected heatwave that, although we were still at 1 °C global warming, struck Ottawa, Canada in 2018 and resulted in deaths, asked how the IPCC had **improved predictions and how accurate they were**. Mr. Zhai explained that although we know that global warming was closely linked to the increase in heatwave, there was still lack of knowledge on attributing a single extreme event to climate change. However, rapid progress was being made and **AR6 would contain an assessment on how much human activity contributes to these events**.

39. A participant sought clarification **why the transition to high or very high risks for four out of the five RFCs was revised since AR5** and asked about the rate of increase of the risk factors. Mr. Pörtner explained that tightening the thresholds means that the impacts were now projected to occur at lower temperature. He noted that the risk assessment was done through expert judgement by a group rather than using a mathematical function. Hence it was difficult to say whether the rate of increase of the risk factors was linear or exponential.

40. Responding to a question concerning the **risk of permafrost thawing** and the release of greenhouse gases, Ms. Masson-Delmotte reminded participants that the report contained an assessment based on existing literature. Potential additional carbon release from future permafrost thawing and methane release from wetlands would reduce the remaining carbon budgets by up to 100 $GtCO_2$ over the course of this century and more thereafter (medium confidence). However, this was identified as a main source of uncertainty with significant implications for mitigation efforts compatible with limiting warming to 1.5 or 2 °C.

4. Emission pathways and system transitions consistent with 1.5 °C global warming

41. Mr. Jim Skea, the Co-Chair of WG III, opened the second round of presentations focusing on emission pathways and system transitions consistent with 1.5 °C global warming. On mitigation efforts (where are we now?), he indicated that the current nationally determined contributions (NDCs) submitted by Parties under the Paris Agreement would lead to global greenhouse gas emissions of 52 to 58 Gt CO_2eq/yr in 2030 and we would not be able to limit the global warming to 1.5 °C, even if these NDCs will be supplemented by very significant increases in the scale and ambition of emission reductions after 2030.

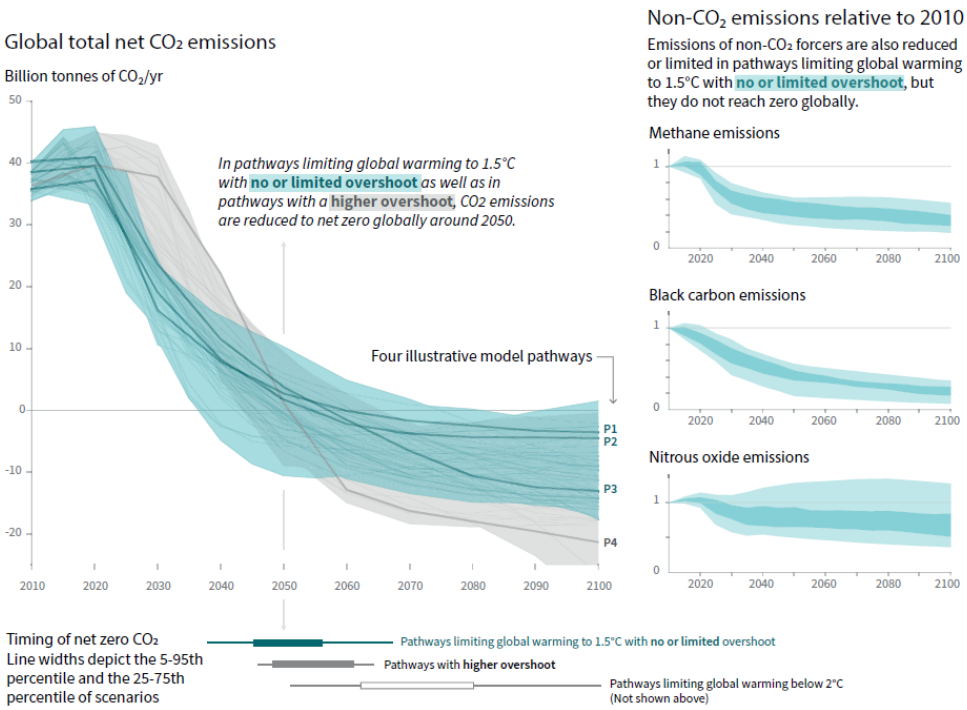
42. Mr. Skea illustrated the characteristics of model pathways compatible with 1.5 °C, focussing on emissions of CO_2 and three other non-CO_2 greenhouse gases (see figure 4). He introduced the concept of overshoot distinguishing as to whether and by what extent the pathways exceeded 1.5 °C warming at some point in the 21st century, before returning to 1.5 °C warming by 2100:

(a) No overshoot pathways – pathways that do not exceed 1.5 °C warming at any point in the 21st century;

(b) Limited overshoot pathways – pathways that exceed 1.5 °C by no more than 0.1 °C;

(c) Higher overshoot pathways – pathways that exceed 1.5 °C by more than 0.1 °C.

