Australian Academy of Science

RESPONSE TO THE SETTING AUSTRALIA'S POST-2020 TARGET FOR GREENHOUSE GAS EMISSIONS ISSUES PAPER

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Australian Academy of Science response to the 'Setting Australia's post-2020 target for greenhouse gas emissions' issues paper

About the submission

The Australian Academy of Science welcomes the opportunity to provide a response to the 'Setting Australia's post-2020 target for greenhouse gas emissions' issues paper. The Academy promotes scientific excellence, disseminates scientific knowledge, and provides independent scientific advice for the benefit of Australia and the world. The Academy is made up of over 470 of Australia's leading scientists, each elected for their outstanding contribution to science. The Academy would be pleased to provide further information or explanation on any of the points made in this submission.

Fellows of the Academy have collaborated with other leading climate experts to develop this submission in response to issues one and three outlined in the issues paper. These relate to the Australian Government's request for advice on what Australia's post-2020 target for greenhouse gas emissions should be, and actions required to achieve a post-2020 target.

Summary

Building on the Australian Government's commitment of achieving at least a 5% reduction of emissions levels by 2020 (relative to year 2000 emissions), the Academy recommends that based on the best available evidence, a **2030 emissions reduction target of 30–40% below 2000 levels** is consistent with approaching zero carbon emissions by 2050, and broadly in line with the level of global emissions reductions considered necessary to limit future human-induced global warming to not more than 2°C above preindustrial levels.

This target would ensure that the common but differentiated responsibilities of nations—based on the social and economic condition of Australia as required by the UNFCCC (article 3.1)—could be met.

While it is not possible to avoid all climate change, meeting the above global reduction target would avoid the most serious impacts of human-induced climate change on Australia and the world. The likely impacts of strong greenhouse warming include:

- increased frequency and severity of extreme weather events, including unprecedented heat extremes
- significant impacts on agricultural production arising from changes in extreme weather events and rainfall patterns
- large sea level rise, with serious impacts in Australia and major dislocations in coastal megacities of south Asia, south-east Asia and China
- potential displacement of people in low lying islands
- significant negative impacts on natural systems such as the Great Barrier Reef.

The enclosed publication by the Australian Academy of Science, 'The science of climate change: Questions and answers', provides further details about the future impacts of climate change on Australia.[1] These changes would impact negatively on the Australian economy, and on the lifestyle,

health and wellbeing of ourselves and future generations.

The evidence summarised in this submission represents the consensus of the vast majority of climate scientists and other relevant experts in Australia and overseas. While the exact magnitude of future change is not certain, enough is known to take action now to manage the risks of climate change by making significant reductions in greenhouse gas emissions. Even if the magnitude of future climate change comes in at the low end of projections, significant emissions reductions are required to limit warming to under 2°C.

Our choice

The choices that the global community makes at the Paris Conference of the Parties at the end of 2015 will play a role in determining the future climate of the Earth. **Unmitigated emissions will lead to dangerous levels of climate change**. We cannot avoid all climate change but significant, urgent and sustained emission reductions will limit impacts to more manageable levels.

Consequences of unmitigated emissions

Current trends in atmospheric greenhouse gas concentrations are following the highest scenario (RCP8.5) considered by the Intergovernmental Panel on Climate Change (IPCC) in their Fifth Assessment Report (AR5)[1]. The increasing concentrations of greenhouse gases, the most important of which is carbon dioxide, are a direct result of human-sourced emissions[2]. For the RCP8.5 scenario, the central estimate of global warming in 2100 relative to 1996 is just over 4°C, with a likely range of about 3°C to over 5°C. Warming is projected to be larger over land than the ocean with more frequent hot and fewer cold temperature extremes over most areas. Global temperatures have already warmed by 0.85°C over the last 160 years relative to pre-industrial levels.

For Australia[3], warming is projected to be slightly above the global average, resulting in rising winter snow-line elevations, more frequent and more severe hot extremes and less frequent cold extremes. Extreme rainfall events are projected to increase and annual average rainfall is expected to decrease over southwest Australia. Fire weather is projected to become more severe over most of southern Australia.

By 2100 for the RCP8.5 scenario, global-average sea level is expected to rise by between 52 and 98 cm relative to 1996[2], and has already risen 19 cm since 1900. A rise in mean sea level brings more frequent flooding and higher-impact storm surge events to coastal regions. Without emissions reductions, sea level will continue to rise for centuries after 2100 with major impacts on coastal infrastructure and the natural environment in Australia, and major dislocation in coastal megacities of south Asia, south-east Asia and China including the potential displacement of many millions of people from low-lying regions. Ongoing warming projected for the RCP8.5 scenario would likely lead to major ice loss from the Greenland ice sheet and a sea level rise from this contribution alone of 7 m over the subsequent centuries.

