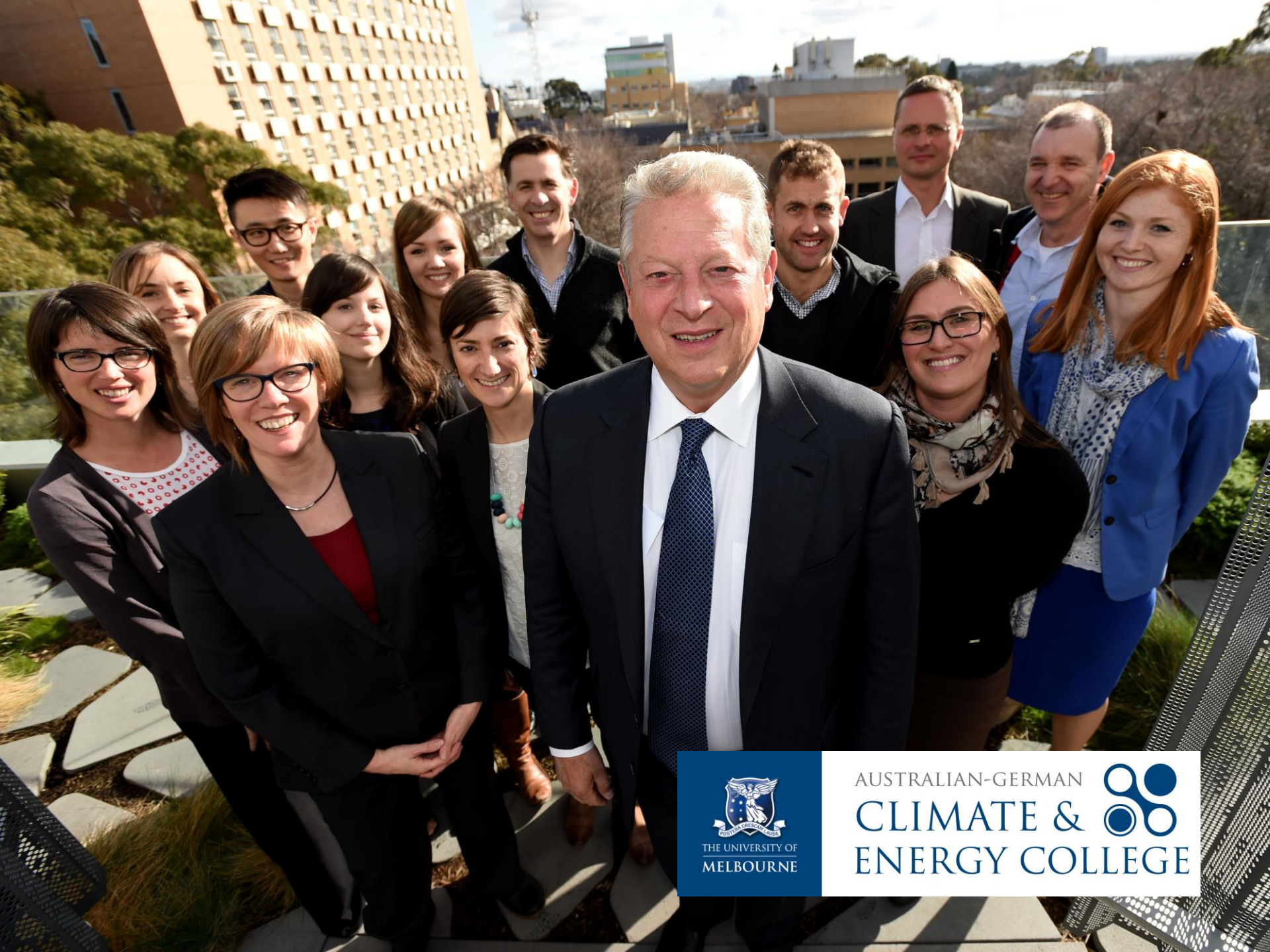


Leadership Forum on energy transition

A/Prof. Malte Meinshausen

18 April 2016

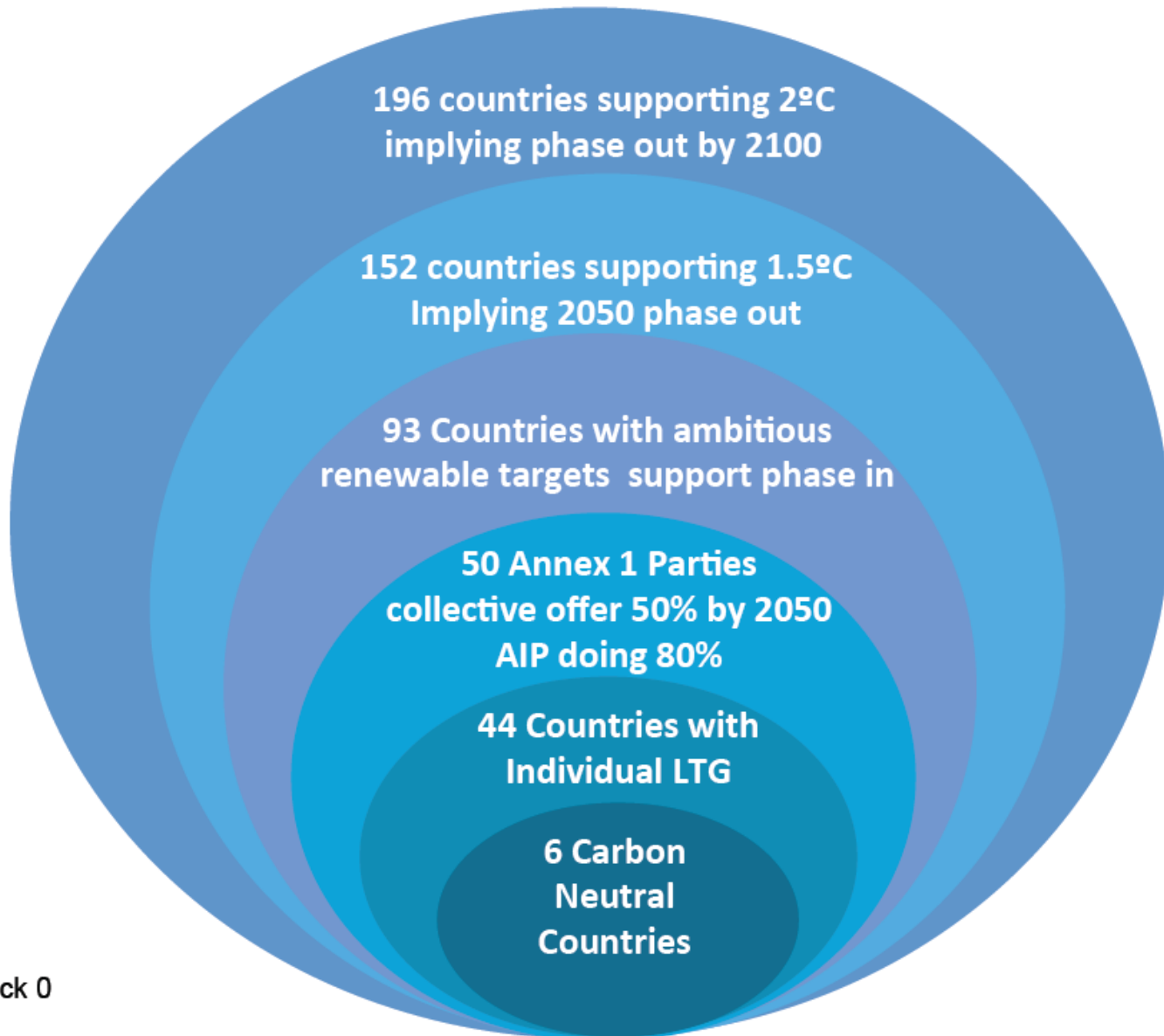




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*“I am making a strong call for governments to put us on a pathway to achieve **zero net emissions from the combustion of fossil fuels in the second half of this century**. Unlike the financial crisis, we do not have a ‘climate bailout’ option up our sleeve.”*

Angel Gurría, SG OECD

October 2013



FINANCIAL TIMES

TUESDAY 9 JUNE 2015

WORLD BUSINESS NEWSPAPER

UK £2.50 Channel Islands £2.80 Republic of Ireland €3.00

Tiger Mums tamed

China's rethink on pre-school cramming — NOTEBOOK, PAGE 12



Why is Isis winning?

How coalition air strikes have failed to deter the jihadists — BIG READ, PAGE 11

Wired workers

Using wearable gadgets to keep tabs on staff — PAGE 14

G7 in historic accord to phase out fossil fuel emissions this century

◆ \$100bn pledge to poor countries reaffirmed ◆ Huge challenge for energy companies

PILITA CLARK — LONDON
STEFAN WAGSTYL — ERON

The Group of Seven industrial powers has agreed that the world should phase out fossil fuel emissions this century, in a move hailed as a historic decision in the fight against climate change.

G7 leaders meeting in Bavaria, Germany, said that in line with scientific findings, "deep cuts in global greenhouse gas emissions are required with a decarbonisation of the global economy over the course of this century".

