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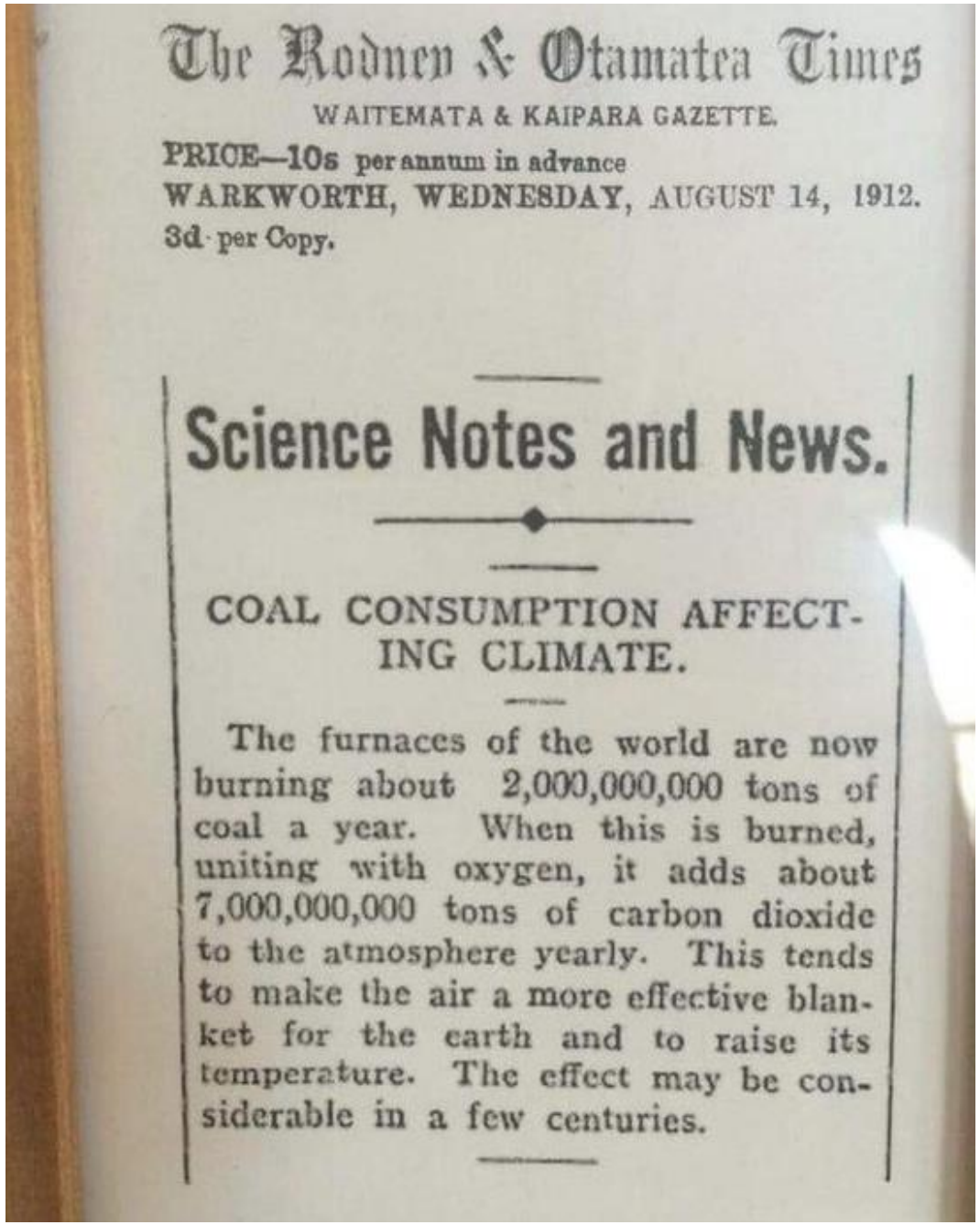
IPCC- Special Report on 1.5°C

Belgrade, Serbia
November 14th, 2018
Valeria Arroyave

UNDP
Empowered lives.
Resilient nations.

UN environment



The Rodney & Otamatea Times
WAITEMATA & KAIPARA GAZETTE.
PRICE—10s per annum in advance
WARKWORTH, WEDNESDAY, AUGUST 14, 1912.
3d per Copy.

Science Notes and News.

COAL CONSUMPTION AFFECTING CLIMATE.

The furnaces of the world are now burning about 2,000,000,000 tons of coal a year. When this is burned, uniting with oxygen, it adds about 7,000,000,000 tons of carbon dioxide to the atmosphere yearly. This tends to make the air a more effective blanket for the earth and to raise its temperature. The effect may be considerable in a few centuries.

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What is Climate Change?

Key Concepts of Climate Change[1]

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- **Climate**: is defined as the long-term average of weather (temperature, precipitation etc.), often defined as at least a 30-year period
- **Global warming** describes the 20th and 21st century increase in global average temperature. Both observations and models are used to estimate temperature changes.
- **Climate change** refers to changes not only in temperature but also in other properties of the climate system such as precipitation, sea level, extremes and wind speeds.
- **Uneven distribution:** The rise in global mean surface temperature (GMST) is not evenly distributed across the planet
- **Extremes**: The rise in temperature is not evenly distributed from month to month and year to year.
- **Pre-industrial:** The multi-century period prior to the onset of large-scale industrial activity. The reference period from 1850–1900 is often used to approximate pre-industrial global mean surface temperature. Earlier temperature records exist but they are fewer and less reliable.