Figure 4
Global emissions pathway characteristics



Source: IPCC, 2018: The Summary for Policymakers of the IPCC Special Report on Global Warming of 1.5°C (SPM figure 3a). The main panel shows global net anthropogenic CO_2 emissions in pathways limiting global warming to 1.5°C with no or limited (less than 0.1°C) overshoot and pathways with higher overshoot, with the shaded area showing the full range of pathways analysed. The panels on the right show non-CO_2 emissions ranges, with shaded areas showing the 5–95% (light shading) and interquartile (dark shading) ranges of pathways limiting global warming to 1.5°C with no or limited overshoot. Box and whiskers at the bottom of the figure show the timing of pathways reaching global net zero CO_2 emissions.

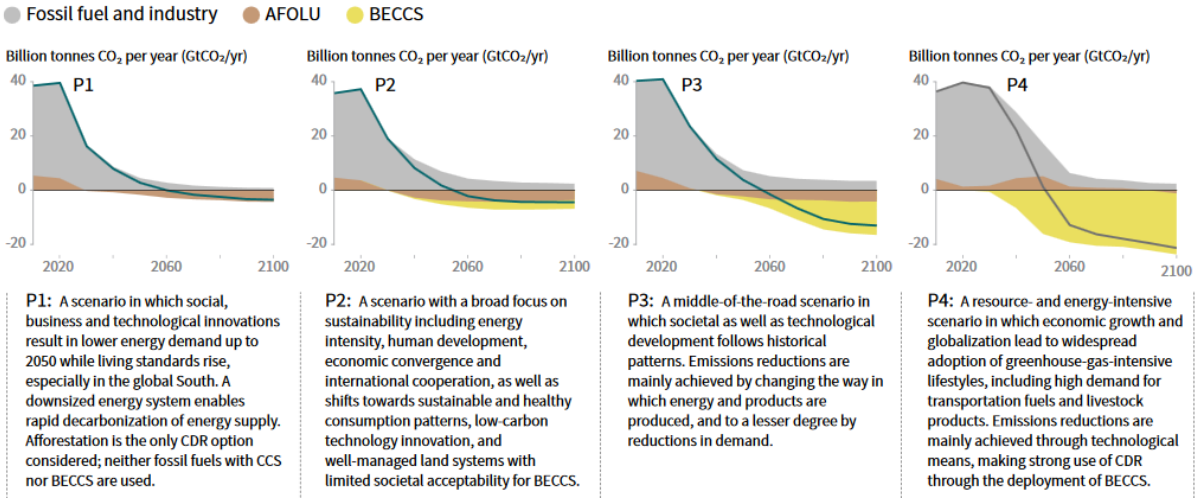
43. Mr. Skea explained that in model pathways with "no" or "limited" overshoot, the CO_2 emissions need to decline by approximately **45% by 2030 from a 2010 baseline** and reached net zero by around mid-century, which required almost immediate action. He added that the emission reductions were delayed in a higher overshoot pathway but must be compensated by higher levels of CO_2 removal in the second half of the 21st century.

44. For **non-CO_2 emissions**, which include methane, black carbon and nitrous oxide, Mr. Skea pointed out the need for these to fall during the 21st century, but not to zero. He further elaborated on this point by providing an example that relative to 2010, the emissions of methane and black carbon would need to decline by 35% or more by 2050.

45. Mr. Skea then presented four illustrative model pathways based on different socioeconomic and technological development assumptions, showing the uses of three different types of sources and sinks: emissions

from fossil fuel and industry; sources or sinks from AFOLU; and sinks associated with BECCS. He emphasised that for all pathways, the net CO_2 emissions reached net zero at approximately mid-century, but each involved different portfolios of mitigation measures, including different balances between lowering energy and resource intensity, rates of decarbonisation and reliance on CO_2 removals (figures 5 and 6).

Figure 5
Breakdown of contributions to global net CO2 emissions in four illustrative model pathways



Source: IPCC, 2018: The Summary for Policymakers of the IPCC Special Report on Global Warming of 1.5°C (SPM figure 3b). This figure illustrates a range of potential mitigation approaches to limit global warming to 1.5°C with no or limited overshoot, with different assumptions of future socio-economic developments, and projected energy and land use. Note that the AFOLU estimates do not necessarily compare to countries' estimates.