The leaders of the US, Germany, France, the UK, Japan, Canada and Italy said they supported cutting greenhouse gases by 40 to 70 per cent by 2050 from 2010 levels — the first time they have backed such a precise long-term target.

Angela Merkel, the German chancellor, said that the cuts would have to be at the upper end of this target because "40 per cent is clearly not enough".

The leaders also reaffirmed a pledge to mobilise \$100bn a year from public and private sources by 2020 to help poorer nations tackle climate change.

Climate campaigners said the decisions taken by the wealthiest democracies would boost talks among nearly 200 countries aimed at finalising a deal



Briefing

► Cameron U-turn on 'Brexit' vote

David Cameron has retracted a threat to ministers that they would have to quit if they wanted to campaign to leave the EU, scuppering an apparent bid to force discipline on Tory eurosceptics. — PAGE 3; EDITORIAL COMMENT, PAGE 11; GIDEON RACHMAN, PAGE 13

► Iceland poised for big step to recovery

Iceland has laid out plans to lift its capital controls, taking a step towards recovery from a crisis sparked by its three largest banks, which collapsed with assets 10 times the size of its economy. — PAGE 10

► Ex-Centrica chief to lead oil and gas push

Former Centrica chief Sam Laidlaw is to take the helm of a private equity push into oil and gas that is backed by Carlyle and CVC Capital Partners and is to spend up to \$5bn. — PAGE 17; LOMBARD, PAGE 21; NORTH SEA DEALS, PAGE 23



► Relief as Tories shelve paid leave drive

David Cameron's plans to revive his push to give bigger companies' employees three days of paid leave each year for voluntary work are being quietly axed, to the relief of some business leaders. — PAGE 2

► Bids invited for military fire service

Companies including Serco, Babcock and Capita have been invited to bid to run the military fire and rescue services, the latest Ministry of Defence outsourcing deal in its search for savings. — PAGE 4

► Syngenta rejects fresh Monsanto move

US agricultural seeds and chemicals company Monsanto's latest move in its pursuit of a "tax inversion" acquisition of Syngenta was rejected as "inadequate" by the Swiss group. — PAGE 17

► Japan growth beats expectations

The expectation-busting 3.9 per cent first-quarter growth in Japan makes it less likely that the country





B-Team in Paris, COP21

- For governments to commit to a **global goal of net-zero greenhouse-gas emissions by 2050**, and to embed this in the agreement to be signed at COP21 in Paris.
- For businesses to match this ambition by committing to long-term targets and driving low-carbon solutions to scale – thereby enabling the world to achieve the net-zero 2050 target.
- For both businesses and governments to adopt meaningful and effective carbon pricing.
- For governments to end all fossil fuel subsidies, and to shift this capital to help scale affordable renewable energy solutions to enable a wider economic transformation.
- For both businesses and governments to ensure the benefits of responses to climate change flow to vulnerable and impoverished communities that suffer disproportionately from climate change and are least equipped to cope with its impacts.



May 1992.

2. “Conference of the Parties” means the Conference of the Parties to the Convention.
3. “Party” means a Party to this Agreement.

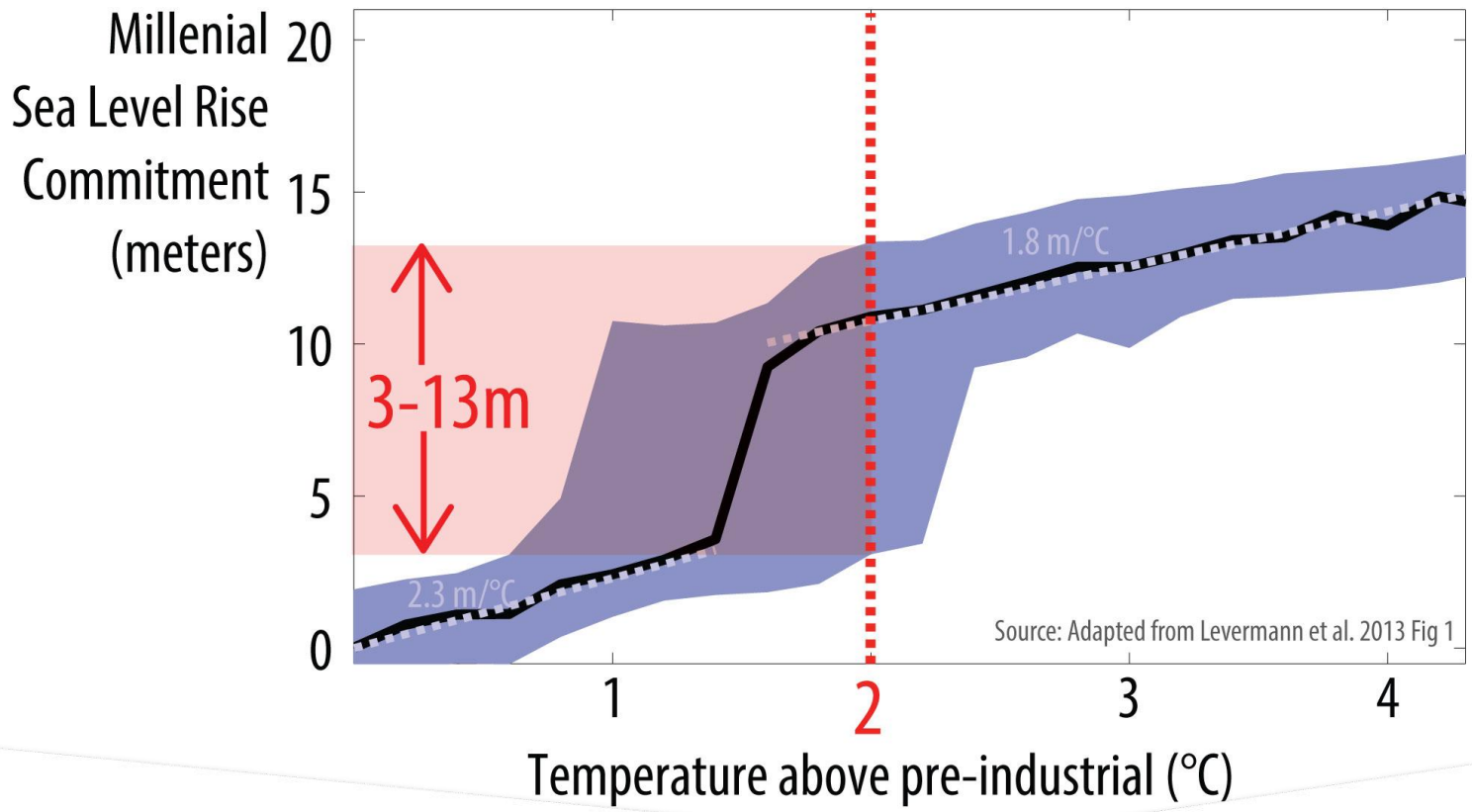
Article 2

1. This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:
 - (a) Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;
 - (b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production;
 - (c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.
2. This Agreement will be implemented to reflect equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances.

Article 3

As nationally determined contributions to the global response to climate change, all Parties are to undertake and communicate ambitious efforts as defined in Articles 4, 7, 9, 10, 11 and 13 with the view to achieving the purpose of this Agreement as set out in Article 2. The efforts of all Parties will represent a progression over time, while recognizing the need to support developing country Parties for the effective implementation of this Agreement.

Is 2°C safe? Or 1.5°C?



The multimillennial sea-level commitment of global warming

Anders Levermann^{a,b,1}, Peter U. Clark^c, Ben Marzeion^d, Glenn A. Milne^e, David Pollard^f, Valentina Radic^g, and Alexander Robinson^{h,i}

^aPotsdam Institute for Climate Impact Research, 14473 Potsdam, Germany; ^bInstitute of Physics, Potsdam University, 14476 Potsdam, Germany; ^cCollege of Earth, Ocean, and Atmospheric Sciences, Oregon State University, Corvallis, OR 97331; ^dInstitute of Physics, Potsdam University, 14476 Potsdam, Germany; ^eCollege of Environmental Systems Institute, Pennsylvania State University, University Park, PA 16802; ^fCenter for Climate and Cryosphere, Institute for Meteorology and Environmental Sciences, University of Vienna, Vienna, Austria; ^gDepartment of Earth Sciences, University of Ottawa, Ottawa, ON, Canada K1N 6N5; ^hEarth and Environmental Sciences, University of Manchester, Oxford Road, Manchester, M13 9PL, UK; ⁱInstituto de Geociencias, Universidad Complutense de Madrid, Madrid, Spain

Edited by John C. Moore, College of Global Change and Earth System Science, Beijing, China, and accepted by the Editorial Board June 13, 2013 (received for review November 7, 2012)

Global mean sea level has been steadily rising over the last century, is projected to increase by the end of this century, and will continue to rise beyond the year 2100 unless the current and global mean temperature trend is reversed. Inertia in the climate and global carbon system, however, causes the global mean temperature to decline slowly even after greenhouse gas emissions have ceased, raising the question of how much sea-level commitment is associated for different levels of global mean temperature. Here we describe the models used and the resulting estimates of long-term sea-level rise from each component of the Earth system. We combine simulations from that contribute to sea-level change from the four main components of the Earth system. Our results show that the sea-level commitment is substantial even for a 1.5°C target, and that additional strategies are required to better constrain the sea-level commitment. Here we describe the models used and the resulting estimates of long-term sea-level rise from each component of the Earth system. We combine simulations from that contribute to sea-level change from the four main components of the Earth system. Our results show that the sea-level commitment is substantial even for a 1.5°C target, and that additional strategies are required to better constrain the sea-level commitment.