Other changes include warming and acidification of the oceans, both of which will severely impact the Great Barrier Reef, and major reductions in sea ice, particularly in the Arctic Ocean.

The enclosed publication outlines in further detail the potential impacts of climate change on Australia[1].

A finite budget of allowable emissions

The amount of global warming at any time is largely related to the cumulative amount of emissions of greenhouse gases from human-related sources since pre-industrial times[2]. Delaying emission reductions means that greater (and more rapid and costly) reductions will have to be made in later years to stabilise carbon dioxide concentration and climate. In addition, later emission reductions would result in a larger sea level rise by 2100.

To have a greater than two-thirds chance (i.e. a probability between 66 and 100%) of staying below a global average warming of 2°C relative to pre-industrial temperatures, cumulative carbon dioxide emissions (which are the dominant factor contributing to warming in the late 21st century and beyond) must be restricted to less than 790 billion tonnes of carbon, of which 515 billion tonnes were already emitted by 2011[2]. The remaining quota is equivalent to just 30 years of continued emissions at today's rate and even less than 30 years if emissions continue to rise. The net allowable quota is much less than estimated reserves of fossil fuels.

To achieve a 66% probability of remaining below the 2°C warming target, the IPCC AR5 estimated that global greenhouse gas emission reductions of 40 to 70% would be required by 2050 compared to 2010 emissions, with greenhouse gas emissions approaching zero or even net negative emissions before 2100[4,5]. To achieve such reductions will require rapid and sustained reductions in carbon dioxide emissions, with a view to emissions reaching zero during the latter half of the 21st century. As context, global carbon emissions over the past decade have increased at 2.5% per year.

Australian mitigation targets

Australia has one of the highest per capita greenhouse gas emissions in the world, at about 2 to 4 times higher than European countries[6]. Climate projections show Australia as substantially exposed to the negative impacts of climate change, and it would be in our national interest to encourage other nations to commit to strong greenhouse gas mitigation targets by actively contributing to agreements to limit global emissions.

Australia as a wealthy nation could be expected to have a higher commitment than poorer nations to mitigate its greenhouse gas emissions and to approach zero emissions by 2050. This is consistent with developed countries taking the lead in combating climate change, as required by the UNFCCC Article 3.1, ratified by Australia. It is also consistent with the most recent analyses for Australia in the United Nations Deep Decarbonisation Pathways report[7].

The Academy considers that a 2030 target of 30–40% reduction below 2000 levels would be consistent with progressing from the current national target of a 5% reduction by 2020 to a longer-term target of zero net emissions by around mid-century. This would also be compatible with Australia's share of global emission reductions seen as necessary to limit human-induced global warming to 2°C relative to pre-industrial levels. These targets are comparable to the commitments of other developed nations.

Investment in climate mitigation needs to be consistent with the long-term goal of becoming carbon neutral. Globally, zero net carbon emissions (carbon neutrality) are required to achieve climate stabilisation at any level on the longer term. A major step towards achieving this goal would be replacing fossil fuel-based energies with clean-renewable ones, and electrifying much of the transport system. Capturing and sequestering the emissions of fossil fuel-based energy sources can achieve some additional limited reductions, although this alone cannot avert the need to decarbonise the energy system. Land-based carbon mitigation options (e.g. reforestation and afforestation) are also insufficient to avert the need to decarbonise the energy system.

Conclusion

Reduction targets of 30–40% relative to 2000 for Australia are consistent with approaching zero net carbon emissions by 2050 and broadly consistent with the global goal of limiting future human-induced global warming to no more than 2°C above pre-industrial levels. It is in our national interest to have a strong and effective climate change policy in line with international standards that demonstrates international leadership to ensure effective global policies.

The Academy recognises that scientific evidence is only one of many inputs to decisions on appropriate emissions reduction targets for Australia. It considers it important, however, that the scientific evidence be fully factored into the decision process and is pleased to provide its recent document[1] on *'The science of climate change: questions and answers'*, as an objective, up-to-date summary of the science for that purpose. Based on scientific work on allowable carbon budgets, it recommends that 30–40% reduction targets relative to 2000 would be consistent with approaching zero net carbon emissions by 2050 and broadly in line with the level of greenhouse gas emission reductions seen as necessary to limit future human-induced global warming to no more than 2°C above pre-industrial levels.

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