Integrated Assessment and Climate Policy

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Figure SPM.10

Linking across Working Groups

Climate Impacts

(A) Risks from climate change... (B) ...depend on cumulative CO₂ emissions...

(C) ...which in turn depend on annual GHG emissions over the next decades

Emissions Reductions over the next decades
Where are emissions, concentrations, and temperature currently headed?
AR5 collected roughly 1200 baseline and mitigation scenarios.

Without additional mitigation, projections of warming range from 3.7 to 4.8°C over the 21st century (median values)

The range is 2.5°C to 7.8°C when including climate uncertainty (WG3 analysis)
How much must emissions be reduced to limit temperature change to 2°C or other levels?
Limiting temperature change will require substantial emissions reductions.
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There are several ways to define a limit on warming.

The 2°C scenarios here are those that make it likely that warming will remain below 2°C.
Limiting concentrations and temperature change requires substantial mitigation in the near- and long-term.

Based on Figure 6.7

Roughly 40% to 70% reductions below 2010 levels by 2050.

Emissions are negative in many scenarios before 2100.
How much does the energy system need to change to limit temperature change?
Baseline scenarios suggest rising GHG emissions in all sectors, except for CO$_2$ emissions in the land-use sector.
Mitigation requires changes throughout the economy. Systemic approaches are expected to be most effective.
Mitigation efforts in one sector determine efforts in others.

450 ppm CO₂ eq without Carbon Dioxide Capture & Storage

- Land-Use (net)
- Electricity
- Transport
- Buildings
- Industry
- Non-CO₂
How will mitigation over the next 15 years influence the challenge of meeting 2°C?
Delaying mitigation increases the difficulty and narrows the options for limiting warming to 2°C.

“immediate action”
Delaying mitigation increases the difficulty and narrows the options for limiting warming to 2°C.
Delivering mitigation increases the difficulty and narrows the options for limiting warming to 2°C.
Delaying mitigation is estimated to increase the difficulty and narrow the options for limiting warming to 2°C.

„delayed mitigation“

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Based on Figures 6.32 and 7.16
How much will it cost to reduce emissions?
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These cost estimates do not account for the benefits from reduced climate change.
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### Global Mitigation Costs and Consumption Growth in Baseline Scenarios

<table>
<thead>
<tr>
<th>Percentage Point Reduction in Annualized Consumption Growth Rate over 21st Century [%–point]</th>
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<tbody>
<tr>
<td>0.03 (0.01–0.05)</td>
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<tr>
<td>0.04 (0.01–0.09)</td>
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<tr>
<td>0.06 (0.03–0.13)</td>
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<td>0.06 (0.04–0.14)</td>
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- **Consumption in Corresponding Baseline Scenarios [% increase from 2010]**
  - 2030
  - 2050
  - 2100

- **Reduction in Consumption Relative to Baseline [%]**
  - 580–650
  - 550 (530–580)
  - 500 (480–530)
  - 450 (430–480)

- **CO₂,eq concentrations in 2100 [ppm CO₂,eq]**
  - 84th percentile
  - Median
  - 16th percentile
Estimates of aggregate global mitigation costs vary widely, even under idealized assumptions; they increase with mitigation.
Substantial reductions in emissions would involve large changes in investment patterns.
How does mitigation interact with other societal goals?
Mitigation can result in large co-benefits for human health and other societal goals.
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Linking from impacts to emissions reductions
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Synthesis Report of the
Fifth Assessment Report of the
Intergovernmental Panel on Climate Change