International Partnership on Mitigation and MRV

INDCs submitted with a view on the global goal

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Potsdam Institute for Climate Impact Research

AUSTRALIAN-GERMAN CLIMATE & ENERGY COLLEGE

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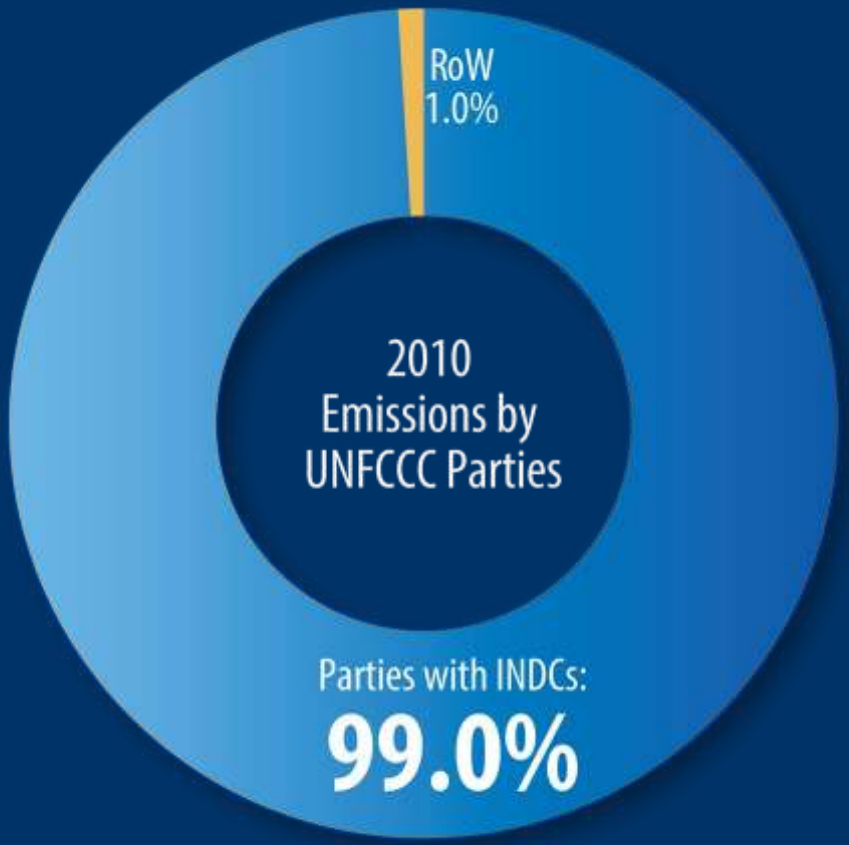
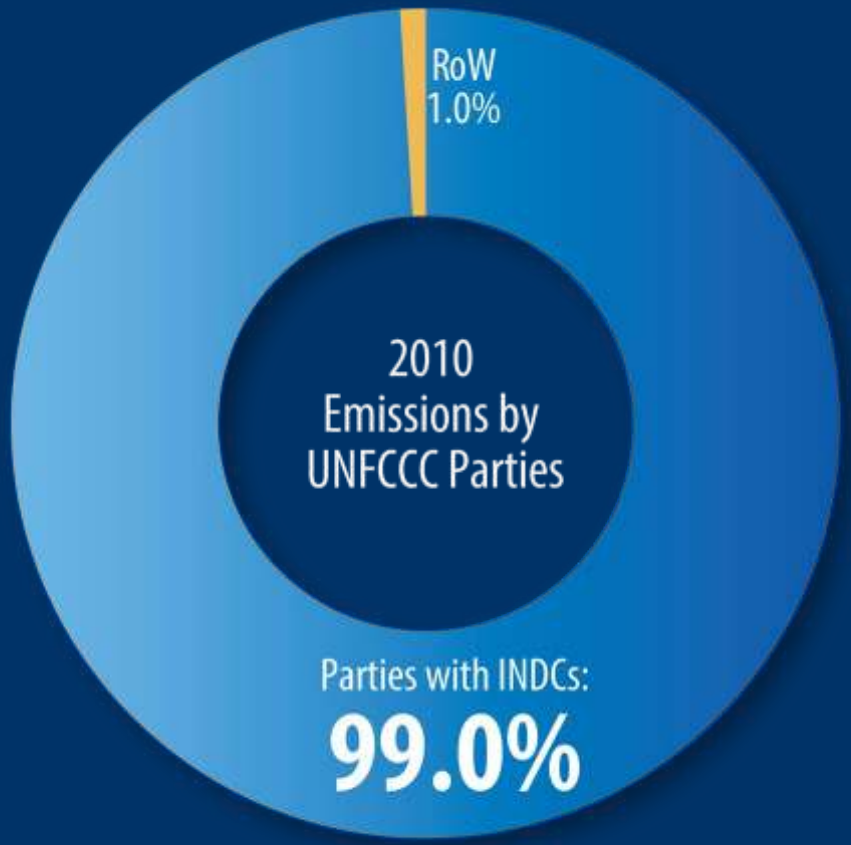
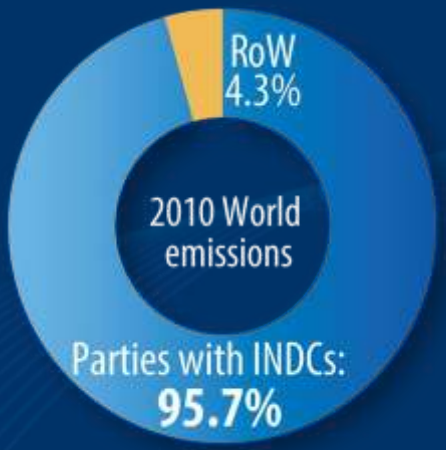
Outline

- Part I: Aggregate effect of NDCs
- Part II: Individual NDCs
- Part III: Issues arising…
  ratcheting up / carbon markets.



Adapted from UNFCCC Synthesis Report, May 2016, Figure 6





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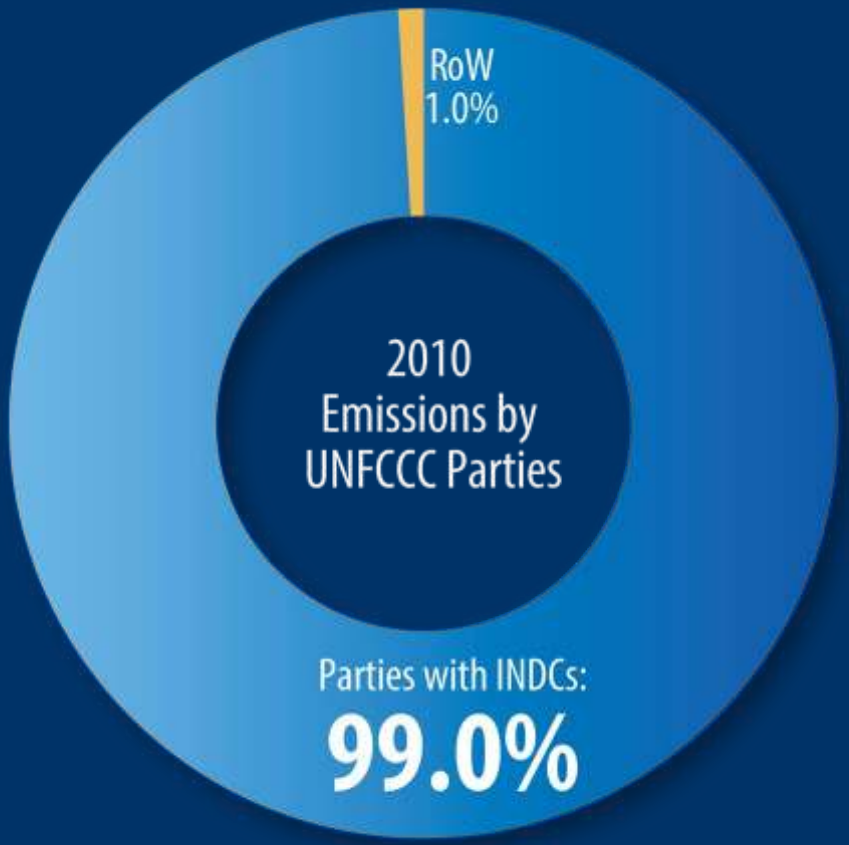

