Emissions Reduction Targets and the
Great Barrier Reef
November 2009

The State of the Climate

“Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.”

Scientific research from multiple independent sources indicates that the emission of greenhouse gases by human activities is the primary cause of the observed global average warming of 0.7°C over the past century. Australia’s land and sea temperatures are currently warming at the global average rate. Furthermore, emissions over the past century have already committed us to a future increase in global average temperature of at least 1°C.

The most recent evidence shows that the climate is changing more rapidly than earlier thought likely. This underscores the need for immediate action to both reduce greenhouse gas emissions caused by human activities that are responsible for climate change, and to adapt to the changes we cannot prevent.

“What target would prevent dangerous interference in the natural and social systems we rely on? This depends not only on scientific assessments but also on the level of risk we are prepared to take. More than 100 nations have endorsed the goal of limiting average global warming to no more than 2°C above the preindustrial temperature. Such an average increase, however, will inevitably lead to significant impacts in many locations and on many sectors. For example, highly sensitive systems such as ice sheets, coral reefs, coastal settlements, alpine ecosystems, and regions of marginal agriculture would be under considerable risk even at this warming scenario.

A stabilisation level of no more than 450 parts per million in the concentration of CO₂-equivalent greenhouse gases in the atmosphere could achieve, at best, an even chance of constraining warming below the 2°C target. To achieve even this 50:50 chance of avoiding 2°C of warming would require global emissions to peak no later than 2020, and then decline to 80-90 per cent below 2000 emissions by 2050. To have a realistic chance of achieving this target, emissions from industrialised countries in 2020 need to be reduced by at least 25 per cent relative to their 2000 levels.


temperatures were elevated by only 1-2°C. Some parts of the GBR have still not fully recovered. Ocean acidification is accelerating and, in combination with thermal stress, has already detrimentally affected the growth and skeletal strength of corals on the GBR. Ocean acidification will impact all marine calcifying organisms, potentially disrupting the entire ecology of the world’s oceans, resulting in severe socio-economic impacts on fisheries and other marine industries. Coral cover is already declining on the GBR and globally. Loss of coral cover reduces biodiversity, ultimately affecting ecosystem services such as fishing, tourism, coastal protection and World Heritage values. Climate change has negatively affected even the most remote and well-managed reefs for the past 25 years. Reefs of the Coral Sea are particularly vulnerable because of their isolation and consequent lower rates of re-seeding from neighbouring reef systems. Local action can help bolster the resilience of reefs to climate change, and promote their recovery from natural and man-made stresses. It is critically important to prevent the replacement of corals by algae, by reducing polluted runoff from land and by protecting stocks of herbivorous fishes. However, reefs cannot be “climate-proofed” by local actions alone.

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The effects of atmospheric concentrations above 450 parts per million CO₂ equivalent and the consequent likely temperature increase of more than 2°C on the GBR will be devastating, particularly given the impacts


observed so far with only one-third this amount of warming. Bleaching events will increase in severity and frequency, further reducing coral cover. Increasing ocean acidification will continue to hamper coral regrowth. Reef-associated organisms will continue to decline as coral cover dwindles. The Great Barrier Reef Outlook Report 2009 indicates that at CO₂ equivalent concentrations above 450 parts per million, most of the Reef's ecosystem components will be severely threatened.

This evidence base supports an emissions reduction target of at least 25 per cent by 2020 in order to stabilise atmospheric CO₂ levels below 450 parts per million, and thereby allow the prospect that the GBR can be inherited by future generations of Australians. Local leadership and concerted global action are both critical to achieving this target.


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“Coral reefs are in the frontline of the effects of climate change.”