46. Mr. Skea explained that although it is feasible in a geophysical and technological sense to limit global warming to 1.5 °C, there were still economic issues and the question of societal and political will. With regards to the economic issue, he indicated that there would be stranded assets in deep emission reduction pathways and policymakers would need to decide whether that would be appropriate.

47. Mr. Skea pointed out that the four illustrative pathways used different ways to achieve limiting warming. For example, P1 and P2 used early action while in P3 and P4 emissions reduction was delayed. He also noted that the policymakers should consider that P3 exceeded the sustainable bioenergy potential by a factor of two by the year 2100 and by a factor of four in P4 via the use of bioenergy and BECCS. In addition to levels of CO_2 removal, other indicators associated with the four pathways were: GHG emissions and temperature; energy including final energy demand (renewables share in electricity, primary energy from coal, gas, nuclear, biomass and non-biomass renewables); carbon capture and storage; and agriculture, including land areas for bio-energy crops (figure 6).

48. With regard to the transformation needed, he emphasised **that rapid, far-reaching and unprecedented changes are required in all systems**: renewables supply between 70 to 85% of electricity by 2050; coal use declined steeply and was effectively zero in the electricity sector by 2050; oil and gas may persist longer and gas use even rose in some pathways by 2050; there are deep emission cuts in transport and buildings; there were transitions in global and regional land use patterns in all pathways, but their scale depends on the mitigation portfolio; and urban and infrastructure system transitions implied changes in land and urban planning practices.

49. Mr. Skea emphasised that all pathways that limit global warming to 1.5 °C with **no or limited overshoot use CO_2 removal**, which were **not synonymous with BECCS**. The longer and larger the overshoot, the greater would be the reliance on CO_2 removal. While BECCS features in most scenarios, it is avoided in a few. Large-scale CO_2 removal could have significant impacts on land, food and water security, ecosystems and biodiversity. On the other hand, some AFOLU-related CO_2 removal measures, which are not captured in all the models, such as restoration of natural ecosystems and soil carbon sequestration could improve biodiversity, soil quality, and local food security.

50. In terms of **energy investments** and emission pathways: energy investments were 1.8% over the period 2015–2035 in assessed baseline scenarios, which rose to 2.1% in 2 °C pathways and 2.2 % in 1.5 °C pathways. Energy investments rose by 0.36% of global GDP compared to the baseline in 1.5 °C pathways; and the annual investments in low carbon energy and energy efficiency would roughly double in the next 20 years, whilst the annual investments in fossil fuel extraction and conversion would decrease by about a quarter in the next 20 years. He also highlighted that all the cost data does not include the avoided costs of limited warming on the impacts and adaptation side.

Figure 6
Global indicators associated with the four illustrative model pathways

Global indicators	P1	P2	P3	P4	Interquartile range
Pathway classification	No or limited overshoot	No or limited overshoot	No or limited overshoot	Higher overshoot	No or limited overshoot
CO_2 emission change in 2030 (% rel to 2010)	-58	-47	-41	4	(-58,-40)
↳ in 2050 (% rel to 2010)	-93	-95	-91	-97	(-107,-94)
Kyoto-GHG emissions* in 2030 (% rel to 2010)	-50	-49	-35	-2	(-51,-39)
↳ in 2050 (% rel to 2010)	-82	-89	-78	-80	(-93,-81)
Final energy demand** in 2030 (% rel to 2010)	-15	-5	17	39	(-12,7)
↳ in 2050 (% rel to 2010)	-32	2	21	44	(-11,22)
Renewable share in electricity in 2030 (%)	60	58	48	25	(47,65)
↳ in 2050 (%)	77	81	63	70	(69,86)
Primary energy from coal in 2030 (% rel to 2010)	-78	-61	-75	-59	(-78, -59)
↳ in 2050 (% rel to 2010)	-97	-77	-73	-97	(-95, -74)
from oil in 2030 (% rel to 2010)	-37	-13	-3	86	(-34,3)
↳ in 2050 (% rel to 2010)	-87	-50	-81	-32	(-78,-31)
from gas in 2030 (% rel to 2010)	-25	-20	33	37	(-26,21)
↳ in 2050 (% rel to 2010)	-74	-53	21	-48	(-56,6)
from nuclear in 2030 (% rel to 2010)	59	83	98	106	(44,102)
↳ in 2050 (% rel to 2010)	150	98	501	468	(91,190)
from biomass in 2030 (% rel to 2010)	-11	0	36	-1	(29,80)
↳ in 2050 (% rel to 2010)	-16	49	121	418	(123,261)
from non-biomass renewables in 2030 (% rel to 2010)	430	470	315	110	(245,436)
↳ in 2050 (% rel to 2010)	833	1327	878	1137	(576,1299)
Cumulative CCS until 2100 ($GtCO_2$)	0	348	687	1218	(550,1017)
↳ of which BECCS ($GtCO_2$)	0	151	414	1191	(364,662)
Land area of bioenergy crops in 2050 (million km^2)	0.2	0.9	2.8	7.2	(1.5,3.2)
Agricultural CH_4 emissions in 2030 (% rel to 2010)	-24	-48	1	14	(-30,-11)
in 2050 (% rel to 2010)	-33	-69	-23	2	(-47,-24)
Agricultural N_2O emissions in 2030 (% rel to 2010)	5	-26	15	3	(-21,3)
in 2050 (% rel to 2010)	6	-26	0	39	(-26,1)