A scaling approach to project regional sea level rise and its uncertainties

M. Perrette¹, F. Landerer², R. Riva³, K. Frieler¹, and M. Meinshausen¹

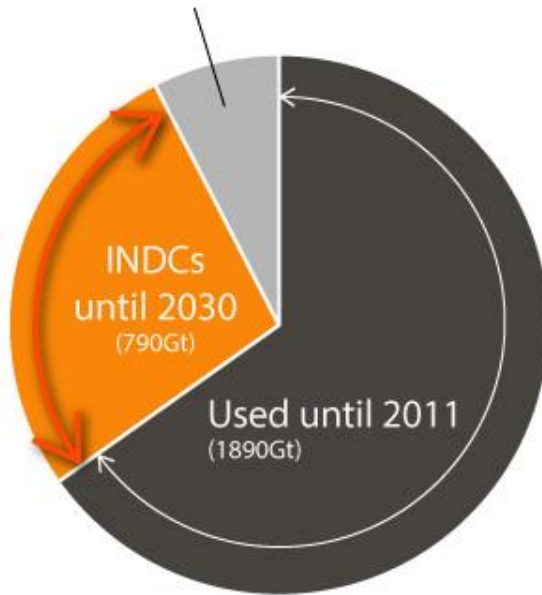
¹Potsdam Institute for Climate Impact Research (PIK) Telegrafenberg A26, 14412 Potsdam, Germany
²Jet Propulsion Laboratory/California Institute of Technology, Pasadena, CA, USA
³Dept. Geoscience and Remote Sensing and TU Delft Climate Institute, Delft University of Technology, Delft, The Netherlands

Earth Syst. Dynam., 4, 11–29, 2013
 www.earth-syst-dynam.net/4/11/2013/
 doi:10.5194/esd-4-11-2013
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Earth System Dynamics

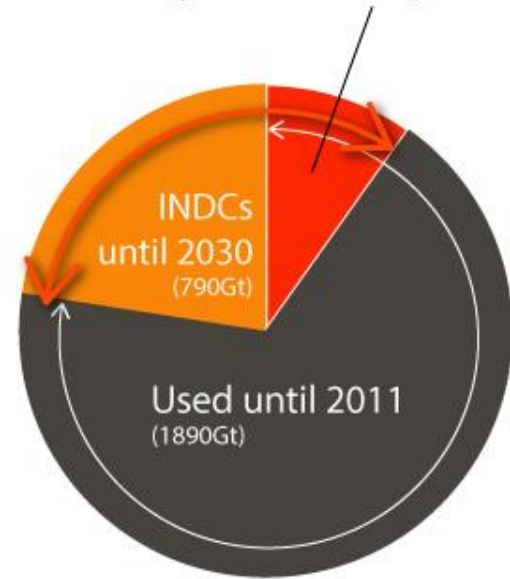
Is current ambition on track for 2°C or 1.5°C?

Leftover for after 2030: 220Gt



2°C carbon budget

1.5°C carbon budget exceeded by 2030: 240Gt



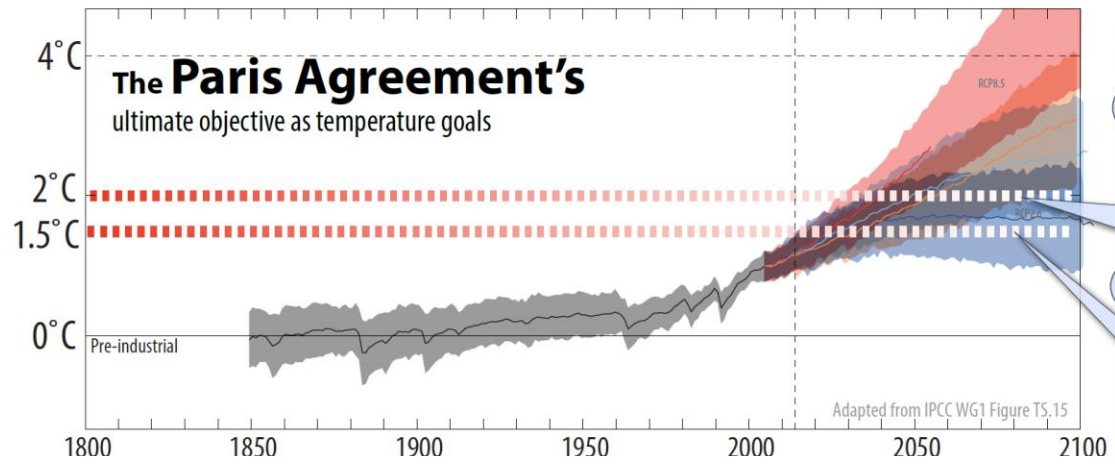
1.5°C carbon budget

#Facts4Paris

purpose of this Agreement as set out in Article 2. The efforts of all Parties will represent a progression over time, while recognizing the need to support developing country Parties for the effective implementation of this Agreement.

Article 4

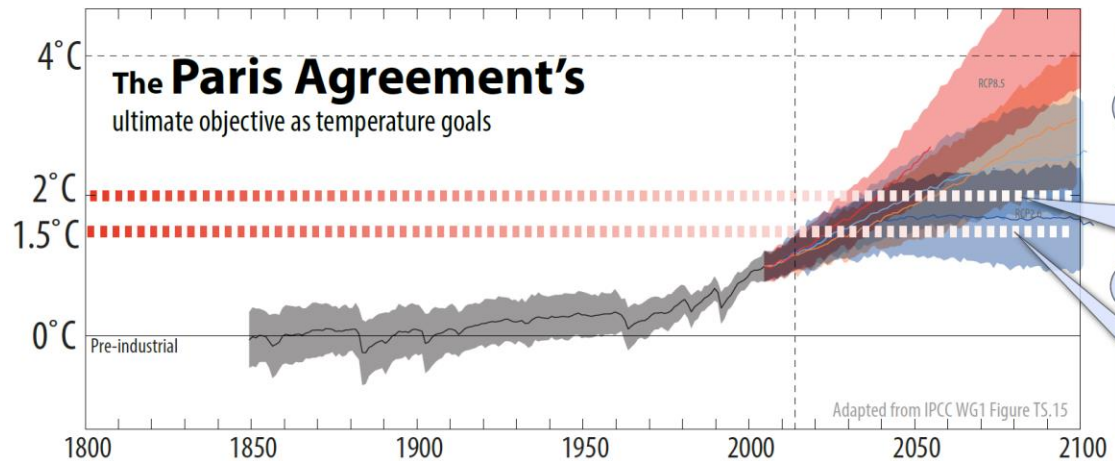
1. In order to achieve the long-term temperature goal set out in Article 2, Parties aim to reach global peaking of greenhouse gas emissions as soon as possible, recognizing that peaking will take longer for developing country Parties, and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty.
2. Each Party shall prepare, communicate and maintain successive nationally determined contributions that it intends to achieve. Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions.
3. Each Party's successive nationally determined contribution will represent a progression beyond the Party's then current nationally determined contribution and reflect its highest possible ambition, reflecting its common but differentiated responsibilities and respective capabilities, in the light of different national circumstances.
4. Developed country Parties should continue taking the lead by undertaking economy-wide absolute emission reduction targets. Developing country Parties should continue enhancing their mitigation efforts, and are encouraged to move over time towards economy-wide emission reduction or limitation targets in the light of different national circumstances.
5. Support shall be provided to developing country Parties for the implementation of this Article, in accordance with Articles 9, 10 and 11, recognizing that enhanced support for developing country Parties will allow for higher ambition in their actions.