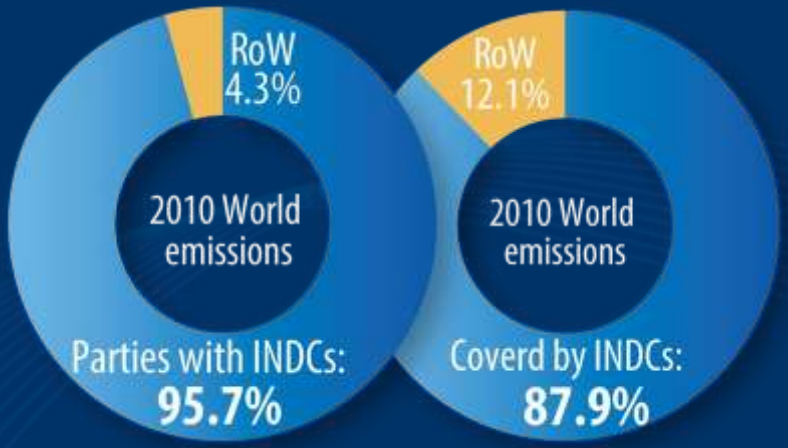

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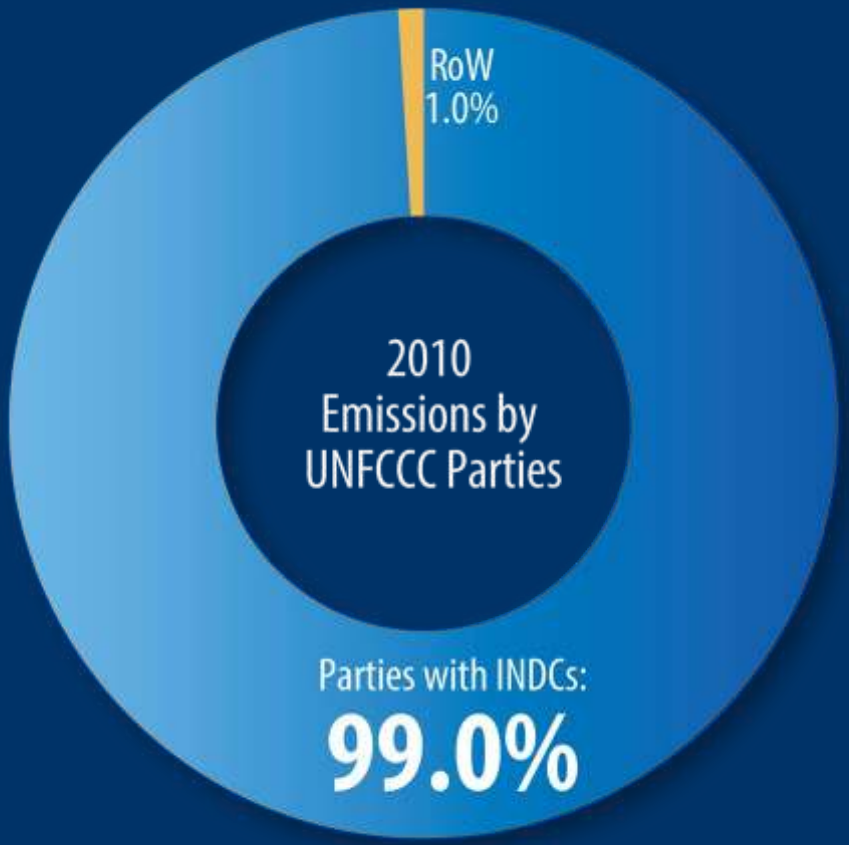

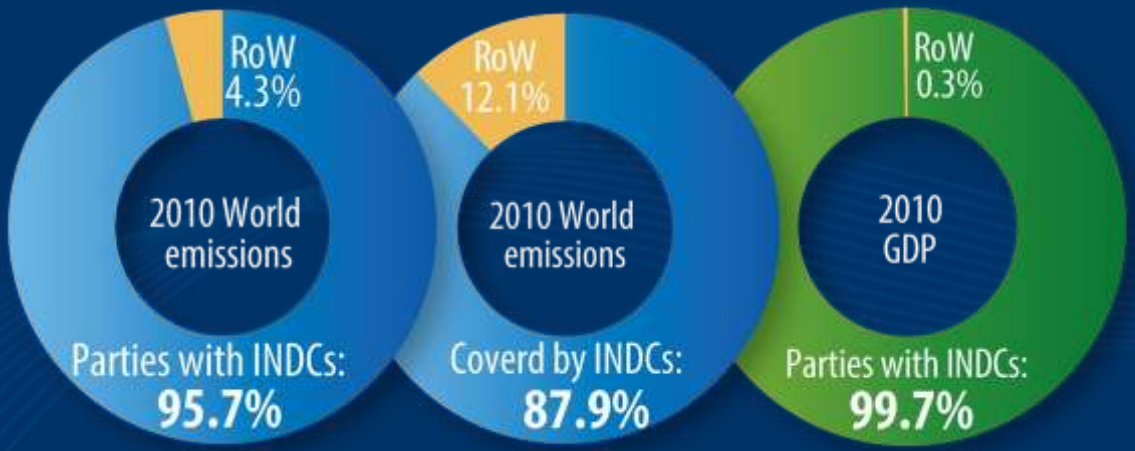

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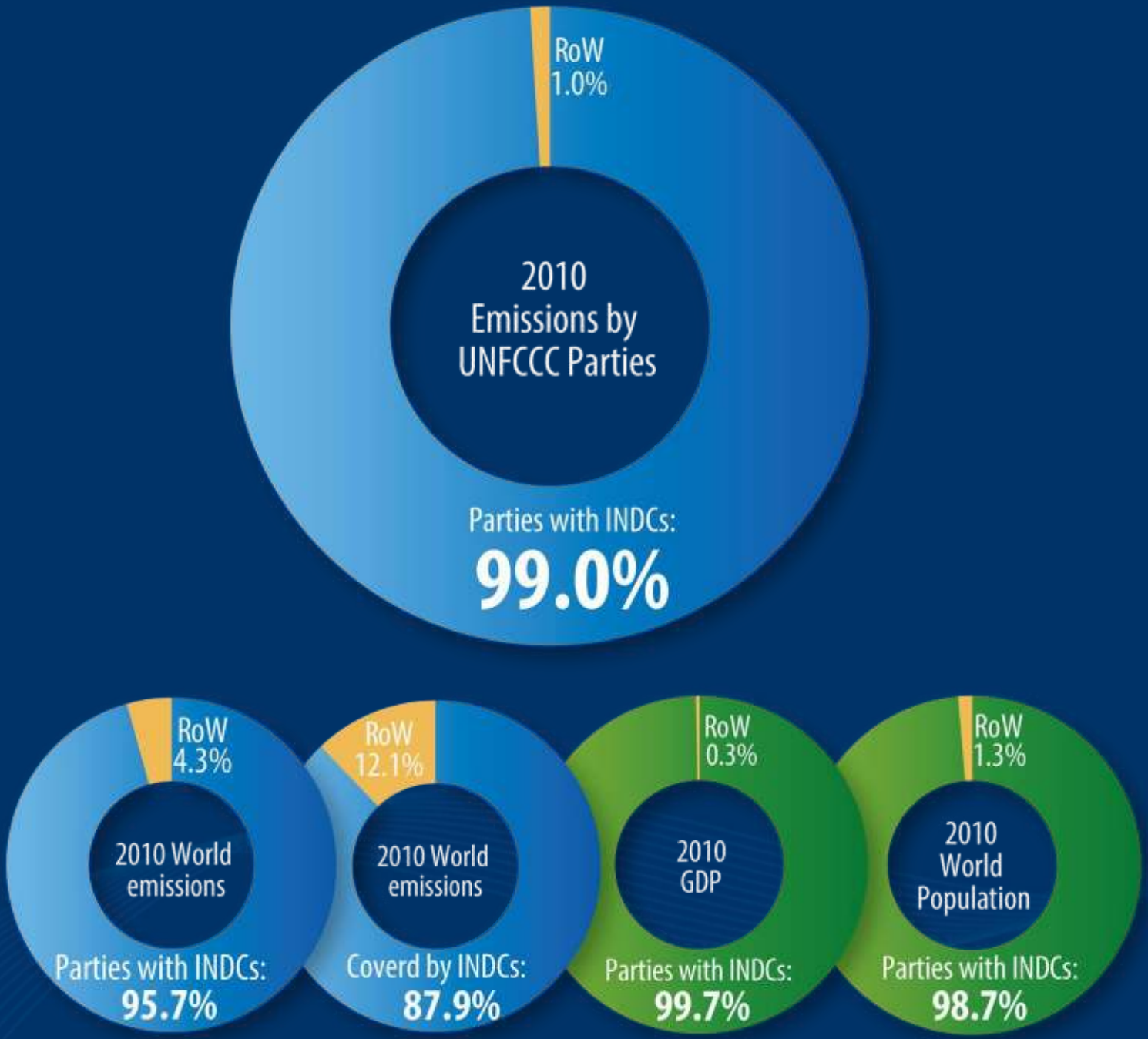