NOTE: Indicators have been selected to show global trends identified by the Chapter 2 assessment. National and sectoral characteristics can differ substantially from the global trends shown above.

* Kyoto-gas emissions are based on IPCC Second Assessment Report GWP-100
** Changes in energy demand are associated with improvements in energy efficiency and behaviour change

Source: IPCC, 2018: The Summary for Policymakers of the IPCC Special Report on Global Warming of 1.5°C (SPM figure 3b). A wide range of global indicators are identified, which further describes the characteristics of each illustrative model pathway.

51. Mr. Skea concluded by inviting the participants to visit a public website[10], which represented a cooperative effort between the Integrated Assessment Modelling Consortium and the International Institute for Applied Systems Analysis and contained the detailed indicators for every scenario assessed in the SR1.5.

5. Strengthening the global response in the context of sustainable development and efforts to eradicate poverty

52. Ms. Debra Roberts, the Co-Chair of WG II, focused her presentation on strengthening the global response in the context of sustainable development and efforts to eradicate poverty. She described the links between impacts of climate change, sustainable development (SD) and sustainable development goals (SDGs) and the ability to balance three important pillars of policy consideration: social well-being, economic prosperity and environmental protection. She stated that **SD supported and enabled the systematic transitions and transformations required** and that the UN SDGs framework, including poverty eradication, reducing inequalities and climate action, can be used as a tool to assess progress.

53. Ms. Roberts emphasised that both **adaptation and mitigation pathways had different benefits and trade-offs with SD** and that the avoided impacts and benefits for SD, eradicated poverty and inequality were greater at 1.5 °C, as compared to 2 °C. She added that avoided impacts can be maximised by maximising the synergies and minimizing the trade-offs between adaptation and mitigation.