Why the 1.5°C Special Report?

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Paris Agreement long temperature goal : “Holding the increase in the global average temperature to well below 2°C above preindustrial levels and pursuing efforts to limit the temperature increase to 1.5°C above preindustrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;” (Article 2.1.a).

The UNFCCC invited the **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 emissions pathways’.

What is in the 1.5°C Special Report?

The scope of the report:

- What would be required to limit warming to 1.5°C (mitigation pathways)
- The impacts of 1.5°C of warming, compared to 2°C and higher
- Strengthening the global response to climate change; mitigation and adaptation options

Key concepts of the Special Report on 1.5°C

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- Emission reduction pledges and Nationally Determined Contributions (**NDCs**)
- Net zero emissions
- Carbon Budget
- Temperature overshoot
- Carbon dioxide removal (CDR)
- Carbon capture and storage (CCS)
- Emission pathways
- Decarbonization
- Scenarios

How close are we to 1.5°C?

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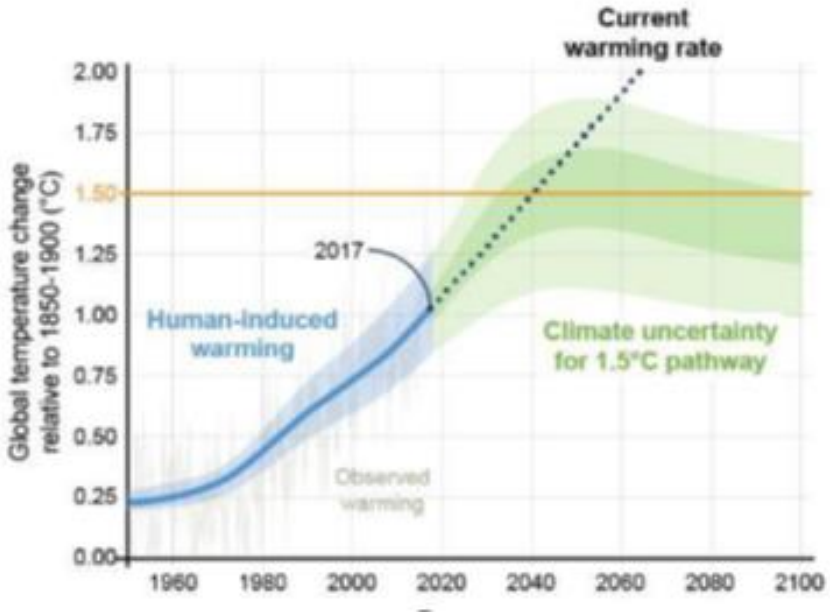
Human-induced warming has already reached about 1°C above pre-industrial levels at the time of writing of this Special Report. By the decade 2006–2015, human activity had warmed the world by 0.87°C (±0.12°C) compared pre-industrial times (1850–1900).

If the current warming rate continues, the world would reach human–induced global warming of 1.5°C around 2040.



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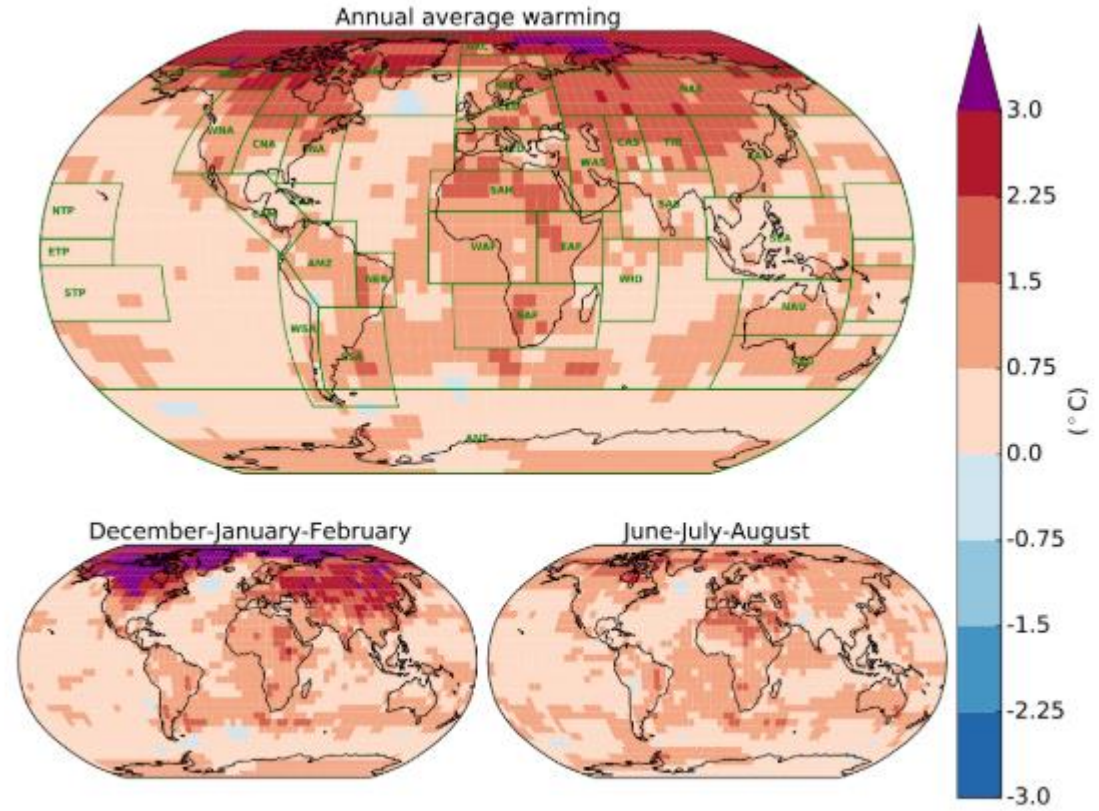
Average temperature