The Ultimate Objective
of the Paris Agreement (Art. 2):

A
Keep temperatures
well below 2°C

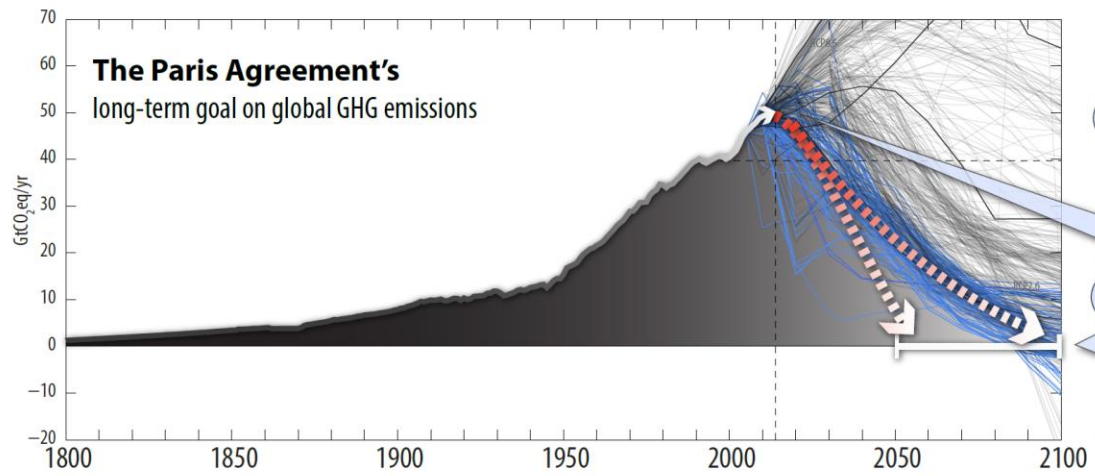
B
and to
Pursue efforts for 1.5°C



The Ultimate Objective of the Paris Agreement (Art. 2):

A
Keep temperatures well below 2°C

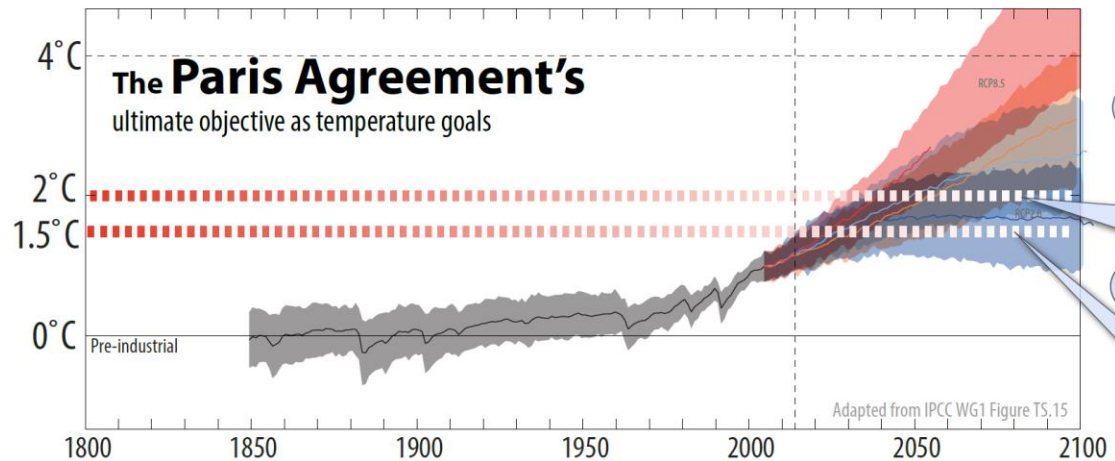
B
and to Pursue efforts for 1.5°C



The Long-Term Goal in the Paris Agreement (Art. 4):

C
Global peaking (as soon as possible) & "rapid reductions thereafter"

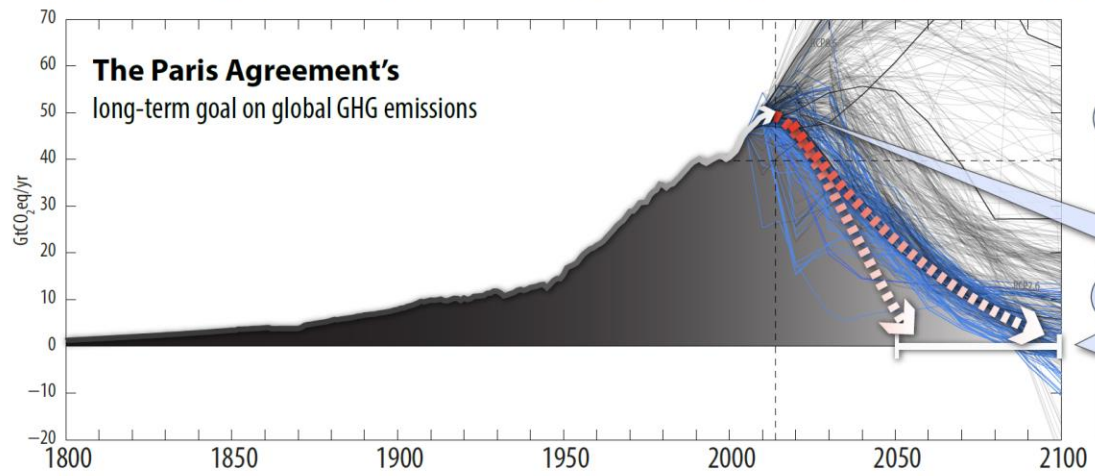
D
Net-Zero between 2050 and 2100, expressed as "balance between anthropogenic emissions by sources and removals by sinks in the second half of this century"



The Ultimate Objective
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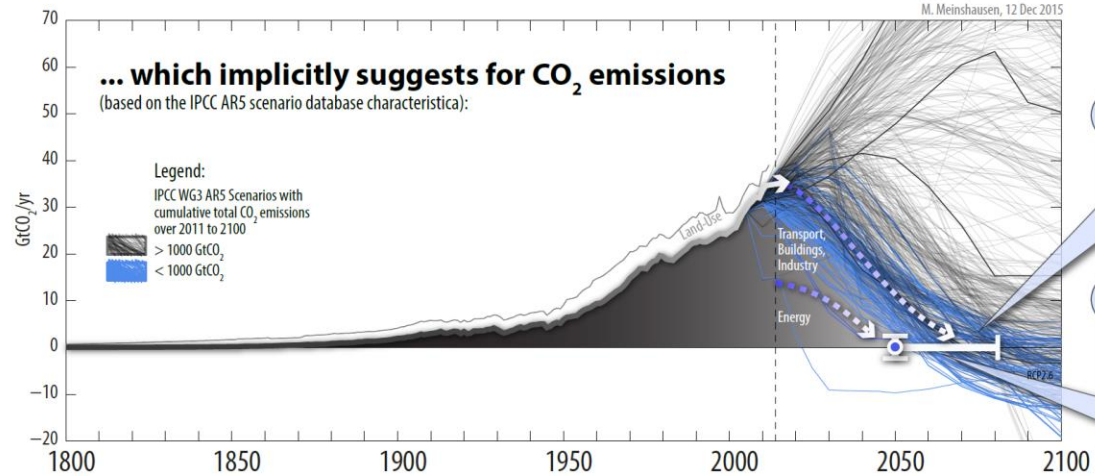
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The Long-Term Goal
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What implicitly follows
from the Paris Agreement:

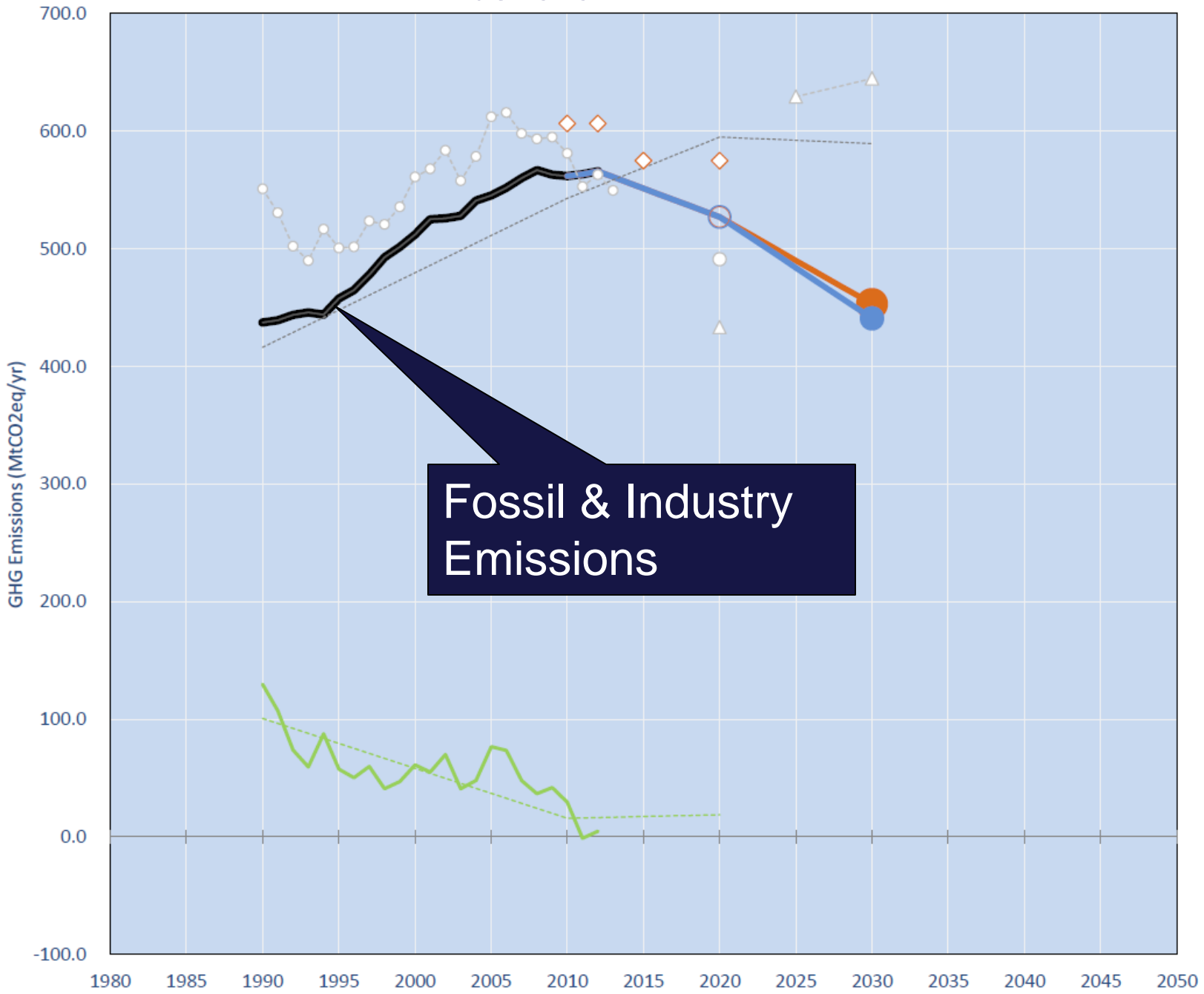
E
Full decarbonisation:
earlier than net zero GHG