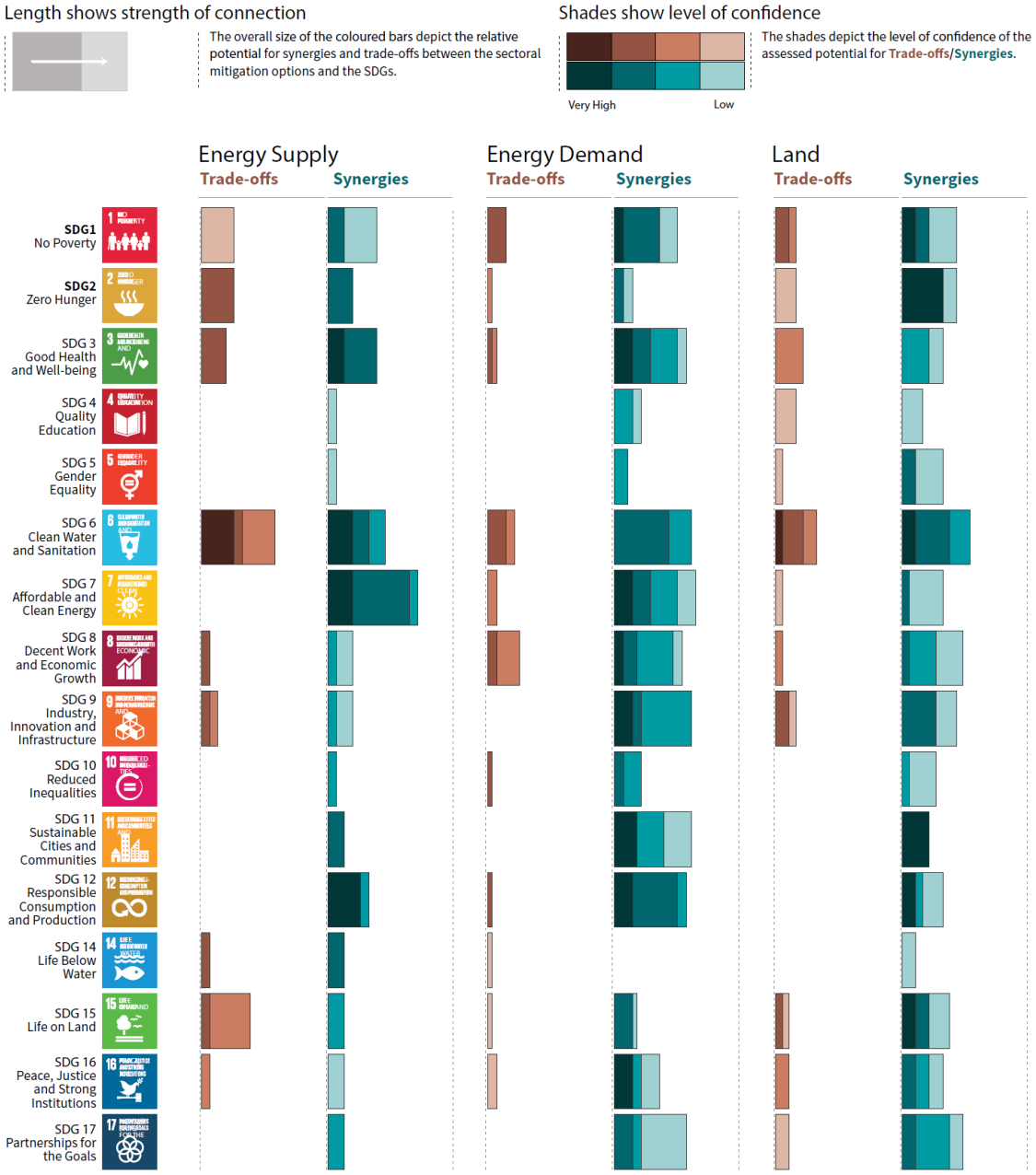
54. In the context of **adaptation**, she pointed out that the **synergies from adapting to 1.5 °C could reduce the vulnerability** of human and natural systems, including food, water, disaster risks, health, poverty, inequality and ecosystem services **but trade-offs would rise if interventions are poorly designed and implemented**. For example, intensifying agriculture and expanding urban infrastructure to adapt to the impacts of climate change could increase greenhouse gas emissions, water use, social and gender inequality, and undermine health and natural systems. Ms. Roberts emphasised the fact that the **adaptation options that also mitigated emissions could create both synergies and cost-savings**. Our responses to climate change must be considered with broader development

[10] Available at https://data.ene.iiasa.ac.at/iamc-1.5c-explorer/#/login?redirect=%2Fworkspaces.

needs, as increasing investment in physical and social infrastructure was a key enabling condition to increase societal resilience and adaptive capacity.

55. She stated that there was no one-size-fits-all **mitigation** action portfolio, presenting that there are potentially strong synergies between mitigation and certain SDGs, for example those related to cities, energy, sustainable consumption and production, whilst there were potential for trade-offs in areas, such as poverty reduction and water and sanitation (figure 7).

Figure 7
Mitigation synergies and trade-offs with the SDGs



Source: IPCC, 2018: Summary for Policymakers. In: Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty (SPM figure 4). This figure illustrates the synergies and trade-offs between climate change mitigation options of different sectoral portfolio and the SDGs.

56. Focusing on **mitigation**, Ms. Roberts indicated that there were **more synergies than trade-offs with the SDGs**, but the net-effect depends on the pace, magnitude, portfolio and management of the mitigation action. She highlighted that most synergies would come from pathways with **low energy demand**, **low material consumption** and **low-emission diets** and added that the mitigation response options relevant to economies that are highly dependent on fossil fuels could create risks for SD, which underscores the need for more diversified economies and energy sectors. She also mentioned that the **trade-offs for a range of SDGs could be resolved through**

redistribution policies focused on protecting the poor and the vulnerable and that the investment needs for such complementary policies were only **a small fraction of the overall mitigation investments** required for 1.5 °C pathways.

57. Ms. Roberts moved on to talk about **enabling conditions**, which would enhance the feasibility of options consistent with limiting global warming to 1.5 °C, including **strengthened multi-level governance and institutions**; **strengthened policy tools**; **technological innovation**; **changes in lifestyle and behaviour**; and **transfer and mobilization of finance**.