Maps of regional human-caused warming for 2006-15, relative to 1850-1900, annual average (top), the average of December, January and February (bottom left) and for June, July and August (bottom right). Shading indicates warming (red and purple) and cooling (blue). Credit: IPCC (pdf)

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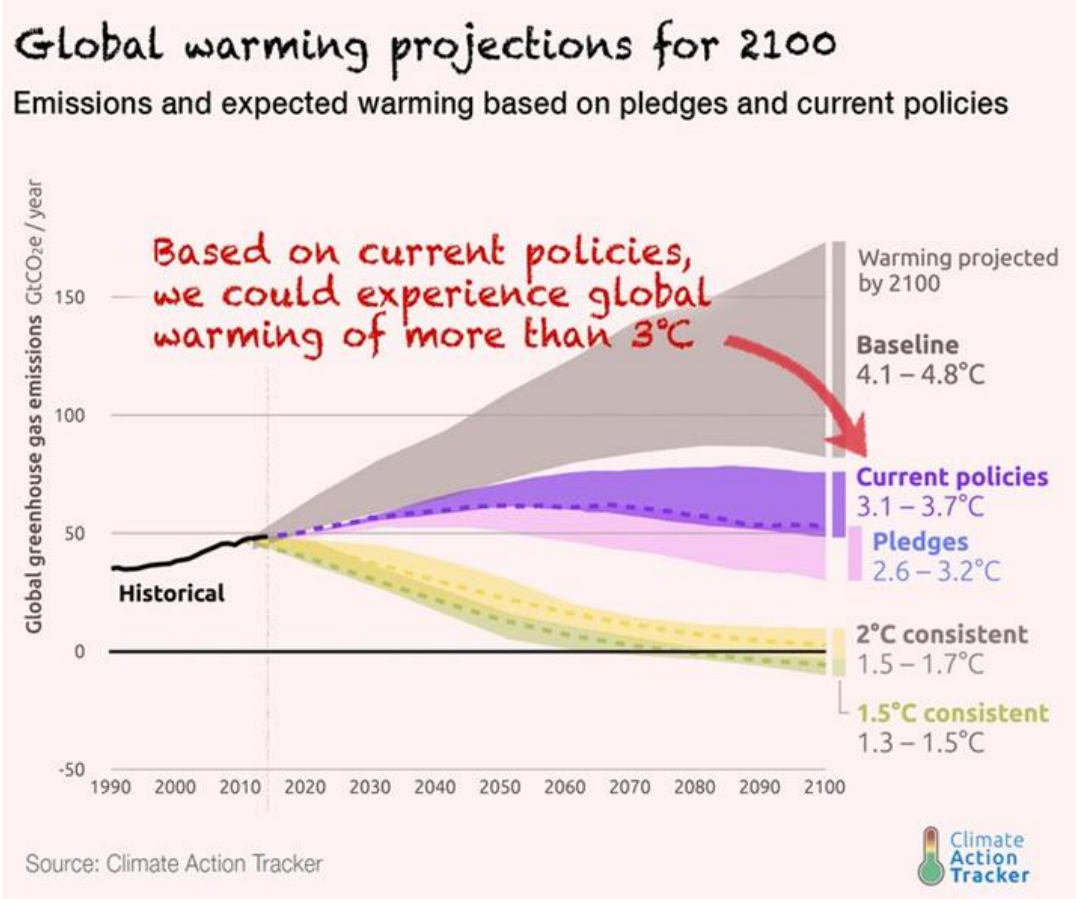
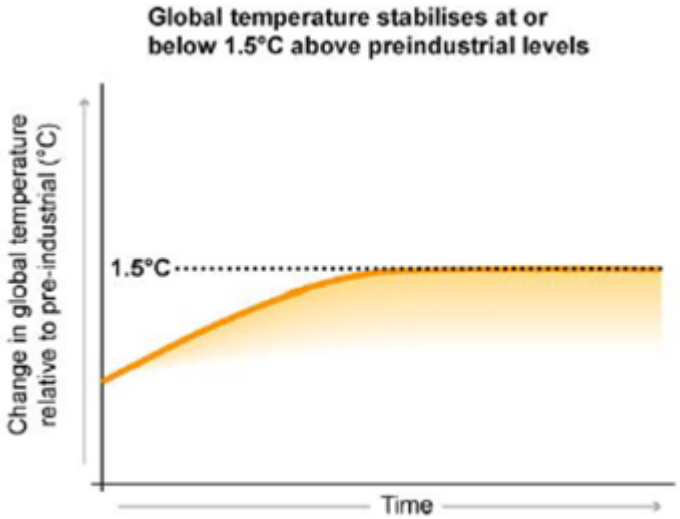
Projections