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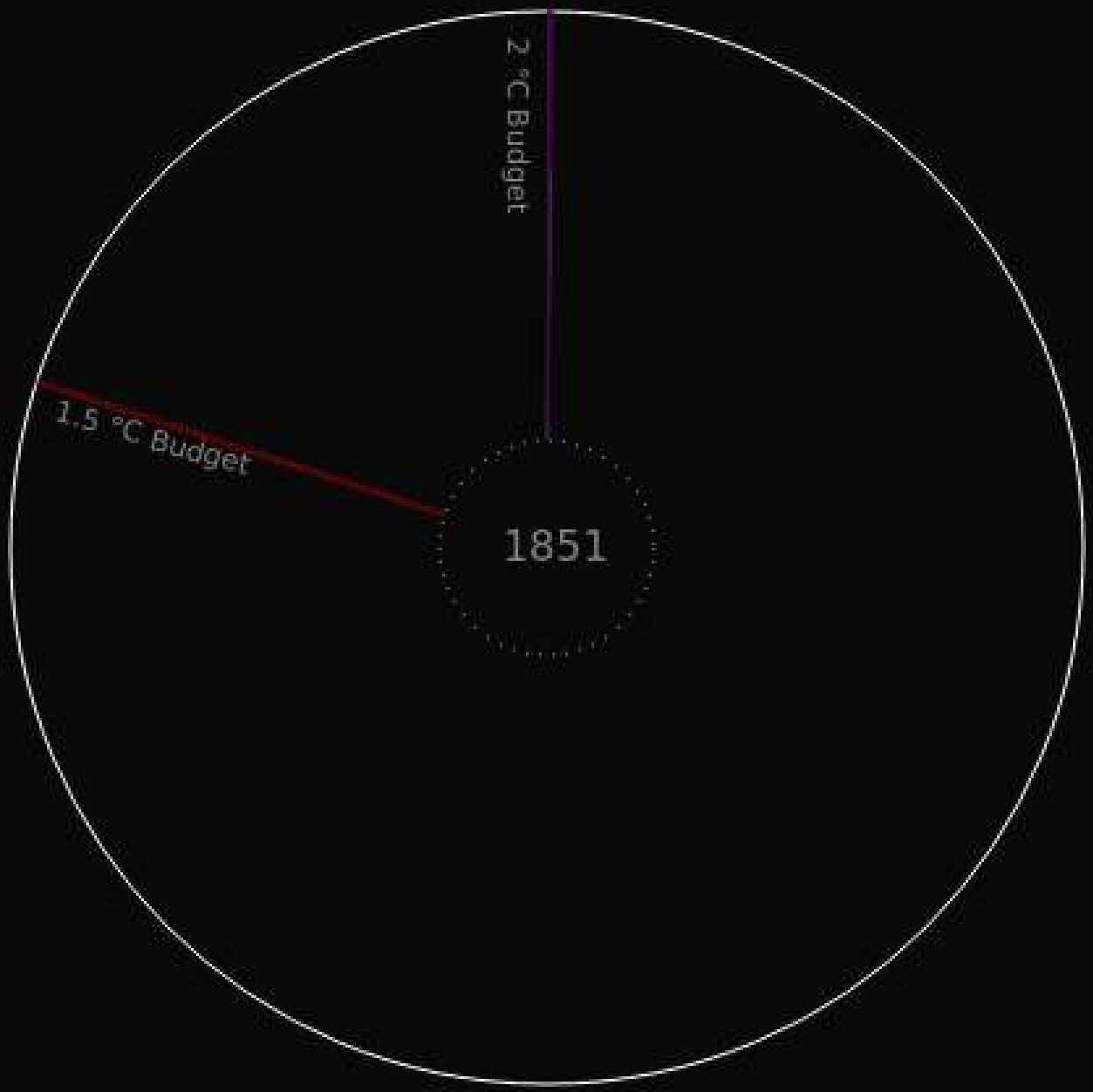
© Image by Alex Lecea


The window for action is rapidly closing
65% of our carbon budget compatible with a 2° C goal already used
Total Carbon Budget:
2900
GtCO2
Amount Used 1870-2011:
1900
GtCO2
Amount Remaining:
1000
GtCO2
ipcc
climate change
UN CLIMATE CHANGE CONFERENCE
LIMA COP20 CMP10



The Carbon Budget. pik-potsdam.de/primap-live/ & climatecollege.unimelb.edu.au, Gieseke, Meinshausen. Thx to Ed Hawkins

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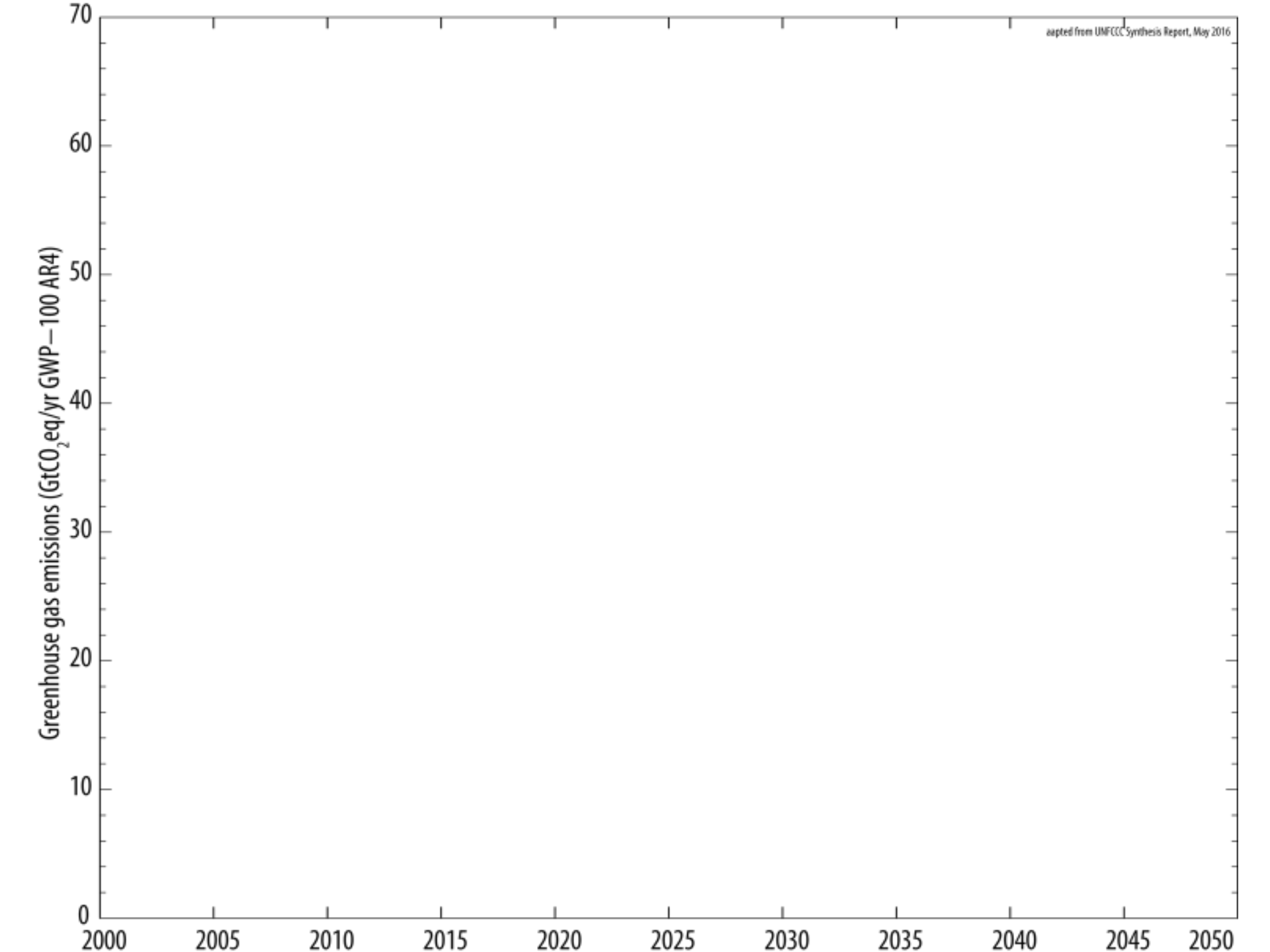
Findings Carbon Budget

