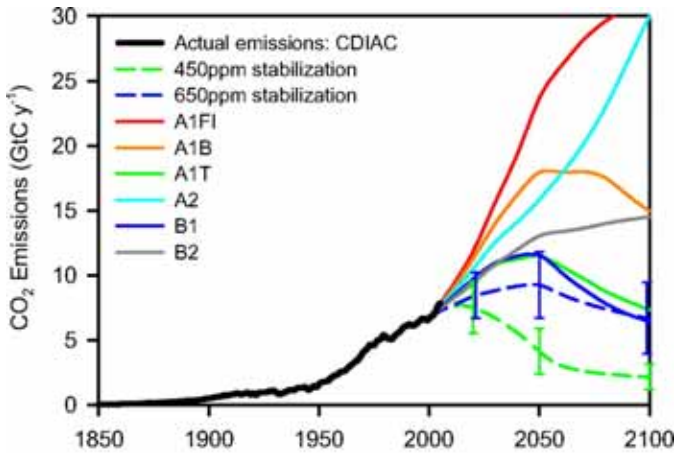
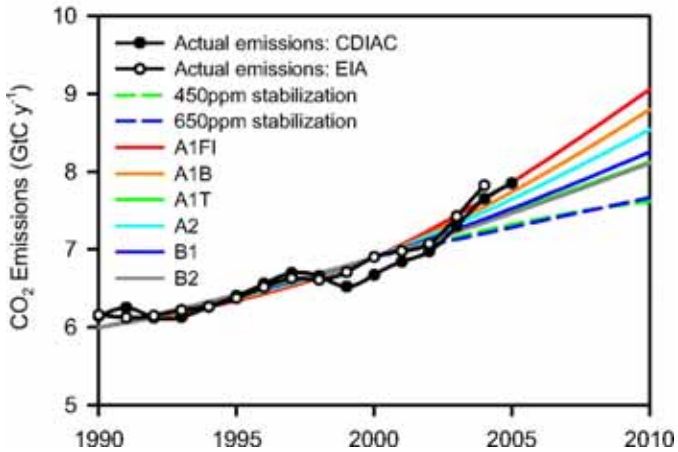
Global and regional drivers of accelerating CO_2 emissions

Contact: G. Marland, marlandgh@ornl.gov, 865-241-4850

Sponsor: DOE/Science/Biological & Environmental Research

- **Objective**
  - Understanding observed magnitudes and patterns of factors influencing global CO_2 emissions
- **Importance**
  - This information is necessary for prediction of future climate and earth system changes and for human governance of climate change and the earth system
  - Long-term (multi-decadal) perspective on emissions is essential because of the long atmospheric residence time of CO_2
- **Findings**
  - Recent CO_2 emissions are unexpectedly higher than any of the SRES scenarios previously considered
  - This analysis has clear implications for long-term global equity and for burden sharing in global responses to climate change





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Worldwide emissions of man-made carbon dioxide are rising faster than even the worst case predictions made by scientists. The increase in CO_2 levels, which averaged 1.1% per year from 1990 to 1999, leaped to over 3% per year from 2000 to 2004.

We divided the world into nine regions and analysed population trends, economic factors and energy-related data for each region. We found that developed nations, representing 20% of the world's population, accounted for 59% of global human CO_2 emissions in 2004. Developing nations, including those with rapidly expanding economies, were responsible for just 41% of total emissions in 2004, but contributed 73% of emissions growth that year.

Even the most fossil fuel-intensive scenarios developed by the Intergovernmental Panel on Climate Change underestimated the rapid increase in CO2 levels since 2000. We attribute the observed trends to the increasing energy intensity of economic activity and the carbon intensity of energy sources. Our study shows that no region is decarbonizing its energy supply and that CO_2 emissions are accelerating worldwide, with China in the lead.

Michael R. Raupach, Gregg Marland, Philippe Ciais, Corinne Le Quéré, Josep G. Canadell, Gernot Klepper, and Christopher B. Field. 2007. Global and regional drivers of accelerating CO_2 emissions PNAS 104: 10288-10293.