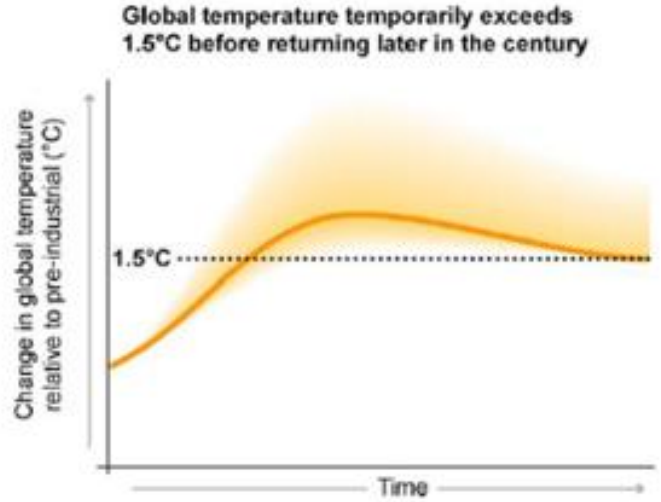


How do we limit global warming to 1.5°C? And will we make it?

2 Options

1. Involves global temperature stabilizing at or below before 1.5 ° C above pre-industrial levels.
2. Sees warming exceed 1.5 ° C around mid-century, remain above 1.5 ° C for a maximum duration of a few decades, and return to below 1.5 ° C before 2100: ‘overshoot’ pathway.





Which Pathway?

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Pathway Group	Pathway Class	Pathway selection criteria and description	Number of scenarios	Number of scenarios
1.5°C or 1.5°C-consistent	Below-1.5°C	Pathways limiting peak warming to below 1.5°C during the entire 21st century with 50-66% likelihood*	9	90
	1.5°C-low-OS	Pathways limiting median warming to below 1.5°C in 2100 and with a 50-67% probability of temporarily overshooting that level earlier, generally implying less than 0.1°C higher peak warming than Below-1.5°C pathways	44	
	1.5°C-high-OS	Pathways limiting median warming to below 1.5°C in 2100 and with a greater than 67% probability of temporarily overshooting that level earlier, generally implying 0.1–0.4°C higher peak warming than Below-1.5°C pathways	37	
2°C or 2°C-consistent	Lower-2°C	Pathways limiting peak warming to below 2°C during the entire 21st century with greater than 66% likelihood	74	132
	Higher-2°C	Pathways assessed to keep peak warming to below 2°C during the entire 21st century with 50-66% likelihood	58	

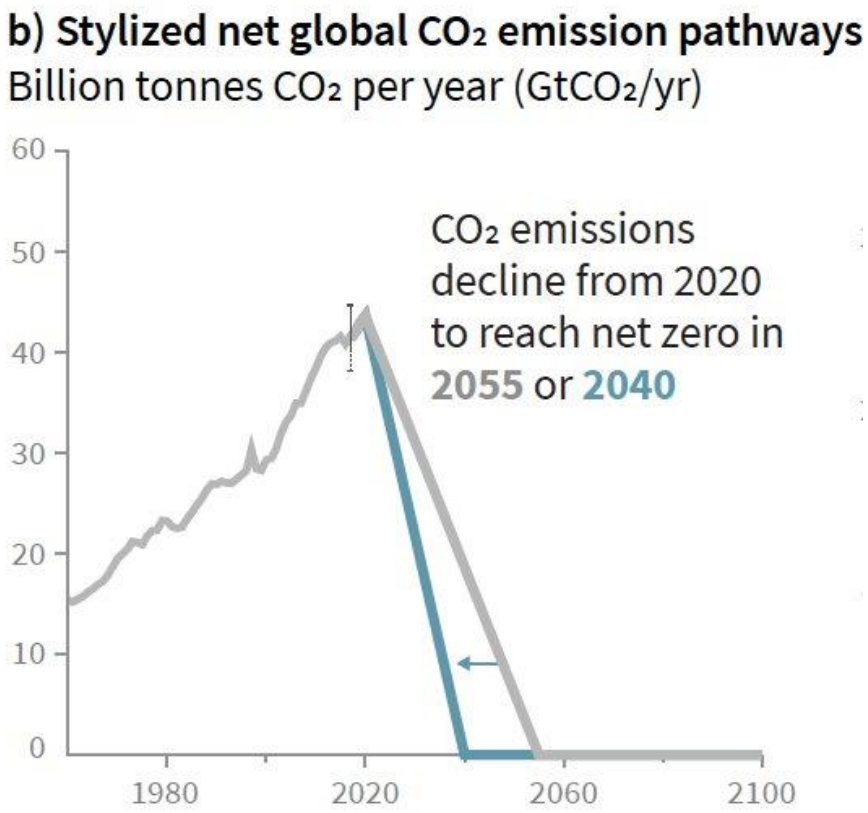
* No pathways were available that achieve a greater than 66% probability of limiting warming below 1.5°C during the entire 21st century based on the MAGICC model projections.

All of the scenario's used in the Special Report on 1.5°C show that current pledges are not on track to limit global warming to 1.5°C above pre-industrial levels.

If current national pledges for 2030 are achieved but no more, researchers find very few (if any) ways to reduce emissions after 2030 sufficiently quickly to limit warming to 1.5°C.

What would it take to limit warming to 1.5 ° C?

- Limiting warming to 1.5°C implies reaching net zero CO2 emissions globally around 2050 and concurrent deep reductions in emissions of non-CO2 forcers, particularly methane



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What would it take to limit warming to 1.5 ° C?

