Submission to the Inquiry into the Great Barrier Reef 2050 Partnership Program

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About the Climate Council

The Climate Council is an independent non-profit organisation funded by donations by the public. Our mission is to provide authoritative, expert advice to the Australian public on climate change. To find out more, visit: https://www.climatecouncil.org.au/

Terms of Reference Focus

This submission from the Climate Council focuses on the first term of reference (a); the ability of the Great Barrier Reef 2050 Partnership Program to support the delivery of the *Reef 2050 Long-Term Sustainability Plan*.

Climate Change and the Reef 2050 Plan

The Reef 2050 Plan was released by the Australian and Queensland governments in March 2015 and is the overarching framework for protecting and managing the Great Barrier Reef until 2050. The Plan is based on the Outlook Report 2014 on the Reef, and a two-year assessment with input from scientists, Traditional Owners, communities, non-government organisations and industries. A mid-term review of the Reef 2050 Plan is currently underway.

The Reef 2050 Plan aims to "ensure the Outstanding Universal Value of the Great Barrier Reef continues to improve each decade between now and 2050, ensuring the Reef remains a natural wonder for successive generations" (p. 1). The Reef 2050 Plan states that: "Climate change is the most significant threat to the future of coral reefs worldwide, especially through ocean acidification and increased temperatures" (p. 6). The Plan also states that "International efforts to reduce global climate change, combined with action at national and local levels to build the resilience of the Reef by reducing impacts, is the best insurance for protecting the Reef" (Commonwealth of Australia 2015a, p. 6).

In relation to domestic mitigation, the Reef 2050 Plan states that: "At home, Australia is committed to reducing its emissions to five per cent below 2000 levels by 2020" and that "Australia has more than met its emission reductions target for the first commitment period of the Kyoto Protocol" (Commonwealth of Australia, 2015b, p. 22). There is no analysis or assessment of the scientific rigour of Australia's emissions reduction targets in the Reef 2050 Plan.

Impacts of Climate Change on the Great Barrier Reef

The Climate Council has concerns about the ability of the *Great Barrier Reef Partnership Program* to deliver the goals and objectives of the Reef 2050 Plan. Preserving the Outstanding Universal Values of the Great Barrier Reef will not be possible if climate change - the greatest threat to the Great Barrier Reef - is not addressed.

The Great Barrier Reef was hit by unprecedented back-to-back bleaching events caused by extreme marine heatwaves during 2016 and 2017. The most severe bleaching during the 2016 event occurred in the northernmost section of the reef between Port Douglas and the

Torres Strait, where 93 percent of individual reefs were affected (Coral COE 2016). The most severe bleaching during the 2017 event occurred between Townsville and Cairns, extending towards Port Douglas (GBRMPA and AIMS 2017).

Corals are at risk of bleaching when sea surface temperatures reach 1-1.5°C above the seasonal maximum mean temperature (Baker et al. 2008). In 2016, the Great Barrier Reef recorded its hottest sea surface temperatures for February, March and April since records began in 1900 (BoM 2016). Scientists have calculated that the 2016 bleaching event was at least 175 times more likely to occur due to climate change (King et al. 2016).

Recent studies have shown that almost one third of the corals on the Great Barrier Reef died either during or after the 2016 bleaching event, with 75 percent of this mortality occurring in the northern section where heat exposure was most severe (Hughes et al. 2018; GBRMPA 2017). Fast-growing corals such as staghorn and tabular species suffered a mass die-off, reducing the three-dimensionality of the reef (Hughes et al. 2018). Coral mortality has reduced the availability of habitat for fish, leading to a decline in reef fish diversity (Richardson et al. 2018). Mean coral cover in the northern section of the reef is now at around 10 percent, the lowest on record. Mean coral cover on the central section declined over the past year from around 22 percent to 14 percent, largely as a result of the 2017 bleaching event (AIMS 2018).

The *Great Barrier Reef Partnership Program* is clearly focused on local management actions: improving water quality, addressing crown-of-thorns starfish, monitoring, community engagement, and research into restoration and adaptation. But in a world where greenhouse gas pollution continues unabated, local measures will be woefully inadequate to protect the Great Barrier Reef from the overarching threats of climate change (Wolff et al. 2018).

Last year, the UNESCO World Heritage Centre released a report showing that nearly half (13) of the 29 World Heritage-listed coral reefs were exposed to levels of heat stress that cause coral bleaching, on average, more than twice per decade during the 1985-2013 period (Heron et al. 2017). This frequency is unsustainable because coral communities take at least a decade to recover from severe bleaching (Hughes et al. 2018). The report further found that under a global business-as-usual (high end) emissions scenario, the Great Barrier Reef can expect severe bleaching to occur twice per decade by 2035, and annually by 2044 (see Figure 1 below) (Heron et al. 2017).