58. The WG II Co-Chair also underlined the importance of **evolution of financial systems**, focusing on the need to consider **realignment of savings and expenditure to low emission and climate resilient infrastructure and services** in our portfolio of options, which would be enabled by a redirection of funding from annual capital revenues on the order of potentially 5 to 10%. This could be achieved through change of incentives; mainstreaming climate finance within financial and banking systems regulations; low-risk, low interest financing for developing countries; and new public-private partnerships to de-risk climate friendly investments and support small-scale enterprises and households.

59. Presenting on the need for **multi-level action** for ambitious action supported by national and sub-national authorities, civil society, private sector, indigenous people and local communities, Ms. Roberts noted the importance of the **mix of adaptation and mitigation action that could be implemented in a participatory and integrated manner** in facilitating systems transitions, especially aligning them with existing economic and sustainable development needs. She added that it was not possible to achieve 1.5 °C of global warming without **international cooperation**.

60. Finally, the concept of **climate resilient development pathways** was discussed, which can strengthen SD and efforts to eradicate poverty; achieve ambitious mitigation and adaptation action and underscore the importance of **equity and social justice** as core elements in the key transitions and transformations that were required for a 1.5 °C world.

61. For her final remarks, Ms. Roberts stressed that there was **no safe level of climate change** and that there was **no geophysical reason why it should be impossible to limit global warming to 1.5 °C**, but the response was in the hands of the society, governments and policymakers.

6. Summary of discussions

62. Responding to a question on what the **best emission pathway** and the **recommended technologies** would be, Mr. Skea reminded participants that IPCC could not be policy-prescriptive, and, therefore, could not recommend a certain pathway. Nonetheless, he noted that pathway 2, which was labelled sustainability, had more synergies with the SDGs than pathway 3, and, especially, pathway 4, where there were many trade-offs. With regards to the question on the recommended technologies, Mr. Skea indicated that all of the technologies were required to achieve the ambitious targets and clarified that the question was more about what was needed in the portfolio, which was for the policymakers to decide.

63. With regards to the **limited-overshoot pathway** specifically and the options and the required technological changes involved, Mr. Skea stated that the four different pathways deliberately had different assumptions about the way consumption patterns evolved. He mentioned that the **changes in people's behaviours** would make it easier to stay below 1.5 °C or even better. He added that the difficulty lies in **some sectors and areas** that are **very difficult to decarbonise**, such as aviation, where there may still be levels of emissions even as we went to net zero, giving rise to the **need of CO_2 removals** to compensate for the positive emissions and for the higher levels of emissions in the earlier part of the century.

64. Mr. Skea clarified that we would **need to go below net zero** to have negative emissions and added that the current integrated assessment **models do not necessarily fully cover all CO_2 removal approaches** and that many of the **nature-based solutions** that were not fully reflected in these models **should be considered**. He also highlighted that the key feature of pathway 1 was the ambitious energy efficiency system, which, although involves a rise in demand for energy services, results in substantially lower energy consumption due to energy efficiency investments.

65. One participant noted a new study published last year in the proceedings of the National Academy of Sciences of the United States of America[11], which showed that **nature-based solutions can contribute** up to 37% of the solution needed to meet the 2 °C goal by 2030. Others raised questions on the topic of BECCS and nature-based solutions.

[11] Available at https://www.pnas.org/content/114/44/11645.

66. Responding to a question **why BECCS featured more strongly than nature-based solutions**, Mr. Skea said that most of the integrated assessment models in the SR1.5 had expanded their scope from the energy models and, with the exception of a few, they do not cover nature-based solutions, which was a knowledge gap and a challenge for the future that needs to be considered in the 6th Assessment Report.

67. Regarding **what to expect to see in the future on CO_2 removal**, specifically on the Special Report on Climate Change and Land (SRCCL), Mr. Skea explained that the second draft of the report was being reviewed by Government and expert and that the available models had not necessarily moved on substantially, as the report was written on a rapid timescale. He strongly emphasised that the SRCCL was not driven to the same extent by the integrated assessment models and, therefore, there would be more emphasis on bottom-up scientific insights, rather than the modelling.

68. Regarding a question on the **environmental, economic and societal cost of BECCS**, Mr. Skea explained that the sustainable bioenergy limit lied within the bioenergy itself, which can also be used without carbon capture and storage, rather than BECCS. He notified that the report assessed the required assumptions of the development of crop yields, dietary changes, and the type of land that could be conceived as converting to bioenergy, for example, in sustainable net-zero CO2, converting prime agricultural land from food production into bioenergy crops was avoided. He added that there will be issues regarding food security if prime agricultural land was taken over, and implications for biodiversity and ecosystem services if high degrees of afforestation, perhaps associated with monoculture, took place.