- Investment in unabated coal is “halted” by 2030 in “most” 1.5 ° C pathways
- By 2050, coal use in the power sector falls to “close to 0%” and renewables supply 70-85% of the electricity mix
- Bioenergy, renewable deployment in 1.5 ° C pathways increases between six and 14-fold by 2050, compared to 2010
- Nuclear energy use increases in “most” 1.5 ° C pathways
- **Policies** reflecting a high price on emissions are necessary in models to achieve cost-effective 1.5°C-consistent pathways
- All analyzed 1.5°C-consistent pathways use carbon dioxide removal (**CDR)** to some extent to neutralize emissions from sources for which no mitigation measures have been identified and, in most cases, also to achieve net-negative emissions that allow temperature to return to 1.5°C following an overshoot

Pathways to limit global warming to 1.5°C

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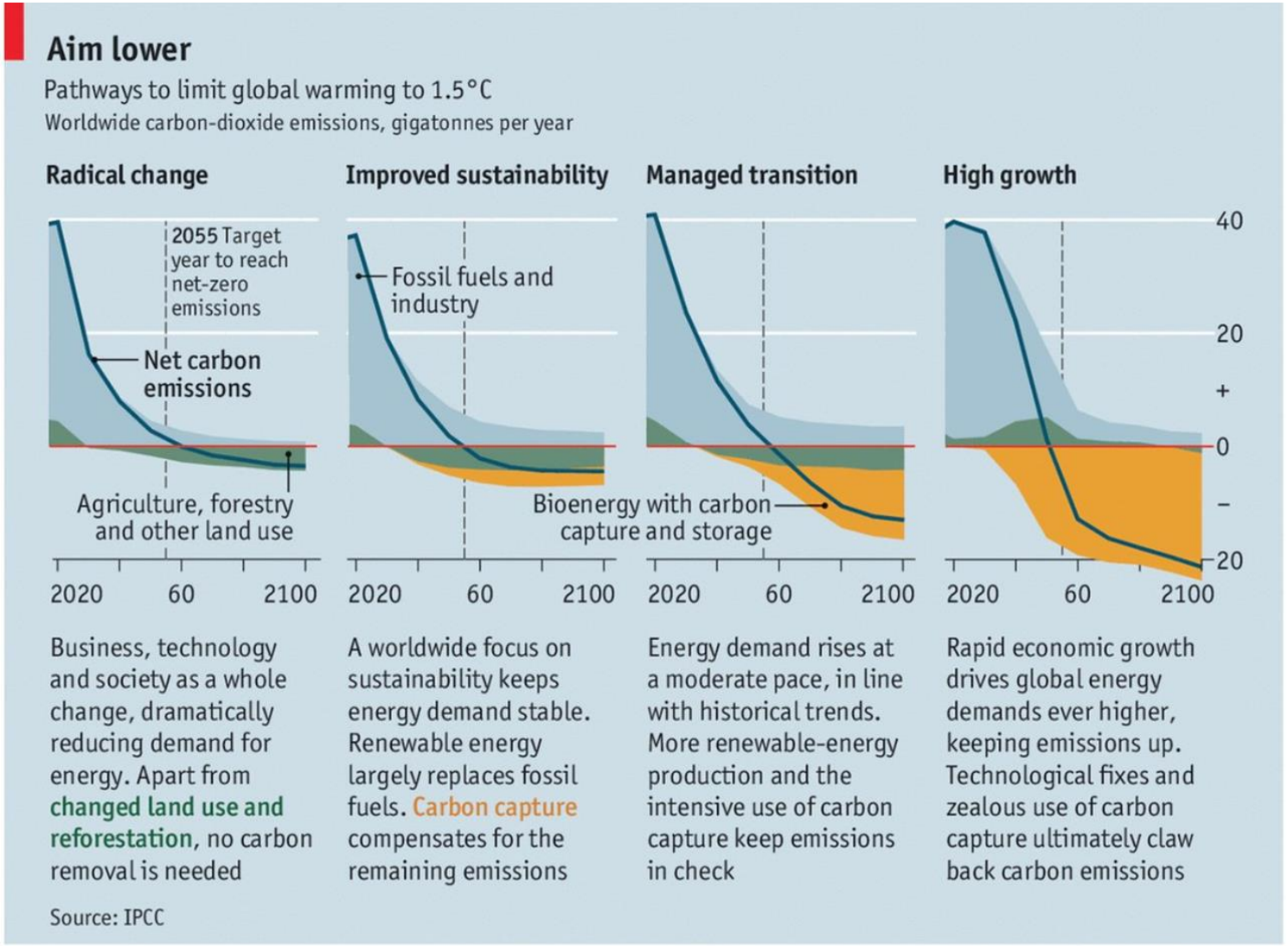

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What are the impacts of 1.5°C and 2 °C of warming?