F
Energy:
Zero net around 2050
see IPCC WG3 Figure SPM.7 on 450ppm scenarios with CCS

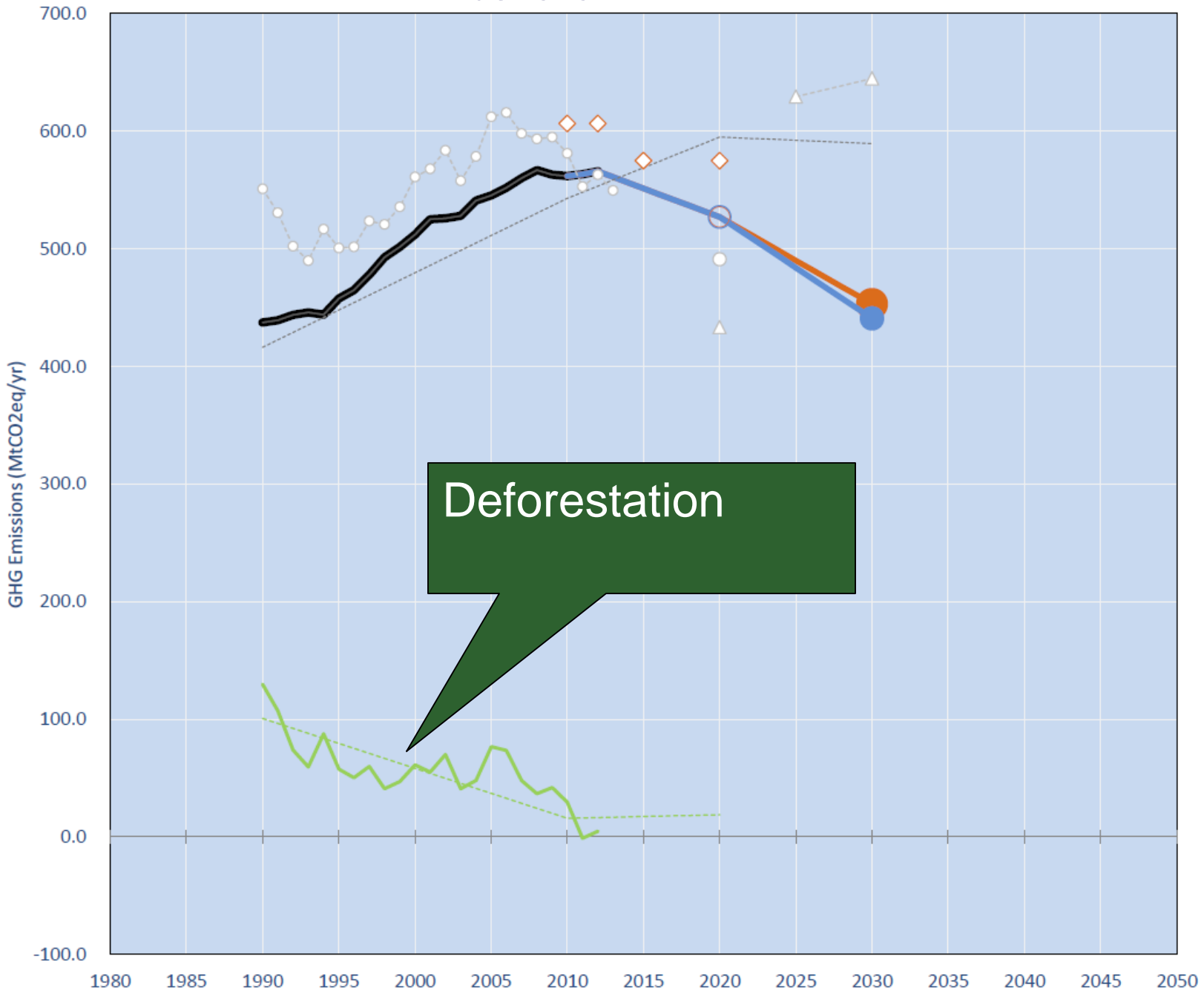
zero

It Co₂

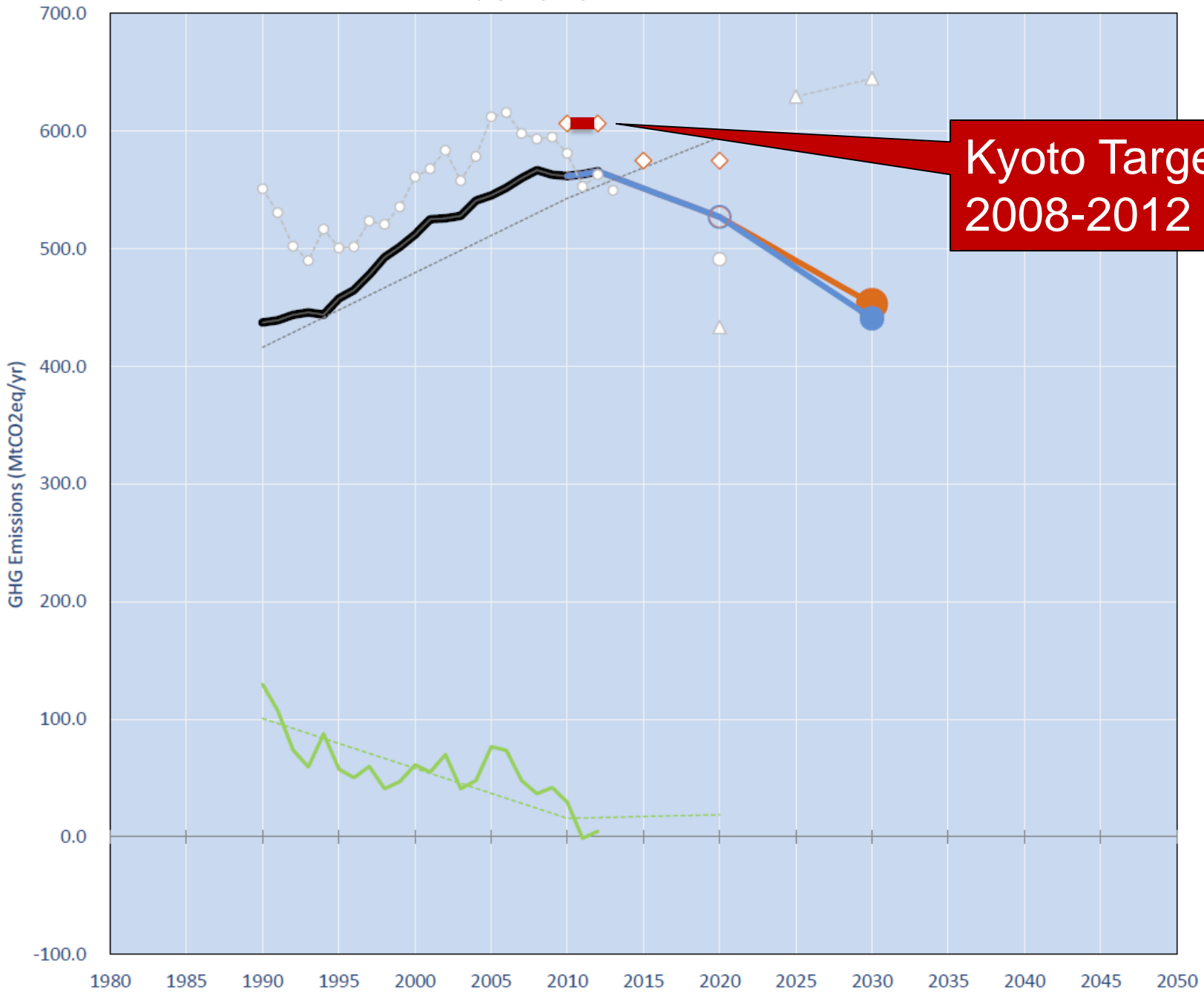
GHG Emissions Australia