69. A few participants asked about **changes in the energy sector**, including on using fossil fuels such as coal and in limited overshoot pathways. Mr. Skea commented on the fossil fuels issue while sharing some data: fossil fuels would supply approximately two thirds of global primary energy by 2030 but would fall to one third of global primary energy by 2050. Coal would fall to about 10% of global primary energy in 2030, compared to 25% in 2020 and down to 5% in 2050. Oil would stay with a similar share in 2030, compared with 2020, supplying approximately 30% of primary energy demand, but would fall to 15% by 2050. Natural gas was expected to keep the similar share of 25% by 2030, compared to 2020, but would fall to 15% by 2050. He added that further information could be found in the table below figure SPM 3b (figure 6). On limited overshoot pathways, Mr. Skea stated that three main things need to happen in the energy sector: **decarbonisation of electricity**; **greater electrification of energy demand**; and **greater levels of energy efficiency**.

70. One participant focused on **non-CO_2 emissions**, asking whether there would be additional measures to reduce the emission of black carbon and methane in the near-term. In response, Mr. Skea clarified that the changes in the non-CO_2 emissions **were driven by the CO_2 climate policies**, rather than by non-CO_2 climate policies. As an example, he illustrated how moving away from traditional biomass, which was a CO_2 climate policy, could drive the reduction of non-CO_2 emissions. He emphasised that the **non-CO_2 emission reductions in the report were more scenario assumptions**, than they were driven by the cost optimisation within the models. He stated that the assumptions that go into 2 °C scenarios and 1.5 °C scenarios do not differ greatly.

B. Summary of the general discussion and interventions from Parties

71. A total of 22 Parties and 6 Observers posed questions and/or provided comments. Overall, participants **expressed their gratitude to the IPCC** for the participation of IPCC experts and the excellent presentations made. In addition to the comments and questions specific to the presentations that were included above, some of the more overarching questions and issues raised follow.

72. A few participants questioned the **feasibility of holding global warming to below 1.5 °C**. Mr. Zhai explained that the feasibility was assessed in six dimensions and added that although current efforts do not yet show the commitment needed to avoid 1.5 °C, there was still a window for action of approximately 22 years. A participant noted that although the report shows limiting warming to 1.5 °C was feasible, **unprecedented transformations** in global energy systems and **enhanced international cooperation** would be needed.

73. Several participants expressed their concern on **uncertainties, knowledge gaps and lack of information** on various findings in the report on topics such as **cryosphere**, **glacier melting**, **impacts of mountain economy and ecosystems**, and the **melting of terrestrial ice**. Ms. Masson-Delmotte acknowledged the limited assessment on various topics, but also informed participants that further assessments will be made in the corresponding chapters on these topics in SROCC and the full report of AR6. Whilst acknowledging **adaptation costs as one of the gaps**, Ms. Masson-Delmotte **referred participants to the knowledge gaps identified at the end of each chapter** and urged the research community to prepare publications to address these gaps in time for the next IPCC assessments.

74. Ms. Masson-Delmotte and Mr. Skea also drew the attention of participants to future IPCC publications, such as the SRCCL, and Special Report on the Oceans and Cryosphere (SROC). Ms. Masson-Delmotte added that

assessment of the knowledge on **climate change beyond 2100, including sea level rise**, and of **new climate projections** with respect to **abrupt change** and potential committed consequences would be done in the main WG I report. She also acknowledged that there was a **limited assessment of observed implications of current warming** and added that there would be more work in the main WG I and II reports, especially building on new developments relating human greenhouse gas emissions and human-induced warming without the attribution of specific events.

75. In terms of **confidence level**, a participant noted that the lower impacts has been quoted with a high degree of confidence and that the values in the reports are different to what the participant's particular region is experiencing. He asked the question of whether the **estimates were too conservative**, and the information being presented was the least expected or "in the middle of the road". In response, Mr. Pörtner stated that confidence levels in the assessment of impacts were high. He clarified that temperature changes on land were usually above those changes in global mean temperature because the global mean temperature comprises ocean surface or atmospheric temperature above the oceans. He also stated that the **global mean temperature** was a common reference point for impacts across the globe. This was **not to deny the diversity in the regional temperature changes and was not changing the severity of the regional impacts**.

76. Responding to a participant asking whether it could be concluded that SDGs would not be met if we go to 2 °C rather than 1.5 °C, Ms. Roberts directed the participants to point D2 in the Summary for Policymakers, which indicated that avoided climate change impacts on sustainable development, eradication of poverty and reducing inequalities, would be greater if we limited global warming to 1.5 °C, as opposed to 2 °C, but there would be potential trade-offs, if the adaptation interventions were poorly designed and implemented.