1. The report confirms that the impacts of climate change are already being felt in every inhabited continent and in the oceans.
2. An average warming of 1.5°C across the whole globe raises the risk of heatwaves and heavy rainfall events, amongst many other potential impacts
3. The impacts the world experiences will depend on the **specific greenhouse gas emission 'pathway' taken**

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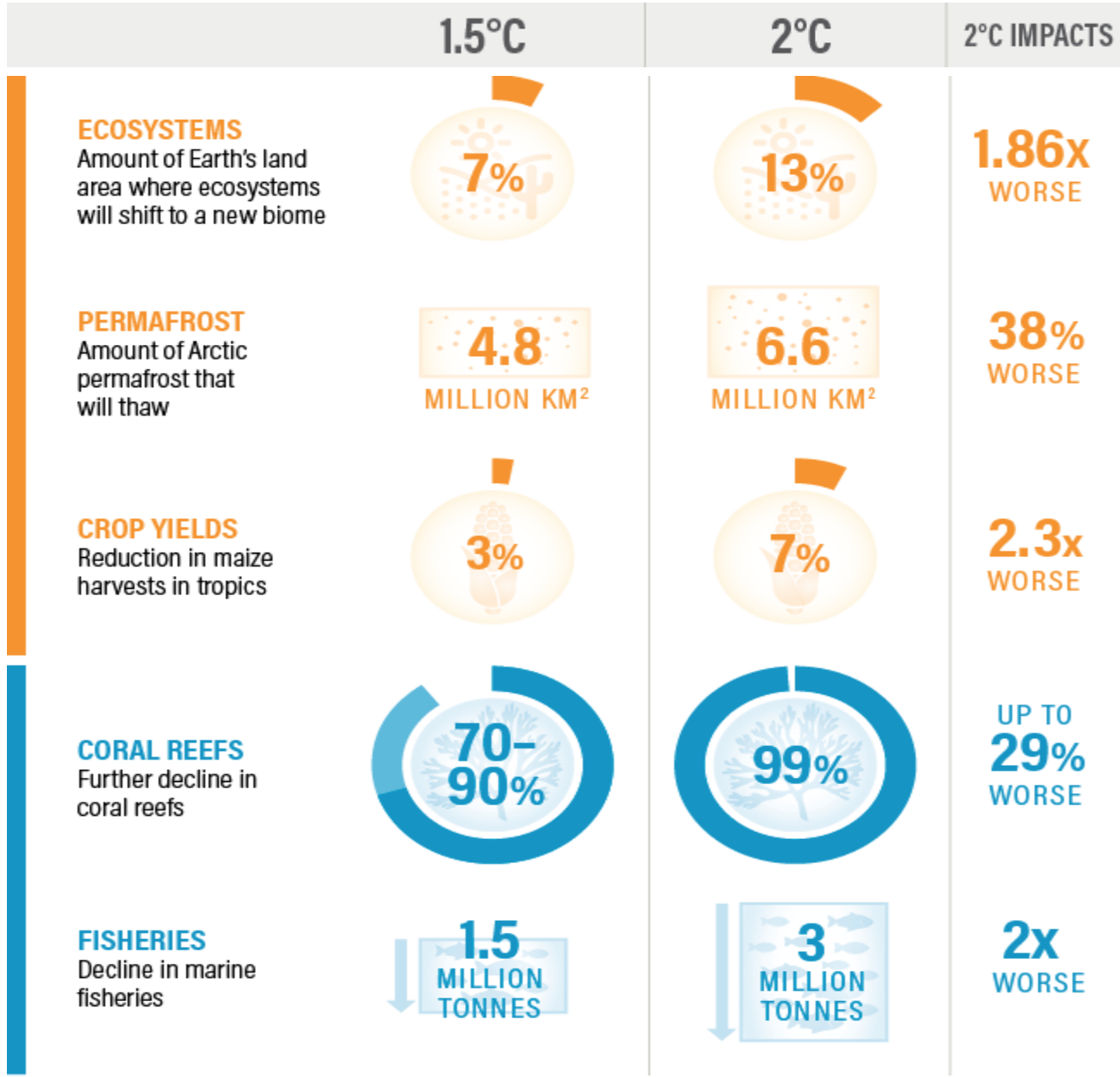
	1.5°C	2°C	2°C IMPACTS
EXTREME HEAT Global population exposed to severe heat at least once every five years	14%	37%	2.6X WORSE
SEA-ICE-FREE ARCTIC Number of ice-free summers	AT LEAST 1 EVERY 100 YEARS	AT LEAST 1 EVERY 10 YEARS	10X WORSE
SEA LEVEL RISE Amount of sea level rise by 2100	0.40 METERS	0.46 METERS	.06M MORE
SPECIES LOSS: VERTEBRATES Vertebrates that lose at least half of their range	4%	8%	2X WORSE
SPECIES LOSS: PLANTS Plants that lose at least half of their range	8%	16%	2X WORSE
SPECIES LOSS: INSECTS Insects that lose at least half of their range	6%	18%	3X WORSE



