Media Release

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Emissions rising faster this decade than last

The latest figures on the global carbon budget to be released in Washington and Paris today indicate a four-fold increase in growth rate of human-generated carbon dioxide emissions since 2000.

“This is a concerning trend in light of global efforts to curb emissions,” says Global Carbon Project (GCP) Executive-Director, Dr Pep Canadell, a carbon specialist based at CSIRO in Canberra.

Releasing the 2007 data, Dr Canadell said emissions from the combustion of fossil fuel and land use change almost reached the mark of 10 billion tonnes of carbon in 2007.

Using research findings published last year in peer-reviewed journals such as *Proceedings of the National Academy of Sciences*, *Nature* and *Science*, Dr Canadell said atmospheric carbon dioxide growth has been outstripping the growth of natural carbon dioxide sinks such as forests and oceans.

The new results were released simultaneously in Washington by Dr Canadell and in Paris by Dr Michael Raupach, GCP co-Chair and a CSIRO scientist.

Dr Raupach said Australia’s position remains unique as a developed country with rapidly growing emissions.

“Since 2000, Australian fossil-fuel emissions have grown by two per cent per year. For Australia to achieve a 2020 fossil-fuel emissions target 10 per cent lower than 2000 levels, the target referred to by Professor Garnaut this month, we would require a reduction in emissions from where they are now by 1.5 per cent per year. Every year of continuing growth makes the future reduction requirement even steeper.”

The Global Carbon Project (GCP) is a joint international project on the global carbon cycle sponsored by the International Geosphere-Biosphere Programme (IGBP), the International Human Dimensions Programme on Global Environmental Research (IHDP), and the World Climate Research Program.

The research team included Corinne Le Quéré (University of East Anglia/British Antarctic Survey, UK), Philippe Ciais (Commissariat a L'Energie Atomique, France), Thomas Conway (NOAA, USA), Chris Field (Carnegie Institution of Washington, USA), Skee Houghton (Woods Hole Research Center, USA), Gregg Marland (Carbon Dioxide Information Analysis Center, USA), and Drs Canadell and Raupach.

Image available at:

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Background

Key figures released today include –

Atmospheric CO_2 growth
Annual mean growth rate of atmospheric CO_2 was 2.2 ppm per year in 2007 (up from 1.8 ppm in 2006), and above the 2.0 ppm average for the period 2000-2007. The average annual mean growth rate for the previous 20 years was about 1.5 ppm per year. This increase brought the atmospheric CO_2 concentration to 383 ppm in 2007, 37% above the concentration at the start of the industrial revolution (about 280 ppm in 1750). The present concentration is the highest during the last 650,000 years and probably during the last 20 million years. [ppm = parts per million].

Emissions from land use change
Land use change was responsible for estimated net emissions of 1.5 PgC per year to the atmosphere. This is largely the difference between CO_2 emissions from deforestation and CO_2 uptake by reforestation. Emissions for 2006 and 2007 were extrapolated from the previous 25-year trend of 1.5 PgC per year. Land use change emissions come almost exclusively from deforestation in tropical countries with an estimated 41% from South and Central America, 43% from South and Southeast Asia, and 17% from Africa. An estimated 160 PgC were emitted to the atmosphere from land use change during the period 1850-2007 [1 Pg = 1 billion tons or 1000 x million tons].

Emissions from fossil fuel and cement
Emissions increased from 6.2 PgC per year in 1990 to 8.5 PgC in 2007, a 38% increase from the Kyoto reference year 1990. The growth rate of emissions was 3.5% per year for the period of 2000-2007, an almost four fold increase from 0.9% per year in 1990-1999. The actual emissions growth rate for 2000-2007 exceeded the highest forecast growth rates for the decade 2000-2010 in the emissions scenarios of the Intergovermental Panel on Climate Change, Special Report on Emissions Scenarios (IPCC-SRES). This makes current trends in emissions higher than the worst case IPCC-SRES scenario. Fossil fuel and cement emissions released approximately 348 PgC to the atmosphere from 1850 to 2007.

Regional fossil fuel emissions
The biggest increase in emissions has taken place in developing countries, largely in China and India, while developed countries have been growing slowly. The largest regional shift was that China passed the U.S. in 2006 to become the largest CO_2 emitter, and India will soon overtake Russia to become the third largest emitter. Currently, more than half of the global emissions come from less developed countries. From a historical perspective, developing countries with 80% of the world's population still account for only 20% of the cumulative emissions since 1751; the poorest countries in the world, with 800 million people, have contributed less than 1% of these cumulative emissions.

Carbon intensity of the economy
After decades of improvements, the carbon intensity of the global economy, the carbon emitted per unit of Gross Domestic Product (GDP), was stalled during the period 2003-2005. This change was largely caused by China's rapidly growing share in economic output and carbon emissions. Since 2005 China's energy intensity (which underpins carbon intensity) has decreased (improved) by 1.2% in 2006 and 3.7% in 2007 compared to 2005 levels (according to the National Energy Administration in China).

CO_2 removal by natural sinks
Natural land and ocean CO_2 sinks have removed 54% (or 4.8 PgC per year) of all CO_2 emitted from human activities during the period 2000-2007. The size of the natural sinks has grown in proportion to increasing atmospheric CO_2. However, the efficiency of these sinks in removing CO_2 has decreased by 5% over the last 50 years, and will continue to do so in the future. That is, 50 years ago, for every ton of CO_2 emitted to the atmosphere, natural sinks removed 600 kg. Currently, the sinks are removing only 550 kg for every ton of CO_2 emitted, and this amount is falling.

Natural Ocean CO_2 sinks
The global oceanic CO_2 sink removed 25% of all CO_2 emissions for the period 2000-2007, equivalent to an average of 2.3 PgC per year. The size of the CO_2 sink in 2007 was similar to that in the previous year but lower by 0.1 PgC compared to its expected increase from atmospheric CO_2 growth. This was due to the presence of a La Nina event in the equatorial Pacific. The Southern Ocean CO_2 sink was higher in 2007 compared to 2006, consistent with the relatively weak winds and the low Southern Annular Mode (a circumpolar pressure oscillation between Antarctica and southern mid-latitudes). An analysis of the long term trend of the ocean sink shows a slower growth than expected of the CO_2 sink over the last 20 years.

Natural Land CO_2 sinks
Terrestrial CO_2 sinks removed 29% of all anthropogenic emissions for the period 2000-2007, equivalent to an average of 2.6 PgC per year. Terrestrial ecosystems removed 2.9 PgC in 2007, down from 3.6 Pg in 2006, largely showing the high year-to-year variability of the sink. An analysis of the long term trend of the terrestrial

sink shows a growing size of the CO_2 sink over the last 50 years.

Conclusions. Anthropogenic CO_2 emissions have been growing about four times faster since 2000 than during the previous decade, and despite efforts to curb emissions in a number of countries which are signatories of the Kyoto Protocol. Emissions from the combustion of fossil fuel and land use change reached the mark of 10 billion tones of carbon in 2007. Natural CO_2 sinks are growing, but more slowly than atmospheric CO_2, which has been growing at 2 ppm per year since 2000. This is 33% faster than during the previous 20 years. All of these changes characterize a carbon cycle that is generating stronger climate forcing and sooner than expected