GHG Emissions Australia

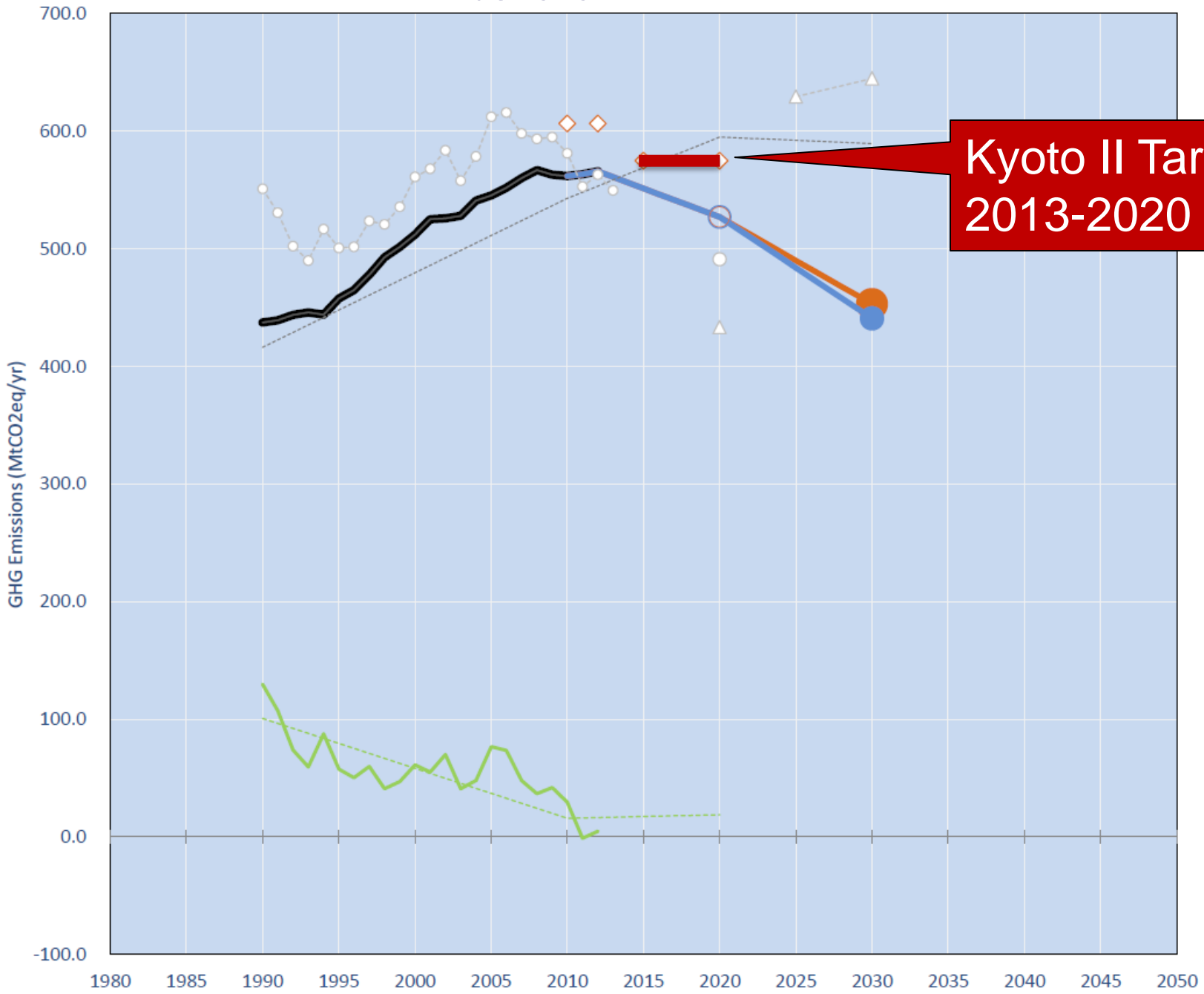


GHG Emissions Australia



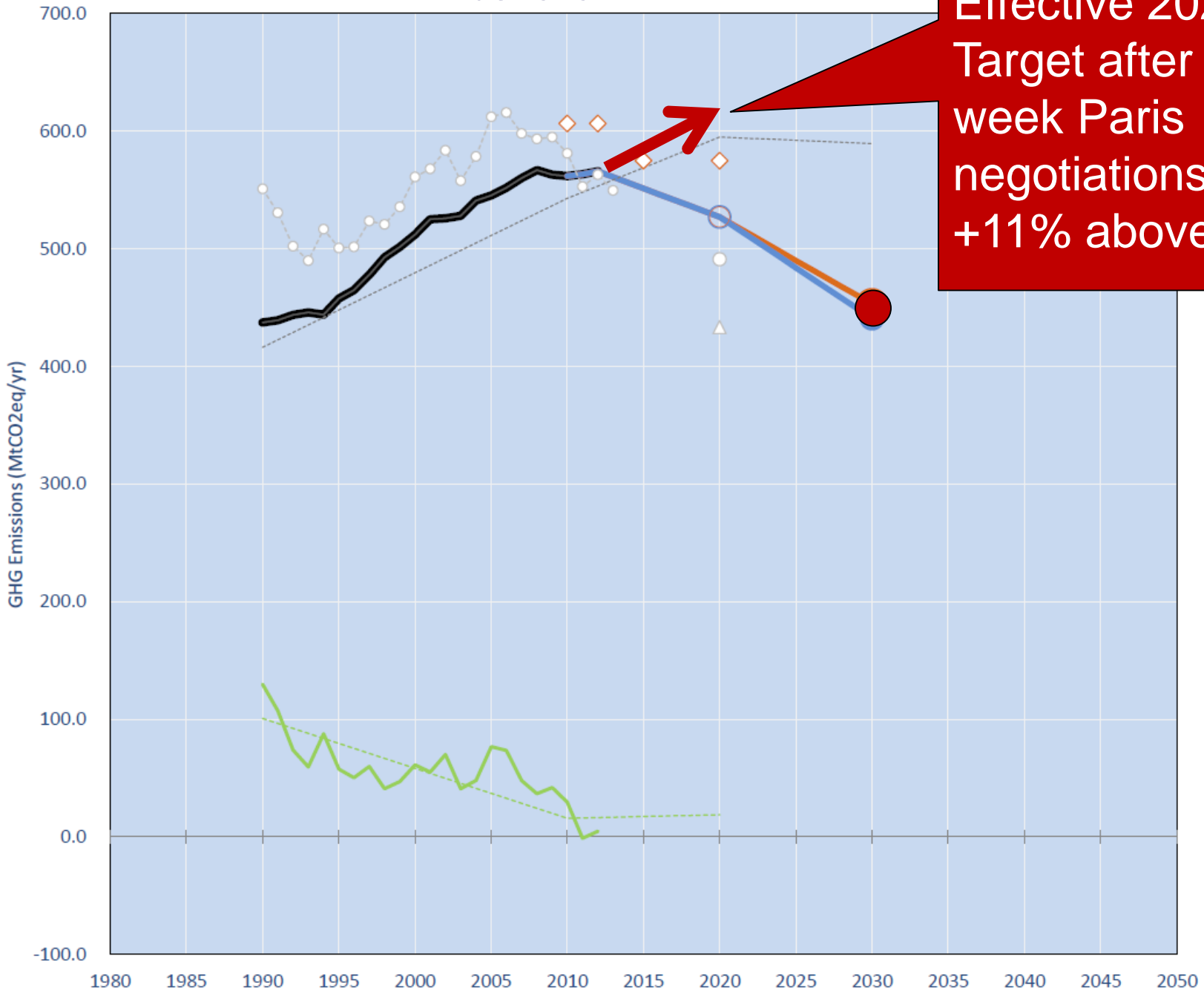
**Kyoto Targets
2008-2012**

GHG Emissions Australia



