Report by numbers

- 278 Authors
- 65 Countries
- 29 % Women / 71 % Men
- 41 % Developing countries
- 59 % Developed countries
- 354 Contributing authors
- More than 18,000 scientific papers
- 59,212 Review comments
Climate Change 2022
Mitigation of Climate Change

2010-2019: Average annual greenhouse gas emissions at highest levels in human history
We are not on track to limit warming to 1.5 °C.
Unless there are immediate and deep emissions reductions across all sectors, 1.5°C is beyond reach.
but there is increased evidence of climate action
Increased evidence of climate action

Some countries have achieved a **steady decrease** in emissions **consistent** with limiting warming to 2°C.

Zero emissions **targets** have been adopted by at least **826 cities** and **103 regions**.
In some cases, costs for renewables have fallen below those of fossil fuels.
Electricity systems in some countries and regions are already predominantly powered by renewables.
Limiting warming to 1.5 °C
- Global GHG emissions peak before 2025, reduced by 43% by 2030.
- Methane reduced by 34% by 2030

Limiting warming to around 2°C
- Global GHG emissions peak before 2025, reduced by 27% by 2030.

*(based on IPCC-assessed scenarios)*
The temperature will stabilise when we reach net zero carbon dioxide emissions

(based on IPCC-assessed scenarios)
Figure 2.26 Future CO₂ emissions from existing and currently planned fossil fuel infrastructure in the context of Paris carbon budgets in GtCO₂ based on historic patterns of infrastructure lifetimes and capacity utilization. Future CO₂ emissions estimates of existing infrastructure for the electricity sector as well as all other sectors (industry, transport, buildings, other fossil fuel infrastructures) and of proposed infrastructures for coal power as well as gas and oil power. Grey bars on the right depict the range (5th – 95th percentile) in overall cumulative net CO₂ emissions until reaching net zero CO₂ in pathways that limit warming to 1.5°C with no or limited overshoot (1.5°C scenarios), and in pathways that limit likely warming to 2°C (2°C scenarios).

Source: Based on (Tong et al., 2019) and (Edenhofer et al., 2018).
There are options available **now** in every sector that can at least **halve** emissions by 2030.
Many options available now in all sectors are estimated to offer substantial potential to reduce net emissions by 2030. Relative potentials and costs will vary across countries and in the longer term compared to 2030.
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### Transport
- Fuel efficient light duty vehicles
- Electric light duty vehicles
- Shift to public transportation
- Shift to bikes and e-bikes
- Fuel efficient heavy duty vehicles
- Electric heavy duty vehicles, incl. buses
- Shipping – efficiency and optimization
- Aviation – energy efficiency
- Biofuels

### Industry
- Energy efficiency
- Material efficiency
- Enhanced recycling
- Fuel switching (electr, nat. gas, bio-energy, H₂)
- Feedstock decarbonisation, process change
- Carbon capture with utilisation (CCU) and CCS
- Cementitious material substitution
- Reduction of non-CO₂ emissions

### Other
- Reduce emission of fluorinated gas
- Reduce CH₄ emissions from solid waste
- Reduce CH₄ emissions from wastewater

**Net lifetime cost of options:**
- Costs are lower than the reference
- 0–20 (USD tCO₂-eq⁻¹)
- 20–50 (USD tCO₂-eq⁻¹)
- 50–100 (USD tCO₂-eq⁻¹)
- 100–200 (USD tCO₂-eq⁻¹)
- Cost not allocated due to high variability or lack of data

Uncertainty range applies to the total potential contribution to emission reduction. The individual cost ranges are also associated with uncertainty.
Accelerated climate action is critical to sustainable development
## Mitigation options in urban areas

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Closing investment gaps

- Financial flows: 3-6x lower than levels needed by 2030 to limit warming to below 1.5°C or 2°C
- There is sufficient global capital and liquidity to close investment gaps
- Challenge of closing gaps is widest for developing countries
Finance – key messages

• Financial regulators and institutions have implemented multiple regulatory and voluntary initiatives to assess and address financial risks. Yet, climate-related financial risks remain greatly underestimated by financial institutions and markets limiting the capital reallocation needed for the low-carbon transition.

• Despite the increasing attention of investors to climate change, there is limited evidence that this attention has directly impacted emission reductions.

• Persistently high levels of both public and private fossil-fuel related financing continue to be of major concern despite promising recent commitments. This reflects policy misalignment, the current perceived risk-return profile of fossil fuel-related investments, and political economy constraints.

• A common understanding of debt sustainability and debt transparency, including negative implications of deferred climate investments, and how stranded assets and resources may be compensated, has not yet been developed.

• Credible signalling by governments and the international community can reduce uncertainty for financial decision-makers and help reduce transition risk. In addition to indirect and direct subsidies, the public sector’s role in addressing market failures, barriers, provision of information, and risk sharing can encourage the efficient mobilisation of private sector finance.

• Innovative financing approaches could help reduce the systemic underpricing of climate risk in markets and foster demand for Paris-aligned investment opportunities. Approaches include de-risking investments, robust ‘green’ labelling and disclosure schemes, in addition to a regulatory focus on transparency and reforming international monetary system financial sector regulations.
"The evidence is clear: The time for action is now"