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Curbing climate change 'unlikely'

By Richard Black

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Rising concentrations of greenhouse gases may have more serious impacts than previously believed, a major new scientific report has said.

The report, published by the UK government, says there is only a small chance of greenhouse gas emissions being kept below "dangerous" levels.

It fears the Greenland ice sheet is likely to melt, leading sea levels to rise by seven metres over 1,000 years.

The poorest countries will be most vulnerable to these effects, it adds.

The report, "Avoiding Dangerous Climate Change", collates evidence presented by scientists at a conference hosted by the UK Meteorological Office in February 2005.

The conference set two principal objectives: to ask what level of greenhouse gases in the atmosphere is too much, and what are the options for avoiding such levels?

In the report's foreword, UK Prime Minister Tony Blair writes: "It is clear from the work presented that the risks of climate change may well be greater than we thought.

"It is now plain that the emission of greenhouse gases, associated with industrialisation and economic growth from a world population that has increased six-fold in 200 years, is causing global warming at a rate that is unsustainable."

Vulnerable ecosystems

One collection of scientific papers sets out the impacts associated with various levels of temperature increase.

"Above a one degree Celsius increase, risks increase significantly, often rapidly for vulnerable ecosystems and species," concludes Bill Hare from the Potsdam Institute of Climate Impact Research in Germany, who produced an overview of more than 70 studies of impacts on water

resources, agriculture and wildlife.

"In the one to two degree range, risks across the board increase significantly, and at a regional level are often substantial," he writes.

"The biggest problem does not seem to be the technologies or the costs, but overcoming the many political, social and behavioural barriers to implementing mitigation options."

Bert Metz and Detlef van Vuuren

"Above two degrees the risks increase very substantially, involving potentially large numbers of extinctions or even ecosystem collapses, major increases in hunger and water shortage risks as well as socio-economic damages, particularly in developing countries."

The European Union has adopted a target of preventing a rise in global average temperature of more than two Celsius.

That, according to the report, might be too high, with two degrees being enough to trigger melting of the Greenland ice sheet.

This would have a major impact on sea levels globally, though it would take up to 1,000 years to see the full predicted rise of seven metres.

Unfeasible targets

A key task undertaken by some scientists contributing to the report was to calculate which greenhouse gas concentrations in the atmosphere would be enough to cause these "dangerous" temperature increases.

Currently, the atmosphere contains about 380 parts per million (ppm) of carbon dioxide, the principal greenhouse gas, compared to levels before the industrial revolution of about 275ppm.

"For achieving the two Celsius target with a probability of more than 60%, greenhouse gas concentrations need to be stabilised at 450 ppm CO₂-equivalent or below," conclude Michel den Elzen from the Netherlands Environmental Assessment Agency and Malte Meinshausen of the US National Center for Atmospheric Research.

"A stabilisation at 450 ppm CO₂-equivalent requires global emissions to peak around 2015, followed by substantial overall reductions in the order of 30%-40% compared to 1990 levels in 2050."

A rise of two Celsius, researchers conclude, will be enough to cause:

- Decreasing crop yields in the developing and developed world
- Tripling of poor harvests in Europe and Russia
- Large-scale displacement of people in north Africa from desertification
- Up to 2.8bn people at risk of water shortage
- 97% loss of coral reefs
- Total loss of summer Arctic sea ice causing extinction of the polar bear and the walrus
- Spread of malaria in Africa and north America

Technological hope

On the other question asked at the 2005 conference - what are the options for avoiding dangerous concentrations in greenhouse gas emissions - the report is more equivocal.

Technological options do exist, it concludes, such as ways to increase energy efficiency, renewable energy sources, and "clean coal" processes.

Financial mechanisms which can increase their uptake, such as emissions trading, are also in existence.

The big issue is how quickly they will be adopted, and by what proportion of governments.

"For all stabilisation strategies, the biggest problem does not seem to be the technologies or the costs, but overcoming the many political, social and behavioural barriers to implementing mitigation options," conclude Bert Metz and Detlef van Vuuren of the Netherlands Environmental Assessment Agency.

"There is a multitude of potential obstacles, ranging from lack of awareness, vested interests, prices not reflecting environmental impacts, cultural and behavioural barriers to change and, in the case of spreading technologies to developing countries, the lack of an effective enabling environment for new investments."

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