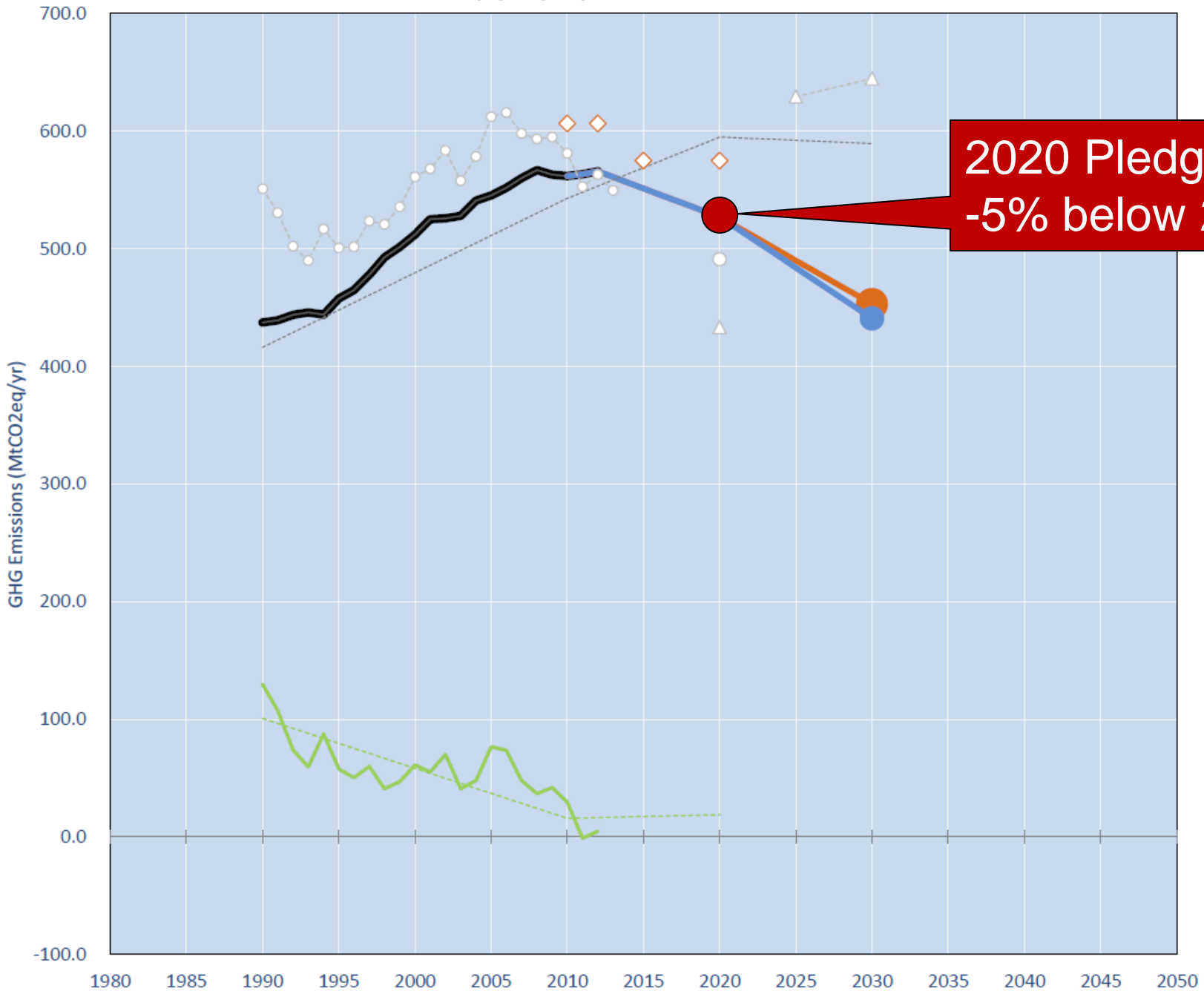
**Kyoto II Targets
2013-2020**

GHG Emissions Australia



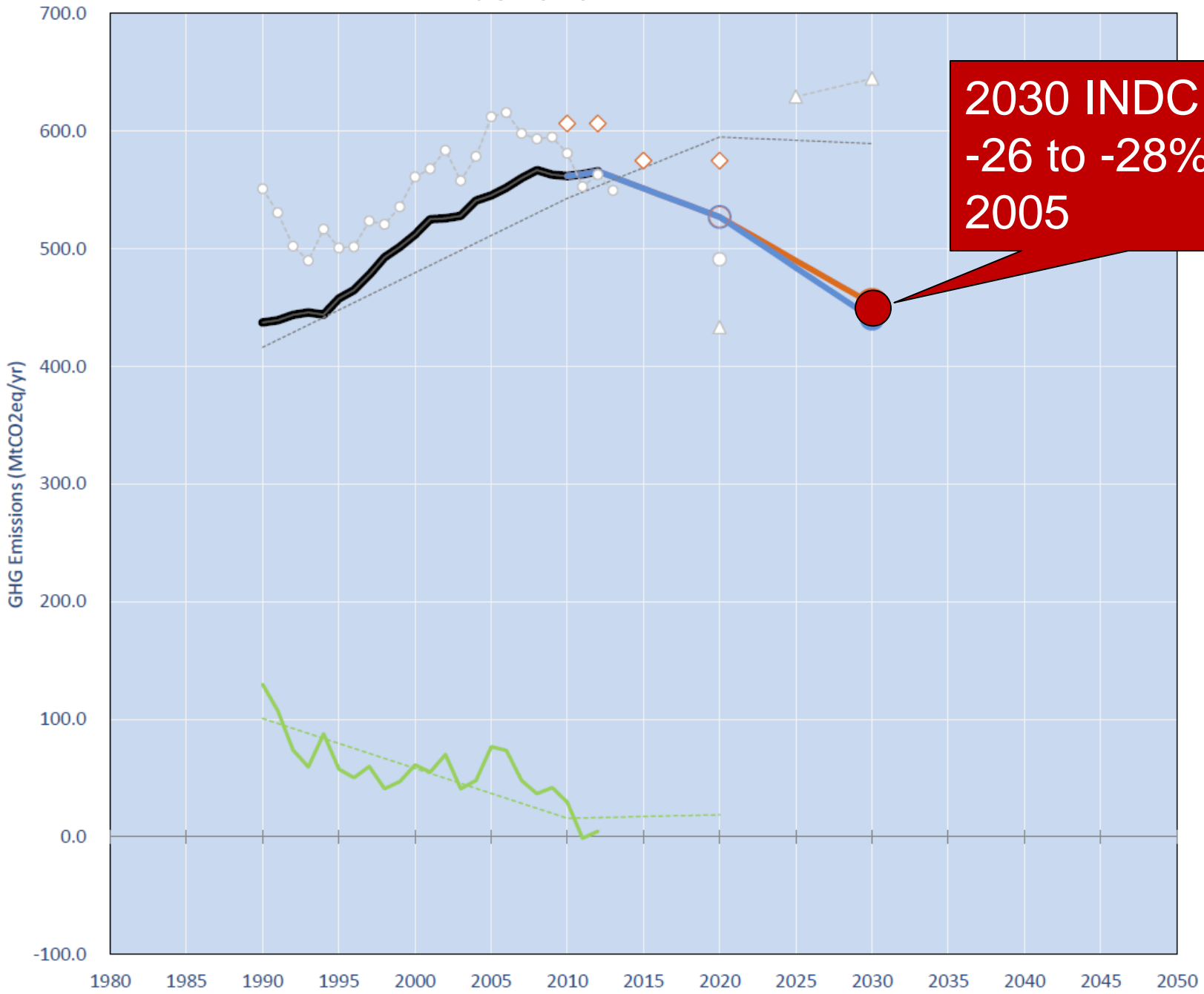
Effective 2020 Target after first week Paris negotiations: +11% above 2000