- There is no way around **zero** carbon emissions.
- The **carbon budget for 1.5ºC** will be exceeded **by 2025** under NDCs.
- **Net negative emissions** are necessary: Taking out of the atmosphere what we added in excess of the carbon budget.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Greenhouse gas emissions (GtCO2eq/yr GWP—100 AR4)
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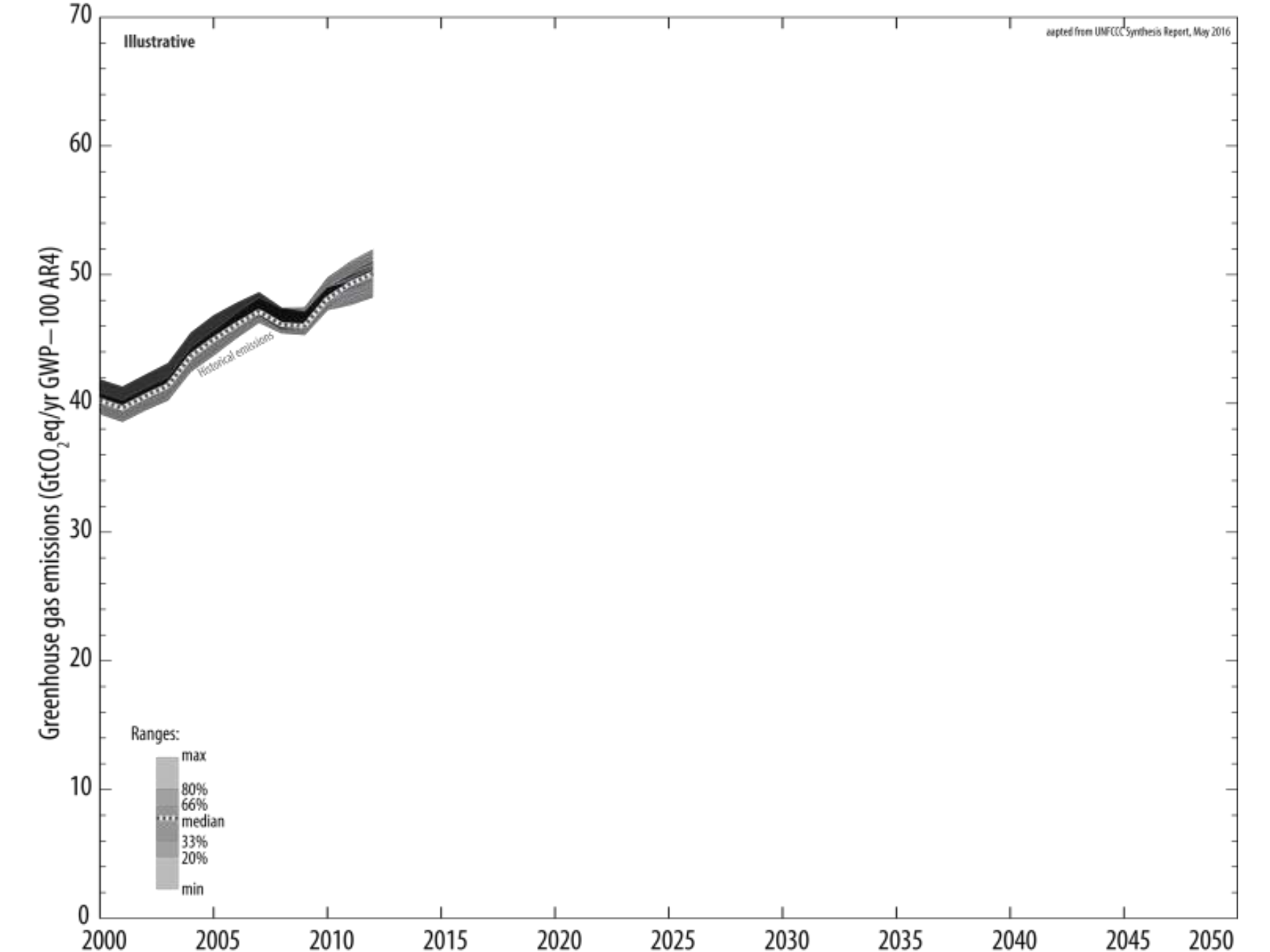
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Historical emissions
Ranges:
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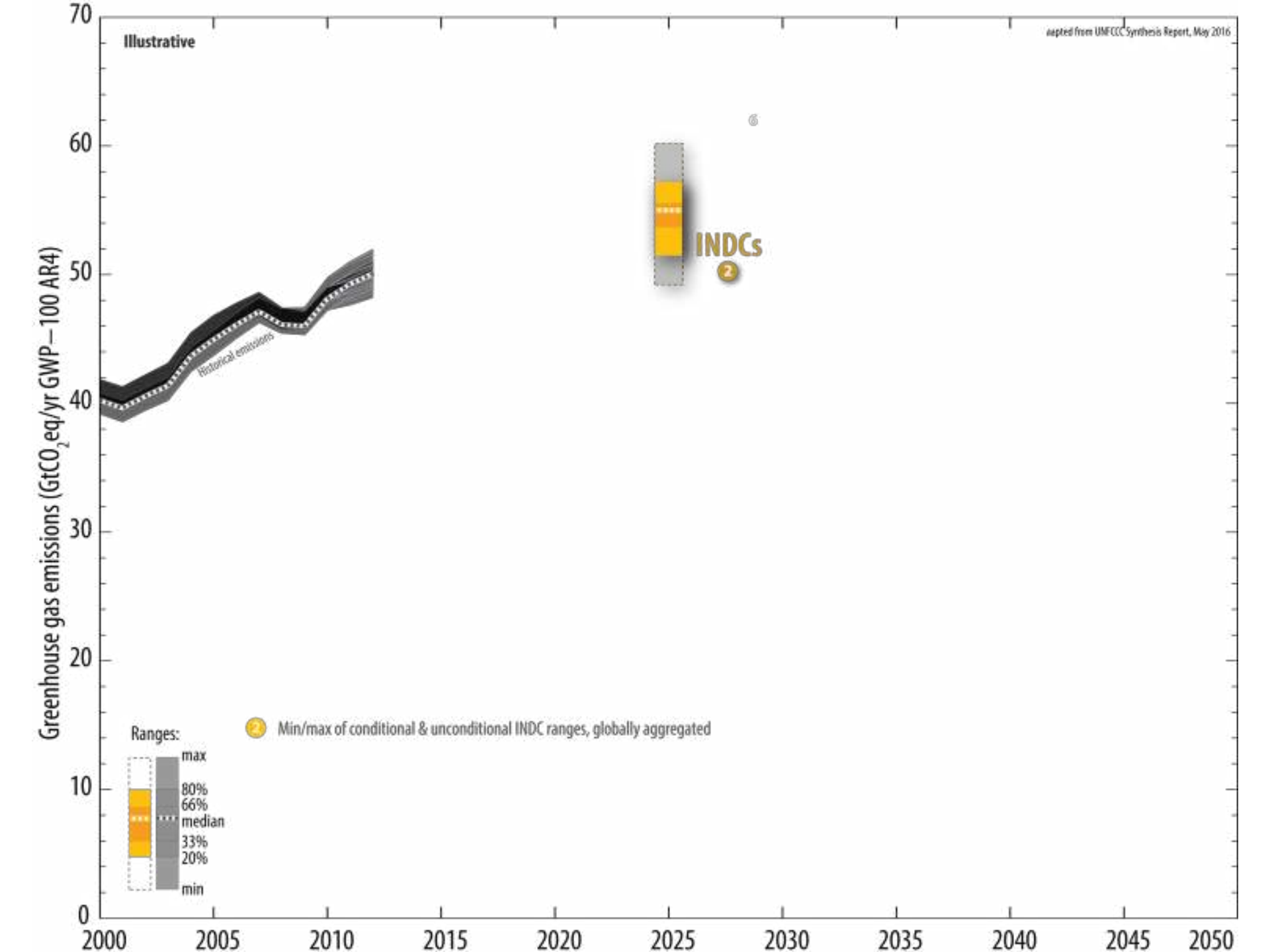
