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SUPPLEMENTARY EXPERT REPORT OF JOSEP G. CANADELL

Pabai & Anor v Commonwealth of Australia (VID622/2021)

13 February 2024

1. Please explain how the inclusion of non-CO2 greenhouse gas emissions, and warming due to those emissions, would change the answers to questions 4 and 5 in your expert report.

The calculations presented in questions 4 and 5 of the Expert Report (lodged 6/10/2023) were based on the Transient Climate Response to Cumulative CO_2 emissions, (TCRE): likely range of 1.0–2.3°C of global mean surface temperature per 1000 Petagrams of carbon emissions, with a best estimate of 1.65°C per 1000 Petagrams of carbon (0.45°C per 1000 $GtCO_2$).

In section 4.b.i, page 9, I subtracted the non-CO_2 emissions from the total GHG emissions of 307.63 $MtCO_2e$ to match the TCR requirements. Here, I do not subtract the non-CO_2 emissions and use the total GHG emissions reported by the Government based on CO_2equivalents in a 100-year timeframe as recommended by the IPCC methodological guidelines. Applying the TCRE relationship to all GHG CO_2e results in an avoided global mean surface temperature due to the counterfactual in Question 4 of 0.000138°C (uncertainty range: 0.0000839°C – 0.00019°C), instead of the central estimate warming of 0.00009°C due to CO_2 emissions-only reported Expert Report.

Applying the same process to the counterfactual in Question 5, section 5, b, i, the avoided global surface temperature is 0.000648°C (uncertainty range: 0.000393°C - 0.00090°C), instead of the central estimate avoided warming of 0.00045°C due to CO_2 emissions-only reported in the Expert Report.

2. Please provide a revised answer to question 4 in your expert report having regard to data (available or projected) for the entire period of 2014-present. Please also provide a revised and expanded version of Table 4.

The Australian Government makes available Australia's National Greenhouse Accounts through this website: https://greenhouseaccounts.climatechange.gov.au/(click on Emissions inventories, then Paris Agreement inventory). The Paris Agreement Inventory informs the National Determined Commitments (i.e., the national mitigation commitments). As per 13 February 2024, the last year available is 2021 as provided in the initial submission. Here, I

project emissions for 2022 and 2023 informed by the quarterly updates provided with slightly different accounting procedures, which shows that emissions over 2022 and 2023 were relatively flat (stable), Figure 1 in https://www.dcceew.gov.au/sites/default/files/documents/national-greenhouse-gas-inventory-june-2023.pdf . Thus, I project GHG emissions for 2022 and 2023 to be the same as emissions in 2021.

Below is an update of Table 4 in the first submission to "present," here as the end of 2023.

Based on the updated Table 4 and the new information provided in Question 1 of this report, the avoided warming from the counterfactual in Question 4 of the initial report would have been 0.000218°C (uncertainty range: 0.00013°C – 0.00030°C).

year	NGHGI Inventory 2005-2021 $MtCO_2e/yr$	Counterfactual 47% reduction implemented 2014-2025 $MtCO_2e/yr$	Difference $MtCO_2e/yr$
2005	616.29	616.29	0
2006	626.79	626.79	0
2007	641.52	641.52	0
2008	630.25	630.25	0
2009	630.91	630.91	0
2010	613.33	613.33	0
2011	594.03	594.03	0
2012	579.08	579.08	0
2013	562.10	562.10	0
2014	555.82	542.48	13.34
2015	540.91	522.86	18.05
2016	512.48	503.24	9.24
2017	509.81	483.62	26.19
2018	514.23	464	50.23
2019	505.86	444.38	61.48
2020	494.23	424.76	69.47
2021	464.77	405.14	59.63
2022	464.77	385.52	79.25
2023	464.77	365.9	98.87
2024		346.28	
2025		326.63	
Total			485.75

3. Please provide a revised answer to question 5 in your expert report having regard to data (available or projected) for the entire period of 2014-2024. Please also provide a revised and expanded version of Table 5.

Consistent with the processes followed in Question 2 of this Supplementary Report, Table 5 has been updated to include end of 2024 emissions.

year	**GHG Inventory 2005-2021** $MtCO_2e/yr$	**Counterfactual Zero emissions by 2024** $MtCO_2e/yr$	**Difference** $MtCO_2e/yr$
2013	562.10	562.10	0
2014	555.82	511	44.82
2015	540.91	459.9	81.01
2016	512.48	408.8	103.68
2017	509.81	357.7	152.11
2018	514.23	306.6	207.63
2019	505.86	255.5	250.36
2020	494.23	204.4	289.83
2021	464.77	153.3	311.47
2022	464.77	102.2	362.57
2023	464.77	51.1	413.67
2024	464.77	0	464.77
Total			2681.92

Based on this updated table and the new information in Question 1 of this Supplementary Report, the avoided warming of the counterfactual in Question 5 is 0.0012°C (uncertainty range: 0.00073°C - 0.0016°C).

In answering questions 2 and 3:

a. For the avoidance of doubt, please include consideration of non-CO2 greenhouse gas emissions (as discussed in question 1).
b. If, due to the absence of data on Australia's actual GHG emissions for part of the period of 2022 to present, you need to make an assumption as to what Australia's GHG emissions are for part of that period, please explain the assumption you are making and the reasons you are making that assumption.