77. In the context of the sustainable development, several participants sought **clarification on the SDGs** and asked for **examples of climate change strategies with synergies with SDGs**:

(a) With regards to the **synergies and trade-offs between the SDGs and ambitious mitigation** Ms. Roberts noted that although there were more benefits and synergies coming from the ambitious mitigations, **there were still trade-offs**, which must be addressed in the interest of securing justice and equity. Ms. Masson-Delmotte directed the participants to the last chapter of the report, which contained an innovative framing of using the SDGs as a way to assess the synergies and trade-offs between climate change effects and responses to climate change and the various adaptation and mitigation options with respect to the various dimensions of sustainability.

(b) With regards to the **adaptation strategies having synergies with the SDGs**, Ms. Roberts identified **restoration of natural systems** as an important opportunity to create synergy between adaptation and the SDGs. She gave an example of using the restoration of natural systems to limit floods that emerge from extreme precipitation events, which also brings benefits to water security, creating strong synergies with SDG 6; and biodiversity in terms of SDG 14 and 15. Underlining the importance of **considering both adaptation and mitigation**, she mentioned that restoration of natural systems also came with important co-benefits to mitigation, giving rise to strong synergies with SDG 13. In line with this, Ms. Roberts underscored the importance of thinking back to basic development needs, such as the provision of basic social and physical infrastructure, which would not only allow us to adapt to the impacts of climate change, but also create strong synergies with SDG 1 (poverty) and SDG 3 (health).

78. In response to the findings of the special report:

(a) Several participants expressed **concerns on the lack of ambition of the emission reductions** and emphasised the need to strengthen the NDCs and efforts in limiting warming to 1.5 °C. A participant shared a view that all Parties with significant emissions should present by 2020 at the latest, NDCs committing to significant reductions in absolute emissions, in order for the world to stay within the 1.5 °C of change;

(b) One participant noted the launch of the process of long-term strategies and a societal debate informed by the findings of the report and urged other participants to initiate similar process in view of considering the adequacy of efforts;

(c) Another participant underlined the **importance of the best available science** being the basis of all the works and the need for the effort to limit the temperature increase to 1.5 °C;

(d) A group of participants **expressed content with the fact that loss and damage is addressed in the report** and highlighted the importance of limiting warming to 1.5 °C.

79. A few participants proposed to make the special report a SBSTA agenda item and wanted to see the report mentioned in decision 1/CP.24. One participant proposed that the output of the Talanoa dialogue should advocate for future consideration and development of concrete responses to the findings of the report. He also suggested that the report be considered under the SBSTA Research and Systematic Observations agenda item and that finance

should be a topic of the 11th meeting of the Research Dialogue since finance had not been adequately addressed in the report.

80. A participant stated that the important message from the report was the need for higher ambitions of all governments and stakeholders and another Party highlighted that limiting the warming to 1.5 °C could go hand-in-hand with achieving other world goals and could lead to the improvement of economic and social life.

C. Closing remarks

81. In his closing remarks, the SBSTA Chair thanked his IPCC counterpart, and the speakers from the three Working Groups and participants. He indicated how far we have come in understanding what it means to limit warming to 1.5 °C, in terms of pathways and interactions with sustainable development, since preparing for the Paris agreement three years ago, and underlined the cooperation by the participants in helping to achieve that understanding.

82. He reminded participants that the special report gave the international community, Parties and human beings the scientific basis to respond to the threat of climate change. There was a lot that these actors needed to do to understand the messages in the special report.

83. The SBSTA Chair thanked the IPCC for the ongoing work on the special reports on Land and Oceans and the whole AR6 cycle, which would bring much more information into the UNFCCC process and inform the first global stocktake. Mr. Watkinson, concluded his remarks by thanking the IPCC and the scientists for their work on the report and the participants for their contributions to the special event.

84. The IPCC Chair thanked the Parties and observer organisations for their inputs and encouraging remarks. He emphasised that the barriers to limiting warming to 1.5 °C were not in science, but rather, with economic, social, and political aspects.

85. Mr. Hoesung Lee added that unprecedented changes can be anticipated in all aspects of the society. He also highlighted that delayed actions would lead to increased stranded assets and urged participants to carefully think about these impacts.

86. The IPCC Chair then informed the participants that the IPCC Pavilion would be hosting further discussions on the special report and touch upon policy-relevant questions that need to be dealt with in the main IPCC assessments (AR6). He concluded by thanking everyone for their support and participation in the special event.