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Historical emissions
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Ranges:
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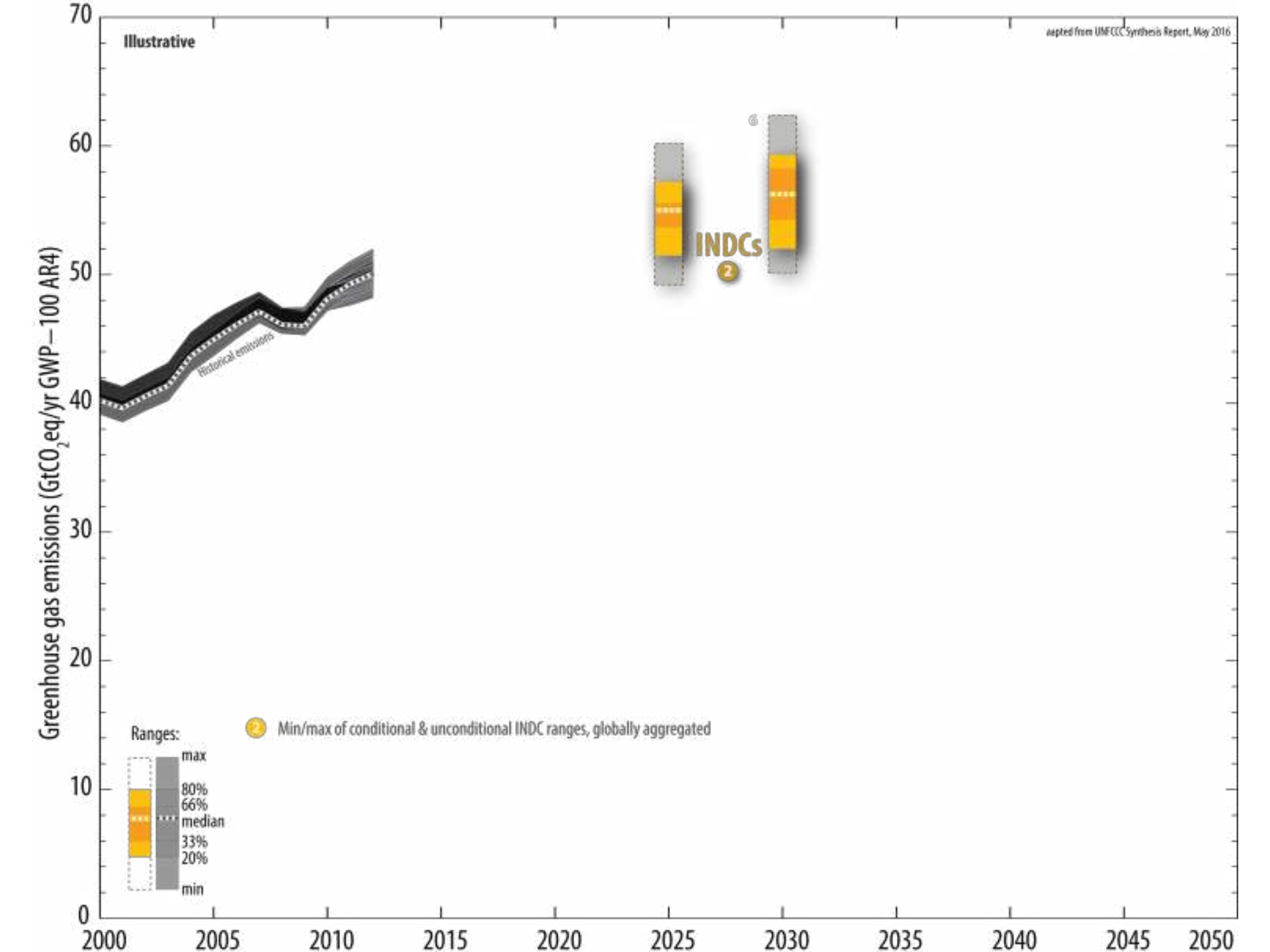
2 Min/max of conditional & unconditional INDC ranges, globally aggregated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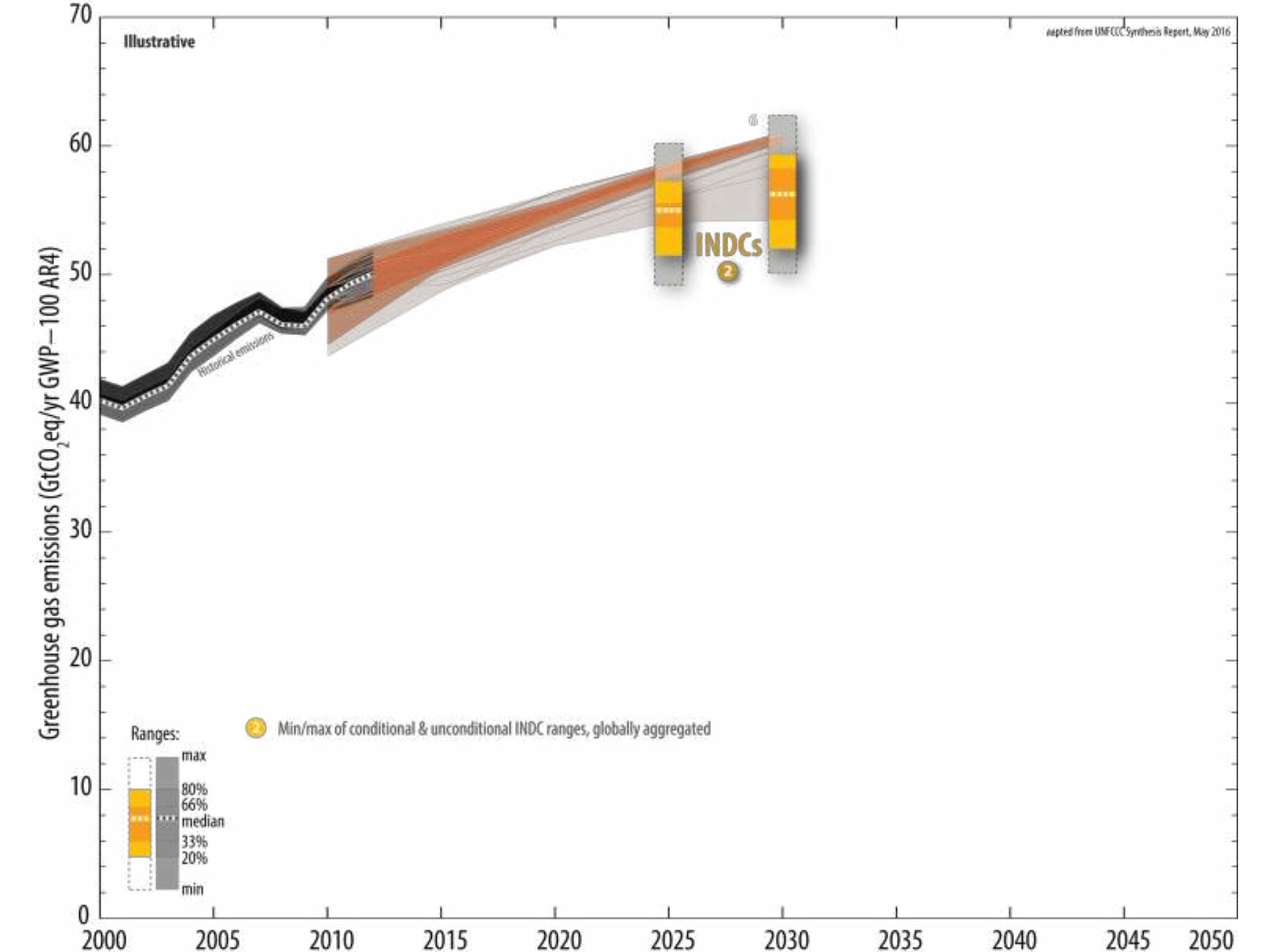