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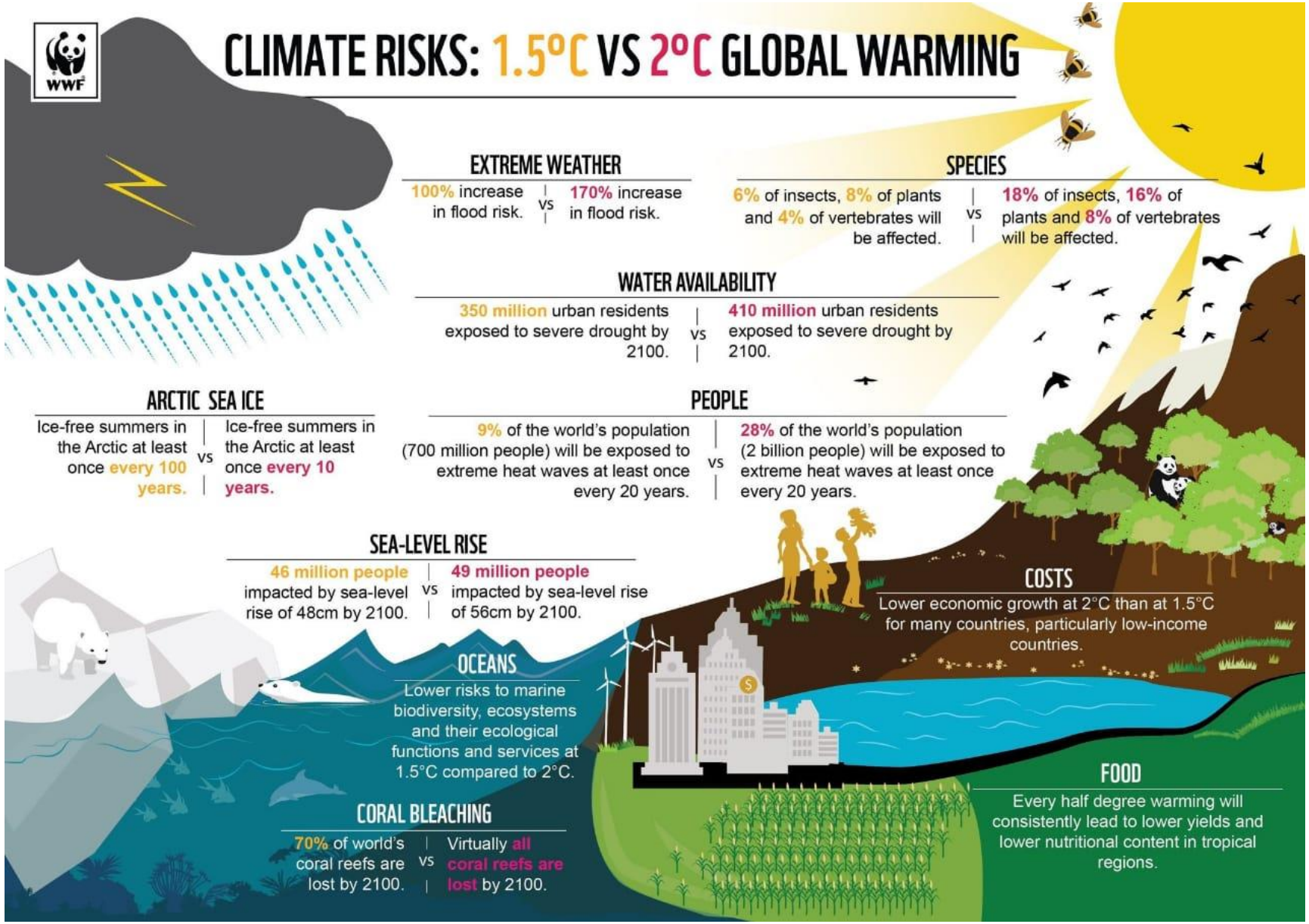
CLIMATE RISKS: 1.5°C VS 2°C GLOBAL WARMING
EXTREME WEATHER
100% increase in flood risk.
VS
170% increase in flood risk.
SPECIES
6% of insects, 8% of plants and 4% of vertebrates will be affected.
VS
18% of insects, 16% of plants and 8% of vertebrates will be affected.
WATER AVAILABILITY
350 million urban residents exposed to severe drought by 2100.
VS
410 million urban residents exposed to severe drought by 2100.
ARCTIC SEA ICE
Ice-free summers in the Arctic at least once every 100 years.
VS
Ice-free summers in the Arctic at least once every 10 years.
PEOPLE
9% of the world's population (700 million people) will be exposed to extreme heat waves at least once every 20 years.
VS
28% of the world's population (2 billion people) will be exposed to extreme heat waves at least once every 20 years.
SEA-LEVEL RISE
46 million people impacted by sea-level rise of 48cm by 2100.
VS
49 million people impacted by sea-level rise of 56cm by 2100.
COSTS
Lower economic growth at 2°C than at 1.5°C for many countries, particularly low-income countries.
OCEANS
Lower risks to marine biodiversity, ecosystems and their ecological functions and services at 1.5°C compared to 2°C.
CORAL BLEACHING
70% of world's coral reefs are lost by 2100.
VS
Virtually all coral reefs are lost by 2100.
FOOD
Every half degree warming will consistently lead to lower yields and lower nutritional content in tropical regions.

What about the Balkan +Lebanon region?

- The Mediterranean is regarded as a climate change hot spot
- Substantial decreases in mean precipitation with associated substantial increases in dry spells
- Low river flows are projected to decrease in the Mediterranean under 1.5°C of global warming with associated significant decreases in high flows and floods
- The median reduction in annual runoff almost double from about 9% at 1.5°C to 17% at 2°C

Limiting global warming to 1.5°C is expected to substantially reduce the probability of drought and risks associated with water availability (i.e. water stress) in some regions

