Cumulative emissions of CO₂ and future non-CO₂ radiative forcing determine the probability of limiting warming to 1.5°C

a) Observed global temperature change and modeled responses to stylized anthropogenic emission and forcing pathways

Global warming relative to 1850-1900 (°C)

b) Stylized net global CO₂ emission pathways

Billion tonnes CO₂ per year (GtCO₂/yr)

Faster immediate CO₂ emission reductions limit cumulative CO₂ emissions shown in panel (c).

CO₂ emissions decline from 2020 to reach net zero in 2055 or 2040

Faster CO₂ reductions (blue in b & c) result in a higher probability of limiting warming to 1.5°C

No reduction of net non-CO₂ radiative forcing (purple in d) results in a lower probability of limiting warming to 1.5°C

c) Cumulative net CO₂ emissions

Billion tonnes CO₂ (GtCO₂)

Maximum temperature rise is determined by cumulative net CO₂ emissions and net non-CO₂ radiative forcing due to methane, nitrous oxide, aerosols and other anthropogenic forcing agents.

d) Non-CO₂ radiative forcing pathways

Watts per square metre (W/m²)

Global CO₂ emissions reach net zero in 2055 while net non-CO₂ radiative forcing is reduced after 2030 (grey in b, c & d)

Non-CO₂ radiative forcing reduced after 2030 or not reduced after 2030

Likely range of modeled responses to stylized pathways

Estimated anthropogenic warming to date and likely range

Observed monthly global mean surface temperature