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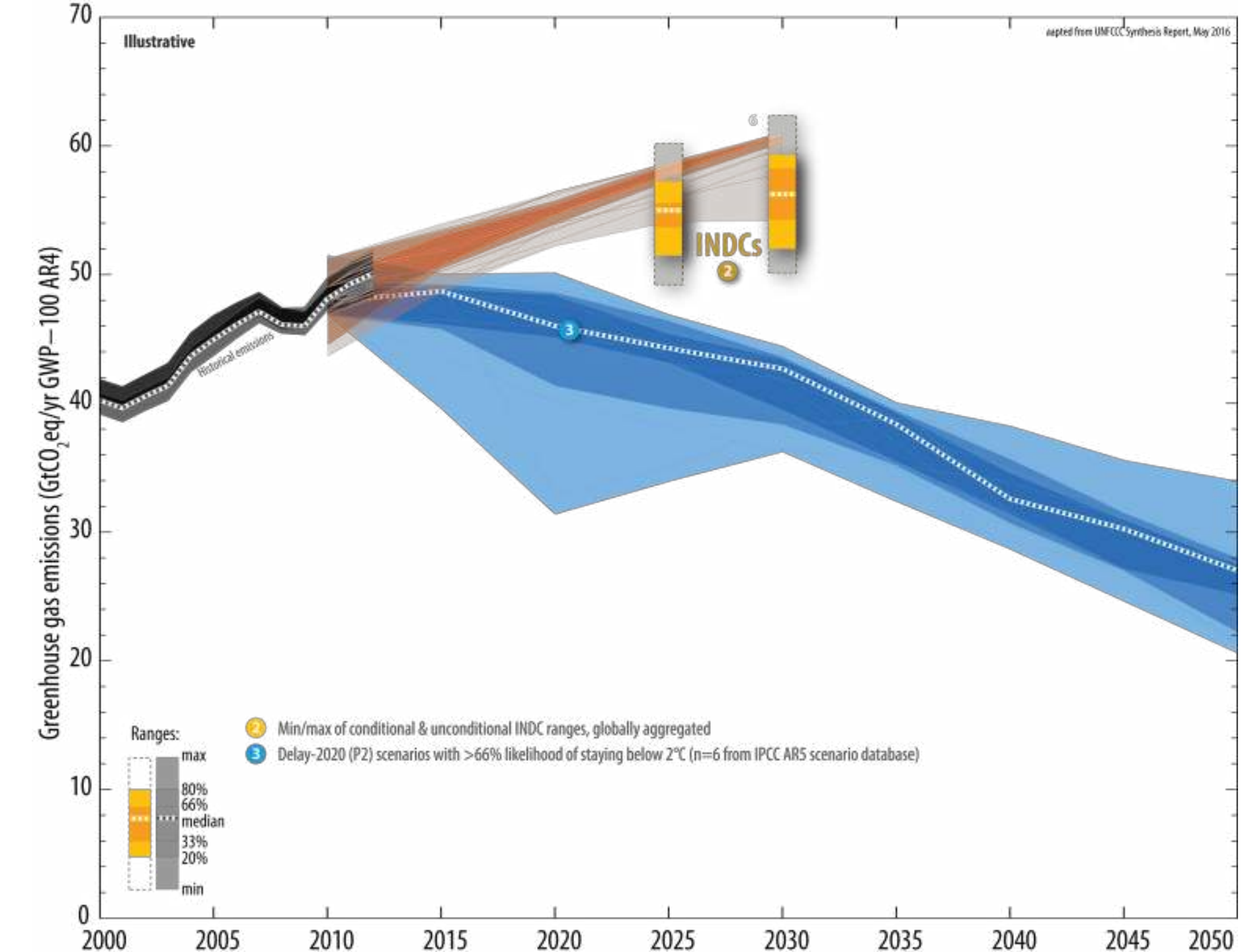
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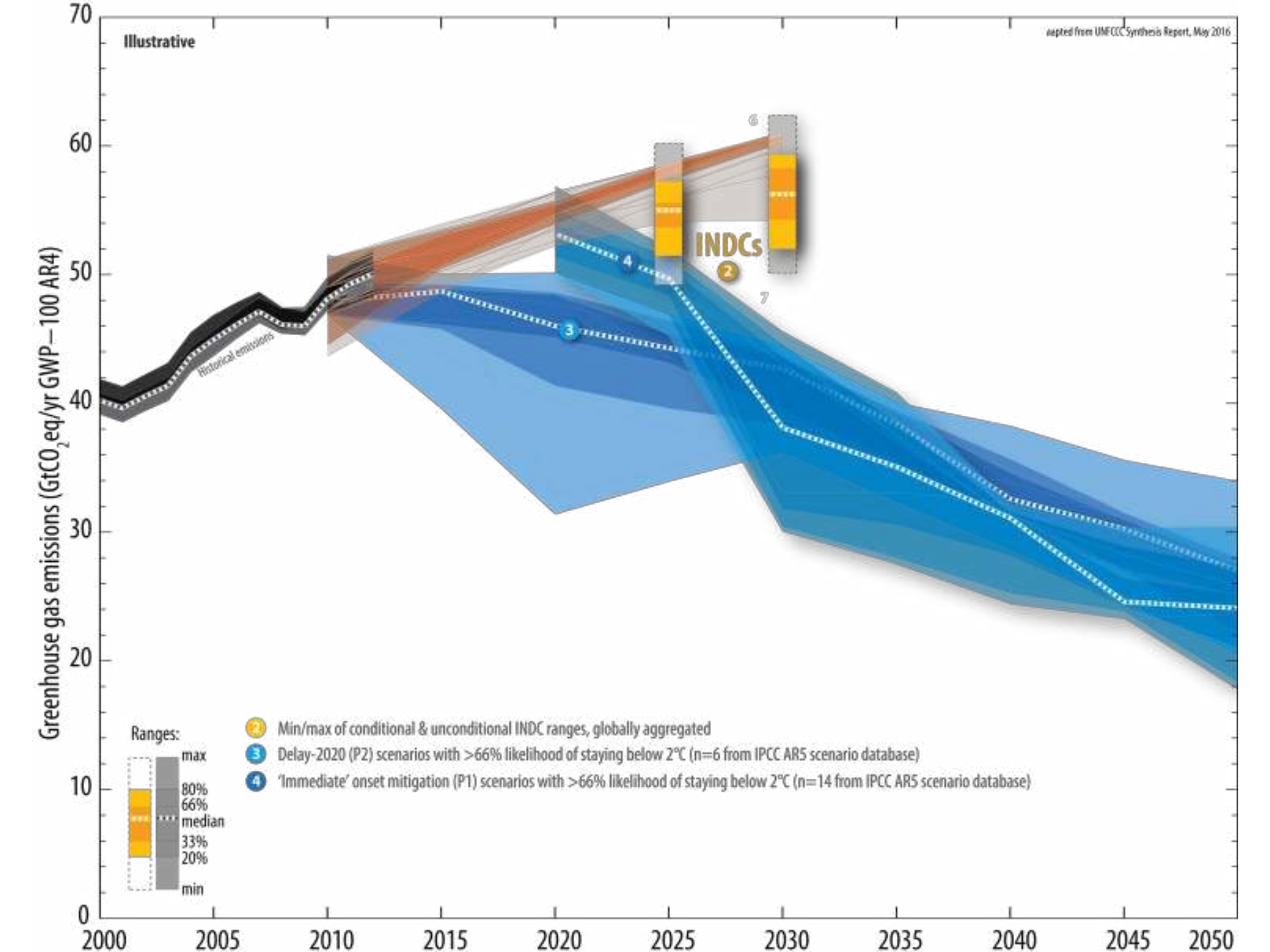
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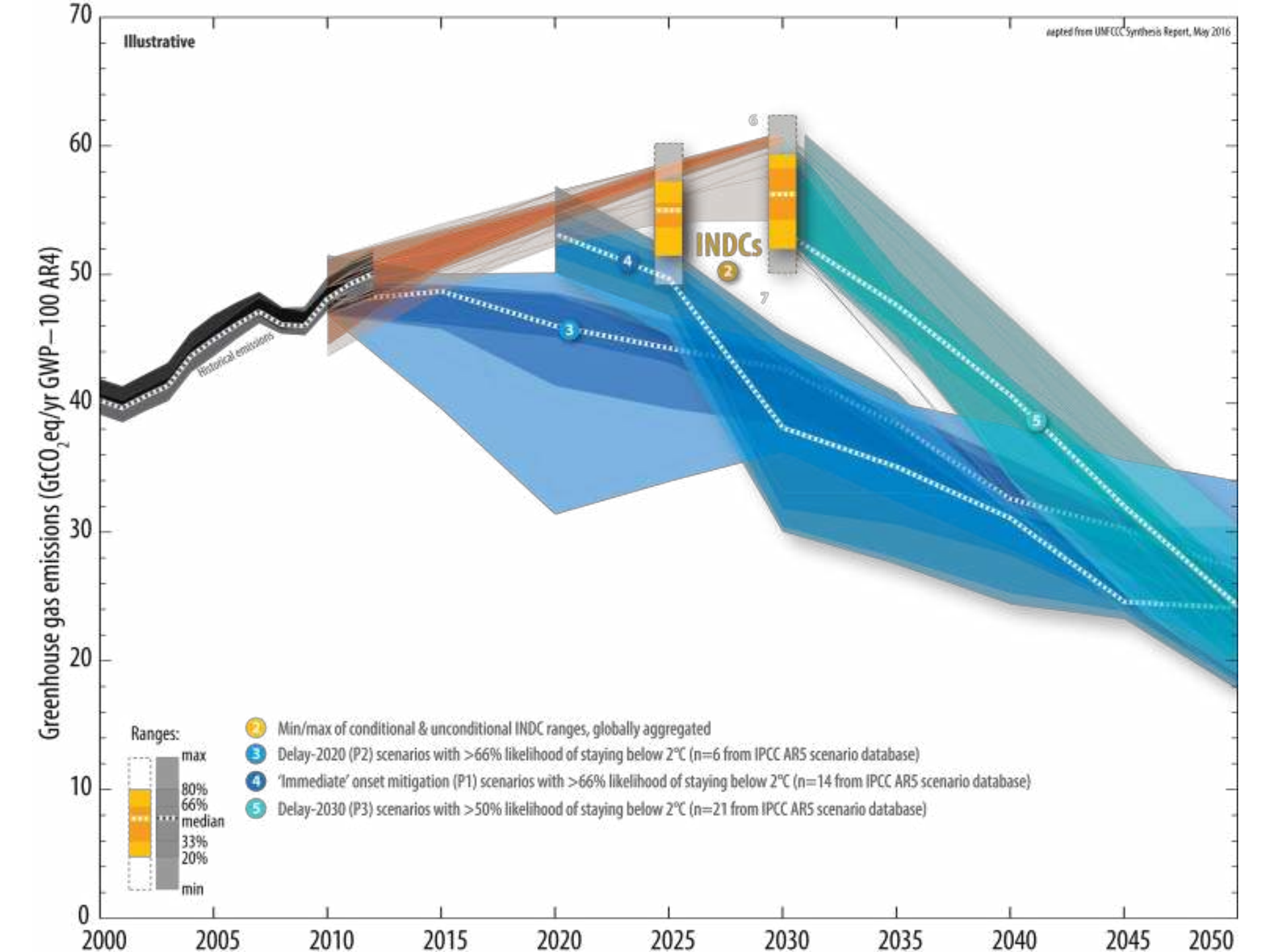