Reef-containing World Heritage site	Future Severe Stress - RCP8.5		Future Severe Stress - RCP4.5		Future Severe Stress - RCP2.6	
	(a) Projected Year of 2x/decade	(b) Projected Year of Annual	(c) Projected Year of 2x/decade	(d) Projected Year of Annual	(e) Projected Year of 2x/decade	(f) Projected Year of Annual
Great Barrier Reef	2035	2044	2041	2051	-----	-----
Lord Howe Island Group	2034	2043	2036	2055	-----	-----
Ningaloo Coast	2041	2049	2052	2074	-----	-----
Shark Bay, Western Australia	2038	2047	2045	2074	-----	-----
Belize Barrier Reef Reserve System	2028	2036	2036	2044	-----	-----
Brazilian Atlantic Islands	2028	2039	2035	2049	-----	-----
Malpelo Fauna and Flora Sanctuary	2038	2050	2056	2077	-----	-----
Cocos Island National Park	2019	2032	2028	2036	2062	-----
Area de Conservación Guanacaste	2030	2043	2040	2055	-----	-----
Galápagos Islands	2017	2036	2027	2042	2070	-----
Lagoons of New Caledonia	2031	2040	2039	2050	-----	-----
Komodo National Park	2017	2025	2021	2032	-----	-----
Ujung Kulon National Park	2032	2043	2042	2053	-----	-----
Ogasawara Islands	2030	2038	2041	2049	-----	-----
Phoenix Islands Protected Area	2020	2035	2028	2040	2038	-----
Gulf of California	2044	2052	-----	-----	-----	-----
Archipiélago de Revillagigedo	2031	2042	2043	2052	-----	-----
Sian Ka'an	2025	2033	2033	2041	-----	-----
Rock Islands Southern Lagoon	2028	2036	2032	2044	-----	-----
Coiba National Park	2030	2043	2040	2053	2053	-----
Tubbataha Reefs Natural Park	2030	2039	2037	2048	-----	-----
Aldabra Atoll	2028	2036	2034	2042	-----	-----
East Rennell	2025	2033	2030	2044	-----	-----
iSimangaliso Wetland Park	2031	2040	2036	2048	-----	-----
Sanganeb Marine National Park	2037	2046	2055	2069	-----	-----
Everglades National Park	2036	2044	2056	2071	-----	-----
Papahānaumokuākea	2029	2041	2044	2052	-----	-----
Ha Long Bay	2077	2086	-----	-----	-----	-----
Socotra Archipelago	2040	2048	2061	2077	-----	-----

Severe bleaching stress threshold defined as DHW of 8 °C-weeks.

Figure 1: Expected dates for onset of recurrent bleaching events on world heritage listed coral reefs globally based on different emissions scenarios (source: Heron et al. 2017).

Another study has found that if greenhouse gas pollution continues unabated, the extreme marine heatwaves that occurred around the Great Barrier Reef in 2016 may occur every two years by 2034 (CoECSS 2016). Numerous other studies show that limiting global average temperature rise to no more than 1.5°C above pre-industrial levels is critical for the long-term survival of warm water coral reefs worldwide (see Frieler et al. 2013; Schleussner et al. 2016). Even under a temperature rise of just 1.5°C, the fraction of coral reef locations at risk of long-term degradation and an eventual ecosystem shift would be around 70 percent by 2100 (Schleussner et al. 2016).

Currently, the voluntary emissions reduction pledges that countries have made, including through their Nationally Determined Contributions (NDCs) to the Paris Agreement, put the world on track for a global average temperature rise above pre-industrial levels of 2.6°C - 3.2°C by 2100. According to current policies that are currently planned or underway, the world is on track for an even greater global average temperature rise of 3.1-3.7°C above pre-industrial levels by 2100 (Climate Action Tracker 2017). If all countries were to adopt emissions reduction targets with similarly low ambition as Australia, the world would be on track for a global average temperature rise of around 3°C (Climate Action Tracker 2017).

The Climate Change Authority has recommended that Australia's emissions reduction targets be at least 40-60 percent below 2000 levels by 2030 (or 45-65 percent below 2005 levels). This target is based on a downscaled carbon budget for Australia, calculated from a global carbon budget with a 66 percent probability of limiting the global average temperature rise to no more than 2°C (Climate Change Authority 2015).

Limiting global temperature rise to no more than 1.5-2°C above pre-industrial levels requires global action, not just action from Australia. Nevertheless, it is abundantly clear

that Australia's emission reduction target of just 26-28 percent below 2005 levels by 2030 is not aligned with a future where the Great Barrier Reef's Outstanding Universal Values are preserved and protected. Instead, Australia's emissions reduction targets are aligned with a future where warm water coral reefs globally will collapse.

For more information about the deadly threat of climate change on coral reefs, please refer to the Climate Council's latest report: *Lethal Consequences: Climate Change Impacts on the Great Barrier Reef.* The report can be accessed here: https://climc.nl/2ywKu9v

Recommendation

1. To have any prospect of limiting global average temperature rise to around 1.5°C, the Australian Federal Government must commit to the upper end of the range of emissions reductions recommended by the Climate Change Authority in 2015; that is, a target of at least 60 percent below 2000 levels by 2030 (or 65 percent below 2005 levels) and net zero emissions by 2050 at the very latest, and preferably by 2040. Australia should also play a leadership role in global climate negotiations. These targets may need to be revised with the IPCC Special Report on the 1.5°C target, which is due to be released later this year. This report will propose carbon budgets consistent with the 1.5°C target.

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