GHG Emissions Australia



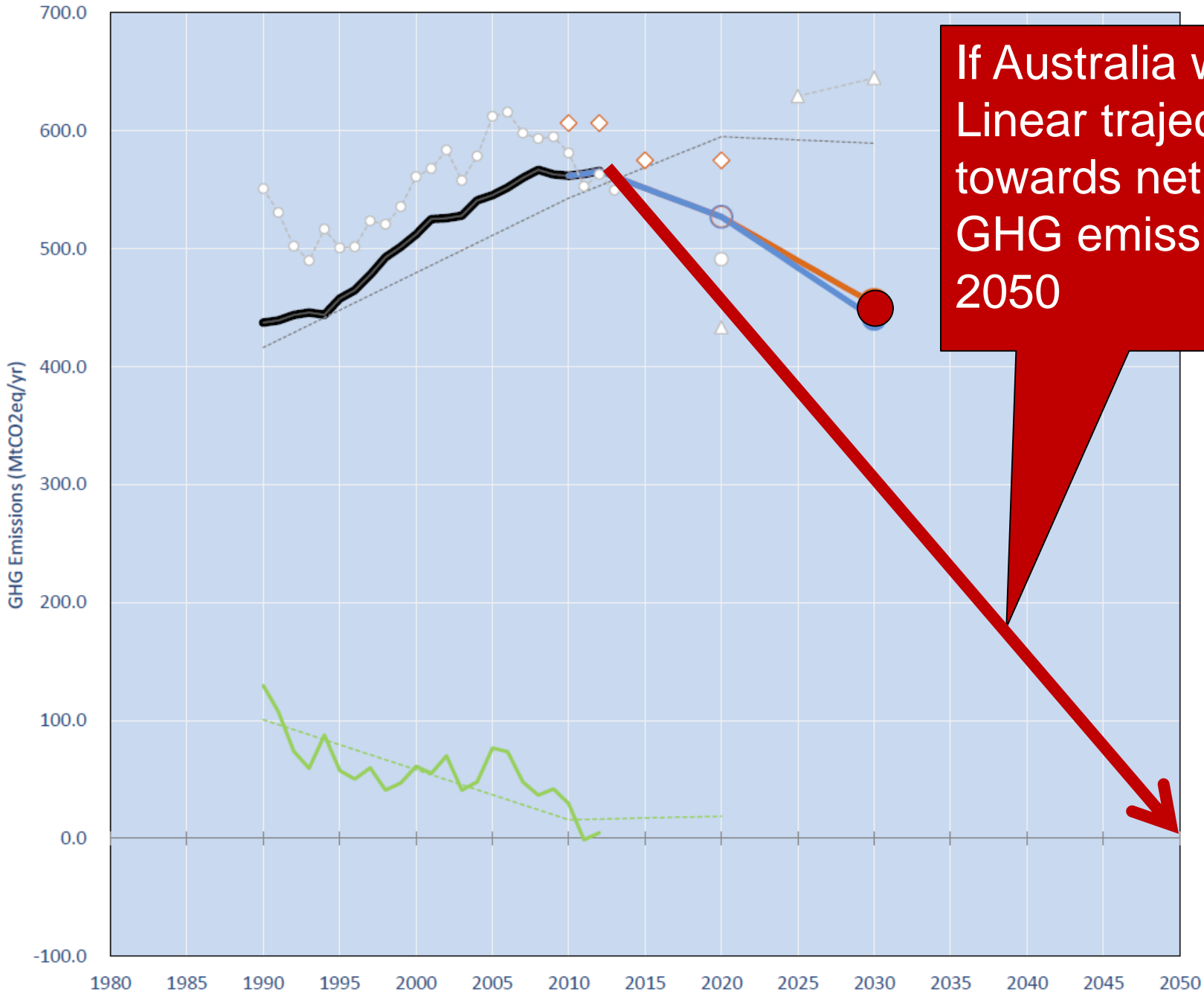
2020 Pledge
-5% below 2000

GHG Emissions Australia



2030 INDC
-26 to -28% below
2005

GHG Emissions Australia



- Our **INDC Factsheets** for individual countries at <http://www.climate-energy-college.net/indc-factsheets>
- **Facts4COP21** – Our collection of science material with relevance to climate negotiations: <http://www.climate-energy-college.net/facts4cop21>
- www.mitigation-contributions.org – Our interactive resource to examine “fair” national 2025 and 2030 targets.
- www.track0.org – Collection of material dedicated to **zero emission target**
- **UNFCCC Synthesis Report** (update coming 4th of May 2016)
- **UNEP GAP reports**



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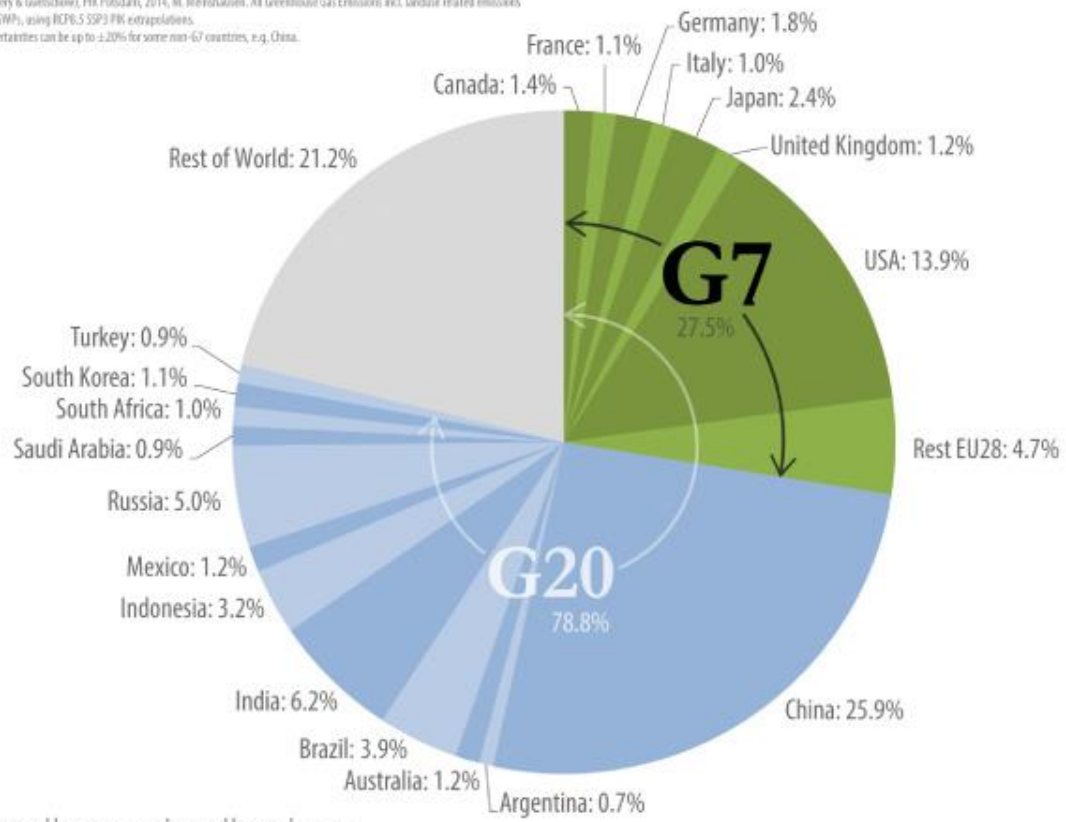


- Backup slides

World Greenhouse Gas Emissions 2014

Estimate (World: 52.6 GtCO₂eq)

Source: PRIMA (Jaffrey & Garmichael), PR Potsdam, 2014; M. Meinshausen. All Greenhouse Gas Emissions incl. Land use related emissions weighted with A19 GWP, using RCP6.5 SSP3 PK extrapolations.
Note: Emissions uncertainties can be up to ±20% for some non-G7 countries, e.g. China.



Current world emissions:
 1/4 G7 countries
 1/4 China
 1/4 Rest of G20
 1/4 Rest of World

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The window for action is rapidly closing

65% of our carbon budget compatible with a 2° C goal already used



AR5 WGI SPM

IPCC AR5 Synthesis Report

ipcc
INTERGOVERNMENTAL PANEL ON climate change



UN CLIMATE CHANGE CONFERENCE
LIMA COP20 CMP10

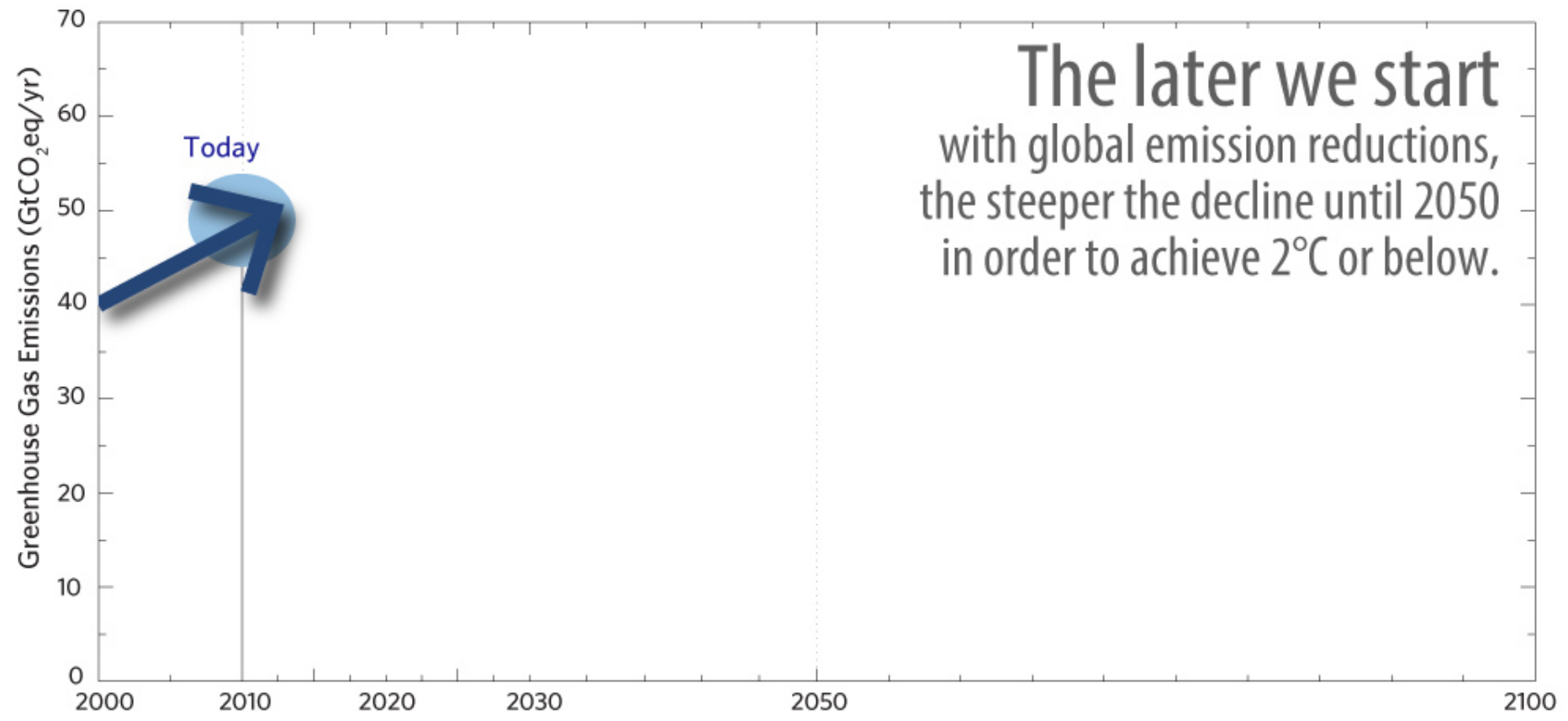


ipcc





The effect of delay.



The later we start with global emission reductions, the steeper the decline until 2050 in order to achieve 2°C or below.