Global Response

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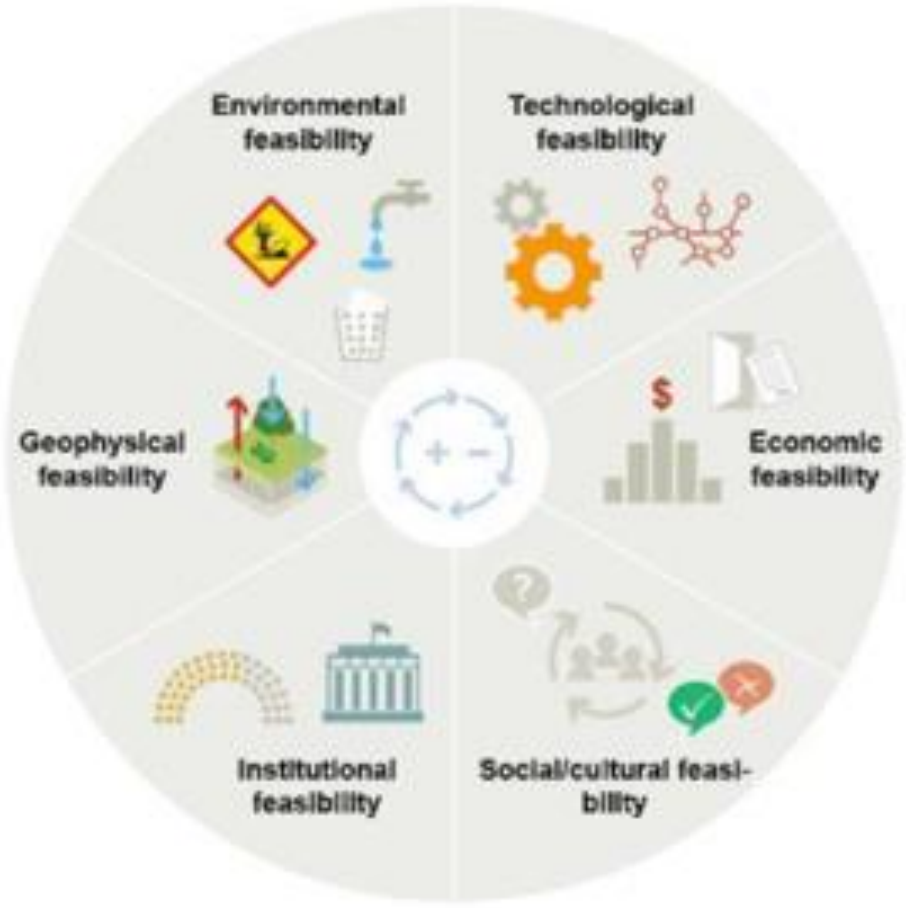
The feasibility dimensions towards limiting the warming to 1.5°C



While transitions in energy efficiency, carbon intensity of fuels, electrification and land use change are underway in various countries, limiting warming to 1.5°C will require a **greater scale and pace of change to transform energy, land, urban and industrial systems globally**.

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Global Response

1. Economic growth
2. Innovation
3. We are on path
4. **All hands**

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Sustainable Development, Poverty Eradication and Reducing Inequalities

- Limiting global warming to 1.5°C rather than 2°C would make it markedly easier to achieve many aspects of sustainable development, with greater potential to eradicate poverty and reduce inequalities
- Prioritization of sustainable development and meeting the SDGs is consistent with efforts to adapt to climate change
- Synergies between adaptation strategies and the SDGs are expected to hold true in a 1.5°C warmer world, across sectors and context
- Social justice and equity are core aspects of climate-resilient development pathways for transformational social change.
- The fundamental societal and systemic changes to achieve sustainable development, eradicate poverty and reduce inequalities while limiting warming to 1.5°C **would require a set of institutional, social, cultural, economic and technological conditions** to be met
- National and sub- national authorities, civil society, the private sector, indigenous peoples and local communities can support ambitious action

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The previous IPCC report concluded : that climate change and climate variability worsen existing poverty and exacerbate inequalities, especially for those disadvantaged by gender, age, race, class, caste, indigeneity and (dis)ability

Impacts and Risks of a 1.5°C Warmer World: Can increase gender inequality

Limiting temperatures to 1.5°C can make it much easier to achieve the SDGs:

Adaptation: Efforts to reduce poverty and gender inequalities, and to enhance food, health and water security can reduce vulnerability to climate change

Mitigation*:*

- Synergies
- Trade-offs

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Gender Equality ⟷ Climate Change Mitigation

- Reduced deforestation RED++
- Afforestation and reforestation
- Accelerating energy efficiency improvement
- Improved access and fuel switch to modern low carbon energy
- Replacing coal to non biomass renewables (solar, wind and hydro)
- Land bases GHG reduction and soil carbon sequestration
- Greenhouse gas reduction from improved livestock production and manure management systems

Key takeaways

- Human activities have caused approximately 1.0°C of global warming above pre-industrial levels. At this level of warming, intensity and frequency of weather extremes has already increased.
- To remain within 1.5°C warming, the world will have to reduce CO2 emissions by 45 per cent by 2030 from 2010 levels and reach net-zero emissions by 2050.
- Current efforts to fight climate change is meager and weak. The pledges made by the countries in the Paris Agreement will take us to 1.5°C between 2032-2050.
- The impacts at 1.5°C of warming on people and ecosystems is much higher than anticipated in the previous scientific reports.
- The impacts at 2°C will be far higher than 1.5°C and will be catastrophic for the poor and the developing countries.
- The goal of the Paris Agreement to limit warming to 2°C must be revised. For a safer world, the target must now be firmly put at 1.5°C.
- Actions to reduce climate risk can interact with other SDGs, as gender equality (SDG5) in positive ways (synergies)

The **time** to act is now

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Thank you!

www.un-gsp.org

- https://interactive.carbonbrief.org/impacts-climate-change-one-point-five-degrees-two-degrees/
- https://www.bbc.com/news/science-environment-4577530
- https://www.carbonbrief.org/in-depth-qa-ipccs-special-report-on-climate-change-at-one-point-five-c