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Earth 'heading for 6C' of warming

By Richard Black

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Fossil fuel emissions are rising with GDP, particularly in developing countries

Average temperatures across the world are on course to rise by up to 6C without urgent action to curb CO2 emissions, according a new analysis.

Emissions rose by 29% between 2000 and 2008, says the Global Carbon Project.

All of that growth came in developing countries; but a quarter of it came through production of goods for consumption in industrialised nations.

The study comes against a backdrop of mixed messages on the chances of a new deal at next month's UN climate summit.

According to lead scientist Corinne Le Quere, the new findings should add urgency to the political discussions.

“ If we want to be staying below 2C then it's true to say we've only got a few years to curb emissions ”

Richard Betts, UK Met Office

Earth Watch: What's binding?

"Based on our knowledge of recent trends and the time it takes to change energy infrastructure, I think that the Copenhagen conference next month is our last chance to stabilise at 2C in a smooth and organised way," she told BBC News

"If the agreement is too weak or if the commitments are not respected, it's not two and a half

or three degrees that we will get, it's five or six - that's the path that we are on right now."

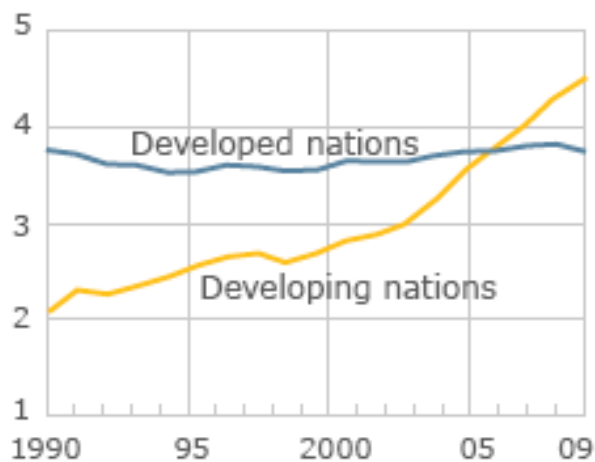
Professor Le Quere, who holds posts at the UK's University of East Anglia and the British Antarctic Survey, is lead author on the study that is published in the journal Nature Geoscience.

Rising sinks

The Global Carbon Project (GCP) is a network of scientists in academic institutions around the world.

Fossil fuel emissions

CO₂ (PgC per year)



Source: GCP / Nature

It uses just about every source of data available, from atmospheric observations to business inventories, to build up a detailed picture of carbon dioxide emissions, carbon sinks, and trends.

Before about 2002, global emissions grew by about 1% per year.

Then the rate increased to about 3% per year, the change coming mainly from a ramping up in China's economic output, before falling slightly in 2008 as the global economy dipped towards recession.

Endorsing similar projections from the International Energy Agency, the GCP suggests emissions will fall by about 3% during 2009 before resuming their rise as the recession ends.

Concentrations in the atmosphere also show an upward trend - as monitored at stations such as Mauna Loa in Hawaii - but at a lower rate.

The team believes that carbon sinks - the oceans and plants - are probably absorbing a slightly lower proportion of the carbon dioxide from fossil fuel emissions than they were 50 years ago, although researchers admit that uncertainty about the behaviour of sinks remains high.

“ In one sense, the developed world owns a large fraction of the developing

world's emissions



John Finnegan, CSIRO

Industrial emissions have climbed, but those from land use change have remains constant.

As a consequence, the proportion of global emissions coming from deforestation has fallen - about 12% now compared with 20% in the 1990s.

"One implication of this low fraction is that there is only limited scope for rich nations to offset emissions by supporting avoidance of deforestation in tropical countries like Indonesia and Brazil," observed Michael Rapauch from the Australian government research agency CSIRO and co-chair of the GCP.

A mechanism for Reducing Emissions from Deforestation and forest Degradation (REDD) is due to be concluded at next month's summit.

Future plans

Richard Betts, head of climate impacts at the UK Met Office and an author on the chapter of the 2007 Intergovernmental Panel on Climate Change (IPCC) report dealing with the effects of a changing atmosphere, suggested the report ought to be of interest to policymakers in the run-up to the Copenhagen summit.

