CLIMATE CHANGE 2014
Mitigation of Climate Change

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IPCC reports are the result of extensive work of many scientists from around the world.

1 Summary for Policymakers
   1 Technical Summary

   16 Chapters
   235 Authors
   900 Reviewers
   More than 2000 pages
   Close to 10,000 references
   More than 38,000 comments
Exploring the solution space: technological, economic and institutional requirements of alternative climate policy goals
#1

GHG emissions growth has accelerated despite reduction efforts.
Continued GHG emission growth 1970-2010 with larger absolute increases during the last decade.
About half of cumulative anthropogenic CO$_2$ emissions between 1750 and 2010 have occurred in the last 40 years.

Total anthropogenic CO$_2$ emissions from fossil fuel combustion, flaring, cement, as well as Forestry and Other Land Use (FOLU) in five major world regions between 1750 and 2010

After 1970: 1100 GtCO$_2$

Before 1970: 910 GtCO$_2$
Regional patterns of GHG emissions are shifting along with changes in the world economy.
GHG emissions rise with growth in GDP and population; long-standing trend of decarbonisation of energy reversed.
#2:

Limit warming to 2°C relative to pre-industrial levels involves substantial technological, economic and institutional challenges.

Reaching less ambitious goal involves similar changes, but at a slower time scale.
Without additional mitigation, global mean surface temperature is projected to increase by 3.7° to 4.8°C (2.5°-7.8°C) over the 21st century.
Stabilization of atmospheric concentrations requires moving away from the baseline – regardless of the mitigation goal.
Mitigation involves substantial upscaling of low- and zero carbon energy and has associated mitigation risks. Delay in mitigation increases challenges and limits options.
Estimates for mitigation costs vary widely.

- Reaching 450ppm CO$_2$eq entails consumption losses of 1.7% (1%-4%) by 2030, 3.4% (2% to 6%) by 2050 and 4.8% (3%-11%) by 2100 relative to baseline (which grows between 300% to 900% over the course of the century).

- This is equivalent to a reduction in consumption growth over the 21$^{\text{st}}$ century by about 0.06 (0.04-0.14) percentage points a year (relative to annualized consumption growth that is between 1.6% and 3% per year).

- Cost estimates exclude benefits of mitigation (reduced impacts from climate change). They also exclude other benefits (e.g. improvements for local air quality).

- Cost estimates are based on a series of assumptions.
Mitigation can result in large co-benefits for human health and other societal goals.
Least-cost mitigation scenarios rely on strong institutions.

Key institutional requirements:

1. All countries cooperate and begin to mitigate immediately.
2. They all introduce a globally uniform price on all GHG emissions.
3. They all allow the use of all key mitigation technologies.
#3:

Stabilizing GHG concentrations in the atmosphere at low levels requires mitigation throughout the economy.
Substantial deviations from baseline required in all sectors. Efforts in one sector determine mitigation efforts in others.

Direct Sectoral CO₂ and Non-CO₂ GHG Emissions in Baseline and Mitigation Scenarios with and without CCS
Best-practice low-GHG technologies available today could already achieve substantial emission reductions, if applied at scale.

Scenario results

Results from Technology studies

CO₂ intensity of energy today

Working Group III contribution to the IPCC Fifth Assessment Report
Climate change is a global commons problem that requires international cooperation and policy coordination across multiple scales.
Substantial reductions in emissions would require large changes in investment patterns already in the short-term.

- 20% decline for freely emitting fossil fuel technologies
- 100% increase for low-carbon technologies

Most investments in non-OECD countries
Since AR4, there has been an increased focus on policies designed to integrate multiple objectives, increase co-benefits and reduce adverse side-effects.

- Sector-specific policies have been more widely used than economy-wide policies.
- Regulatory approaches and information measures are widely used, and are often environmentally effective.
- Since AR4, cap and trade systems for GHGs have been established in a number of countries and regions.
- In some countries, tax-based policies specifically aimed at reducing GHG emissions—alongside technology and other policies—have helped to weaken the link between GHG emissions and GDP.
- The reduction of subsidies for GHG-related activities in various sectors can achieve emission reductions.
Effective mitigation will not be achieved if individual agents advance their own interests independently.

- Existing and proposed international climate change cooperation arrangements vary in their focus and degree of centralization and coordination.
- Issues of equity, justice, and fairness arise with respect to mitigation and adaptation.
- Climate policy may be informed by a consideration of a diverse array of risks and uncertainties, some of which are difficult to measure, notably events that are of low probability but which would have a significant impact if they occur.
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www.mitigation2014.org

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