

Key Findings of the IPCC *Fourth Assessment Report, 2007*

The Intergovernmental Panel on Climate Change (IPCC) released its Fourth Assessment Report (AR4) on global climate change in 2007. Founded in 1988, the IPCC is the world's most authoritative scientific body on the subject of global warming, including a panel of 2,500 scientists who assess the risk of human-induced climate change and provide information to policymakers on solutions to combat global warming. The IPCC does not carry out new research, nor does it monitor climate-related data. Its periodic Assessment Reports, based on published and peer-reviewed scientific technical literature, represent a consensus among participating scientists. Typically, the reports are organized into three Working Group Reports covering the science, impacts & adaptation, and mitigation, plus a final synthesis report. The synthesis report for the IPCC AR4 was released in November 2007.

Global Warming Science, Trends and Causes

The 2007 IPCC report provided the most certainty yet regarding global warming and its causes. Scientists stated for the first time that warming is “unequivocal,” citing evidence including observations of increases in global average air and ocean temperatures and widespread melting of snow and ice. The IPCC also found with 90% certainty that human activities since the 18th century have had a warming effect on the earth.¹

Eleven of the last twelve years (1995–2006) rank among the 12 warmest years in the instrumental record of global surface temperature (since 1850).² If the trend continues and the world does not dramatically reduce global warming emissions, the IPCC estimates that under the worst emissions scenario global temperatures could increase by 4°C by the end of the century, with the potential to go as high as 6.4°C.³

Increasing atmospheric carbon dioxide (CO₂) concentrations are also causing changes in the world's oceans. Absorption of CO₂ makes ocean water more acidic, impacting marine life with carbonate shells like coral reefs, snails, and other organisms that are vital supports for the food chain.⁴ Also, as the ocean continues to absorb CO₂, its capacity to serve as a sink for future atmospheric CO₂ declines.⁵ If emissions continue growing as they are now, such an imbalance in the relationship between storage reservoirs of CO₂ – i.e., the carbon feedback cycle – is projected to increase global average warming in 2100 by at least an additional 1°C over existing projections.⁶

Impacts of Global Warming

Scientists identified, in far greater detail than earlier reports, how global warming is currently affecting life on earth and projected future impacts. The IPCC found that the relatively small amount of warming that has already occurred is currently contributing “to the global burden of disease and premature deaths.”⁷ Regarding future impacts, the IPCC says, “For increases in global average temperature exceeding 1.5°C–2.5°C. . . there are projected to be . . . predominantly negative consequences for biodiversity, and ecosystem goods and services *e.g.*, water and food supply.”⁸

Under extreme temperature increases, researchers project serious consequences for human populations. By mid-century, up to two billion people could be at risk of water stress, including up to 600 million people in Africa alone.⁹ With a warming of 3°C or more, agricultural systems will begin to break down, causing a global decrease in food production potential.¹⁰ (For more information on these impacts, see

the Pew Environment Group's fact sheet, "National Security and Global Stability in a Warming Climate.")

Serious damage to ecosystems and wildlife is projected across a range of temperature increases. With an increase of 2°C and higher, widespread coral mortality is predicted, and with an increase of 4-5°C in global temperatures, more than 40% of known plant and animal species are projected to go extinct.¹¹

Mitigation: Reducing Emissions that Cause Global Warming

The Third Working Group Report (WGIII), entitled "Climate Change 2007: Mitigation," concluded, "There is substantial economic potential for the mitigation of global GHG emissions over the coming decades, that could offset the projected growth of global emissions or reduce emissions below current levels."¹² The IPCC report lays out several climate stabilization scenarios. By stabilizing greenhouse gases at CO₂-equivalent concentrations of roughly 450-500 parts per million (a scenario that requires a reduction in global CO₂ emissions of between 50-85% of 2000 levels by 2050), global temperature rise could be limited to a range of 2–2.4°C.¹³

Limiting the global temperature rise to this level requires that global emissions peak by 2015.¹⁴ The IPCC estimates that doing so will reduce average global GDP growth rates by less than 0.12 percentage points per year and notes, "Climate change policies related to energy efficiency and renewable energy are often economically beneficial, improve energy security and reduce local pollutant emissions."¹⁵ Other mitigation options can provide sustainable development benefits such as avoided displacement of local populations, new jobs, and health improvement. The scientists found, "In all analyzed world regions near-term health co-benefits from reduced air pollution as a result of actions to reduce GHG emissions can be substantial and may offset a substantial fraction of mitigation costs."¹⁶

The IPCC report makes clear that the tools needed to start reducing the threat of global warming are available now. The stabilization levels assessed can be achieved by deployment of a portfolio of technologies that are either currently available or expected to be commercialized in coming decades. Technologies commercially available today are listed in the report – technologies that could be used to immediately begin reducing emissions in virtually all sectors of the economy including energy, transportation, buildings, industry, agriculture and waste management. (For more information on policies to reduce emissions in the United States, see the Pew Environment Group's fact sheet "Federal Global Warming Emissions Reduction Policies.")

¹ IPCC Fourth Assessment Report, 2007. Working Group I (WGI) Summary for Policy Makers (SPM), p. 3.

<www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf>.

² IPCC, 2007, WGI SPM, *Op. cit.*, p. 5.

³ IPCC, 2007, WGI SPM, *Op. cit.*, p. 13, Table SPM.3. The 4°C is the ‘best estimate’ of the temperature increase that will result from continued fossil-fuel intensive economic growth (the A1FI scenario).

⁴ IPCC, 2007, WGI Chapter 5. p. 405-406. <www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter5.pdf>; and IPCC, 2007, WGI Chapter 7, p. 529, Box 7.3: Marine Carbon Chemistry and Ocean Acidification. <www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter7.pdf>.

⁵ *Ibid.*

⁶ IPCC, 2007, WGI SPM, *Op. cit.*, p. 13.

⁷ IPCC Fourth Assessment Report, 2007. Working Group II Report (WGII), Chapter 8, p. 393.

<www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter8.pdf>.

⁸ *Ibid.*, p. 11.

⁹ IPCC, 2007, WGII Chapters 3 (p. 194) and 9 (p. 435). <www.ipcc.ch/ipccreports/ar4-wg2.htm>.

¹⁰ IPCC, 2007, WGII SMP, *Op. cit.*, p. 11.

¹¹ *Ibid.*, p. 16.

¹² IPCC Fourth Assessment Report, 2007. Working Group Report (WGIII) SPM, p. 9. <www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-spm.pdf>.

¹³ *Ibid.*, p. 15.

¹⁴ *Ibid.*

¹⁵ *Ibid.*, p. 18 and p. 22.

¹⁶ *Ibid.*, p. 12.

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