



## Global Warming of 1.5°C (#SR15)

**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**

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### **Opening remarks : key findings and implications of SR15**

I would like to first highlight the four main messages of this report:

- Climate change is already affecting people, ecosystems and livelihoods all around the world.
- Limiting warming to 1.5°C is not impossible but would require unprecedented transitions in all aspects of society.
- There are clear benefits to keeping warming to 1.5°C compared to 2°C, or higher.
- Limiting global warming to 1.5°C can go hand-in-hand with achieving other world goals, such as achieving sustainable development and eradicating poverty.

*This report is the outcome of the work of 91 lead authors from 40 countries, and the inputs of 133 contributing authors. They have assessed more than 6 000 scientific publications. The successive drafts of the report received more than 42 001 comments from 1131 reviewers.*

### **Where are we now ?**

Since pre-industrial times<sup>3</sup>, human activities have caused approximately 1°C of global warming. We are already seeing the consequences of this warming through for instance rising sea levels and more extreme weather.

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<sup>2</sup> the physical science basis of climate change

<sup>3</sup> approximated in this report using the period 1850 to 1900,

At the current rate of warming of 0.2°C per decade, global mean surface temperature is expected to reach 1.5°C in the climate sense (averaged over 30 years) between around 2030 and 2050.

Although past emissions will continue to cause changes in the climate system, these past emissions alone are unlikely to cause global warming of 1.5°C. Limiting warming to 1.5°C is thus not geophysically impossible.

### **What are the differences between global warming of 1.5°C or 2°C for climate-related risks ?**

Climate models project robust differences in regional climate characteristics between global warming of 1.0°C, 1.5°C and 2°C. These differences include increases in mean temperature on land and in the oceans, including hot extremes, heavy rainfall in several regions, and the probability of drought in some regions.

Sea level rise is projected to continue in the future. Limiting global warming to 1.5°C compared to 2°C would reduce the rate of sea level rise by around 10 cm by 2100, and around 10 million fewer people would be exposed to coastal submersion and other consequences.

Limiting warming at 1.5°C compared to 2°C would reduce the transformation and degradation of marine and terrestrial ecosystems and the risk of irreversible loss of biodiversity. It would imply smaller reductions in yields of maize, rice, wheat and other key crops, and lower risks for fisheries and associated livelihoods, especially for tropical fisheries. Limiting warming at 1.5°C compared to 2°C would reduce by 50% the fraction of the global population exposed to water shortages.

Climate-related risks are disproportionately higher for dryland regions, small island developing states and least developed countries as well as the Arctic region. Limiting warming at 1.5°C compared to 2°C would reduce the number of people exposed to climate-related risks and susceptible to poverty by up to several hundred million by 2050.

Our report shows that limiting warming at 1.5°C compared to 2°C is associated with lower climate-related risks for food and water security, health, human security, livelihoods, and economic growth.

This assessment highlights adaptation needs and a wide range of adaptation options which can reduce climate risks. Knowledge gaps are associated with the co-benefits, costs and limits of adaptation.

To summarize, each half degree matters.

### **What are emission pathways and systems transitions consistent with 1.5°C global warming ?**

To limit global warming to 1.5°C, global emissions of carbon dioxide need to fall by about 50% by 2030, and reach net zero around 2050.

For comparison, limiting warming to 2°C implies emissions to decrease by around 20% by 2030 and reach net zero by 2075.

Mitigation pathways also imply deep reductions in emissions of methane and black carbon, by 35% or more by 2050. Reducing non CO<sub>2</sub> emissions has direct and immediate benefits for air quality and health.

Limiting global warming to 1.5°C is not impossible but implies rapid changes on an unprecedented scale in energy, land, urban, infrastructure and industrial systems.

It means deep emission reductions in all sectors, a steep decline in coal, the use of a wide range of technologies, behavioural changes, and an increase of investments in low carbon energy and energy efficiency by a factor of 5 by 2050.

Rapid progress is already being made in some areas, notably renewable energy. This progress would need to be picked up in other sectors such as transport and land management.

To limit warming to 1.5°C, we would need to start eliminating carbon dioxide out of the atmosphere during the 21<sup>st</sup> century.

Methods for doing this include land management, for instance afforestation and reforestation, agricultural practices linked with biochar and soil carbon sequestration, bioenergy combined with carbon dioxide capture and storage; as well as other approaches that are at very early stages of development.

Carbon dioxide removal on a large scale would have implications for food security, ecosystems and biodiversity.

Pledges that governments made over the last three years are not enough to keep warming below 1.5°C, even with ambitious and very challenging efforts after 2030.

Carbon dioxide emissions would need to decline substantially before 2030 to avoid warming of more than 1.5°C in the middle of the 21<sup>st</sup> century and the associated climate risks, followed by large scale carbon dioxide removal.

To summarize, each year matters.

### **What is the interplay with sustainable development and efforts to eradicate poverty?**

Climate change impacts and how we respond to them are closely linked to sustainable development. Our report shows that different pathways have different synergies and trade-offs with the Sustainable Development Goals.

As part of limiting global warming to 1.5°C, a mix of measures to adapt to climate change and options to reduce emissions will, if carefully selected, have benefits for meeting sustainable development goals. This reflects the notion of ethical and fair transitions.

Pathways with low energy demand, low material consumption and low carbon food carry the highest co-benefits.

Cooperation, governance, innovation and mobilisation of finance are key for feasibility.

To conclude, each half degree matters, each year matters and each choice matters.

Limiting global warming at 1.5°C is not impossible, but political will to accelerate transitions is key.

*Full report: [www.ipcc.ch/report/sr15](http://www.ipcc.ch/report/sr15), including the Summary for Policy Makers, 5 chapters, 10 FAQs and the glossary.*

*Database of SR15 mitigation pathways: <https://data.ene.iiasa.ac.at/iamc-1.5c-explorer/>*