CLIMATE CHANGE GLOSSARY

Select a term from the dropdown:

Glossary
Adaptation
Annex I countries
Annex II countries
Anthropogenic climate change
Atmospheric aerosols
Bali action plan
Bali roadmap
Baseline for cuts
Black carbon
Boxer-Kerry bill
Business as usual
Cap and trade
Carbon capture and storage (CCS)
Carbon dioxide (CO₂)
Carbon dioxide (CO₂) equivalent
Carbon intensity
Carbon leakage
Carbon neutral
Carbon offsetting
Carbon sequestration
Certified Emission Reduction (CER)
Clean Coal Technology
Clean Development Mechanism (CDM)
Climate change
CFCCO₂
COP15
Dangerous climate change
Deforestation
Emission Trading Scheme (ETS)
EU Burden-sharing agreement
Fossil_fuels
Geological sequestration
Global average temperature
Global energy budget
Global dimming
Global warming
Greenhouse gases (GHGs)
Greenhouse effect
IPCC
Joint implementation
Kyoto Protocol
Major Economies Forum on Energy and Climate
Methane
Mitigation
Natural greenhouse effect
Non-annex I countries
Per-capita emissions
Pre-industrial levels of carbon dioxide
REDD
Stern review
Technology transfer
UNFCCC
Waxman-Markey energy bill
Weather

CO₂ - The chemical formula for carbon dioxide, a gas in the Earth's atmosphere, which occurs naturally and is also a by-product of human activities, such as burning fossil fuels.

It is the principal greenhouse gas produced by human activity.

[Suggest additions](#)

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"It's an important step towards understanding

what we're doing to the world's carbon budget," he said.

However, he questioned the conclusion that society is necessarily on a trajectory leading towards 6C.

The IPCC plots out a number of "scenarios" - visions of how society might develop in terms of the size of the human population, economic growth and energy use - each of which comes with projected ranges of temperature rise.

Although the GCP study suggests society is on one of the high emission (and therefore high temperature rise) pathways, Dr Betts cautioned that it was too soon to discern a long term trend.

"Year-to-year changes in the global economy have quite an effect, and it's too early to discern longer term, robust changes," he said.

"However, if we continue to let emissions rise without mitigation, there's a strong chance we'll hit 4C and beyond.

"If we want to be staying below 2C then it's true to say we've only got a few years to curb emissions."

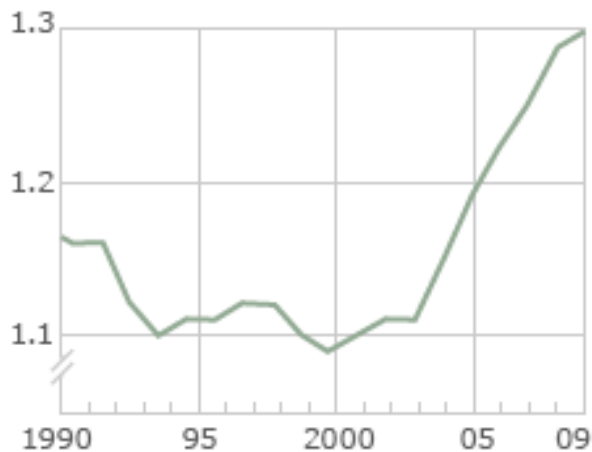
These temperature rises - measured against a 19th Century baseline - would be expected to occur around the end of this century or the middle of next century, said Professor Le Quere.

Border controls

One of the most intriguing findings from the study is the difference between the emissions produced directly by a given nation and the emissions generated through production of the goods and services consumed by its citizens.

Global emissions per capita

Tonnes of carbon per year



Source: GCP / Nature

Emissions from within the UK's borders, for example, fell by 5% between 1992 and 2004, says the GCP analysis.

However, emissions from goods and services consumed in the UK rose by 12% over the same period.

"The developed world has exported to the developing world the emissions it would have produced had it met its growing appetite for consumer goods itself for the last two decades," said CSIRO's John Finnegan.

"In one sense, the developed world owns a large fraction of the developing world's emissions."

Another of the analyses shows that per-capita emissions across the globe are rising.

On average, each human now consumes goods and services "worth" 1.3 tonnes of carbon - up from 1.1 tonnes in 2000.

The GCP analysis suggests that constraining the global temperature rise to 2C would entail reducing per-capita emissions to 0.3 tonnes by 2050.

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