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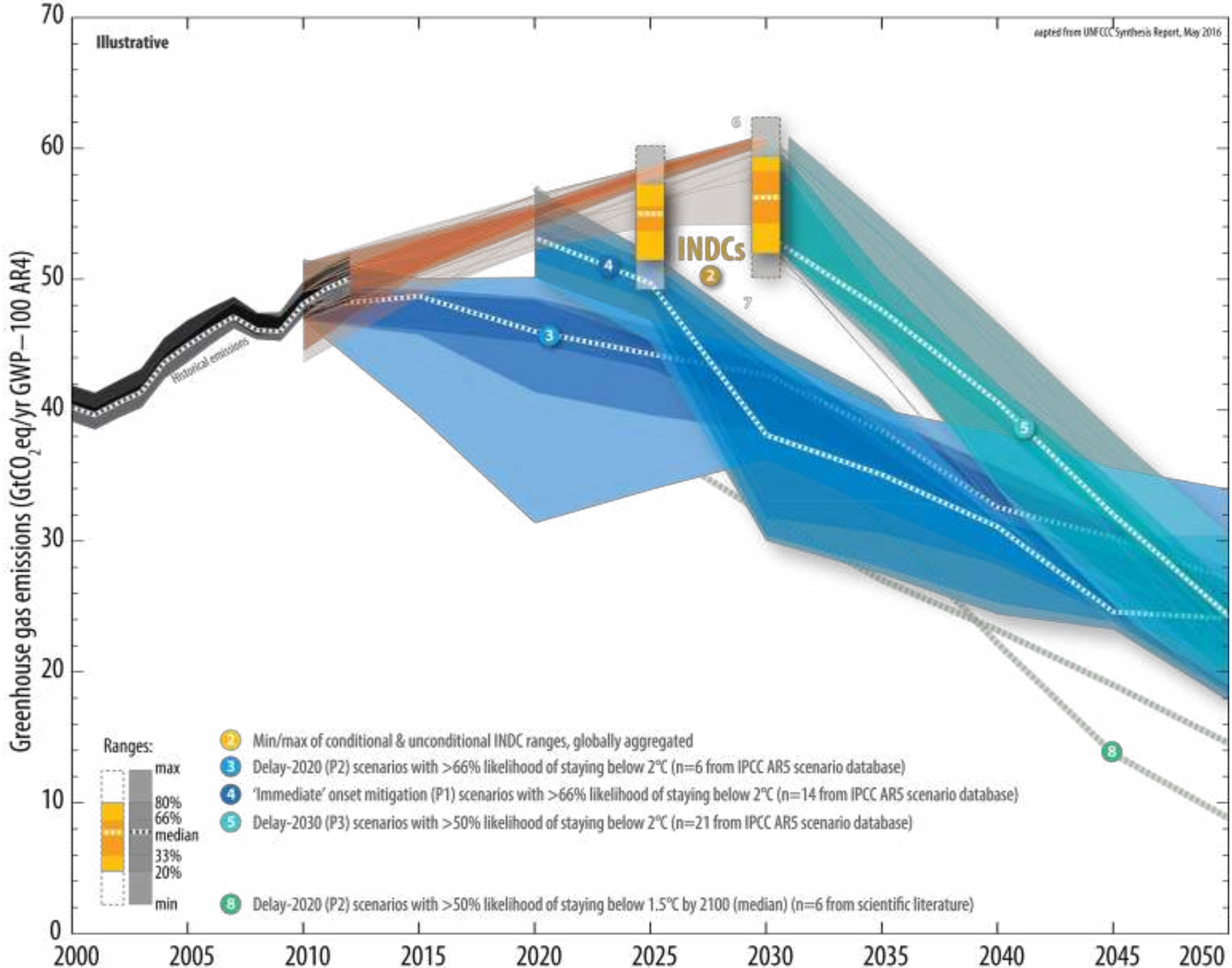
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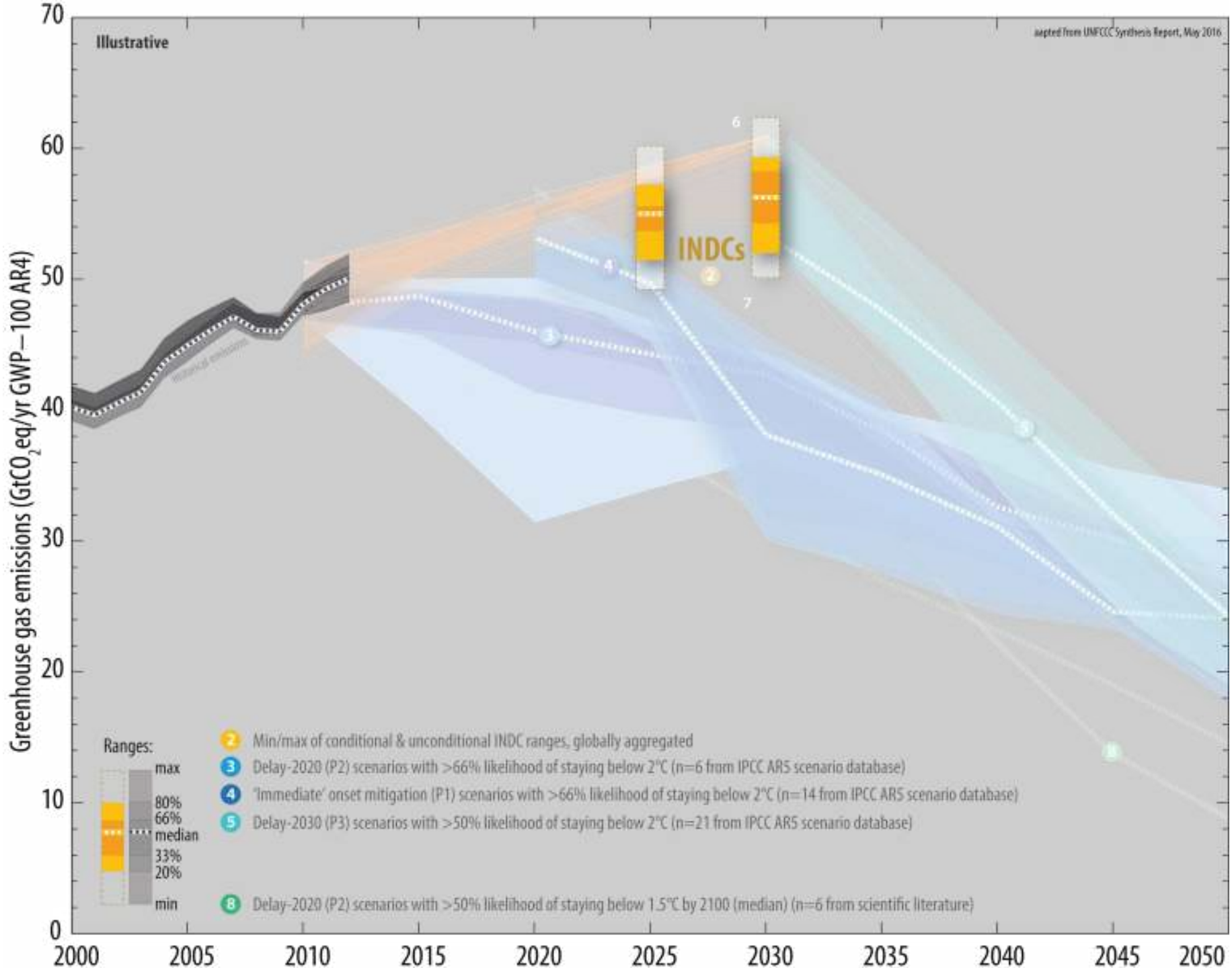
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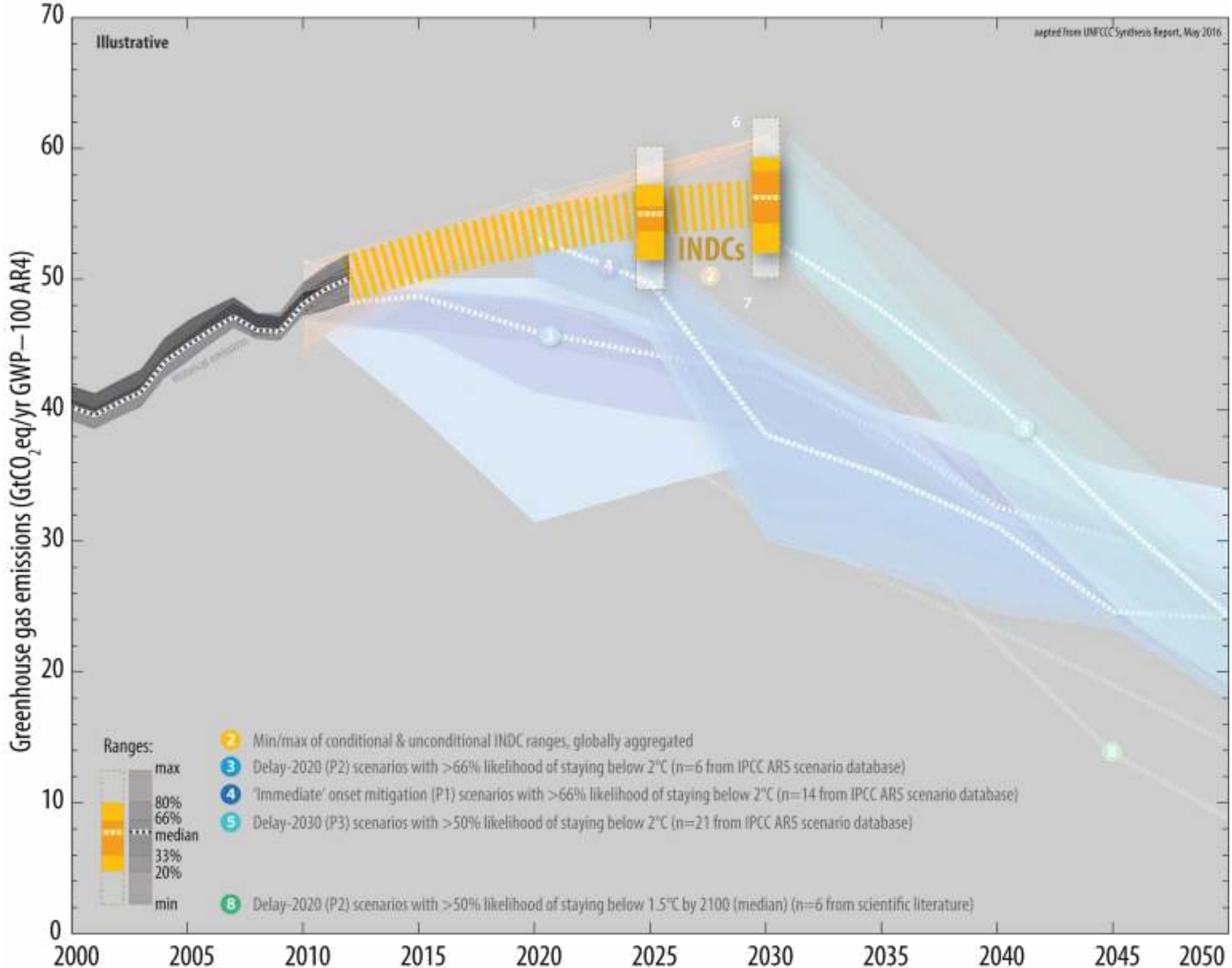
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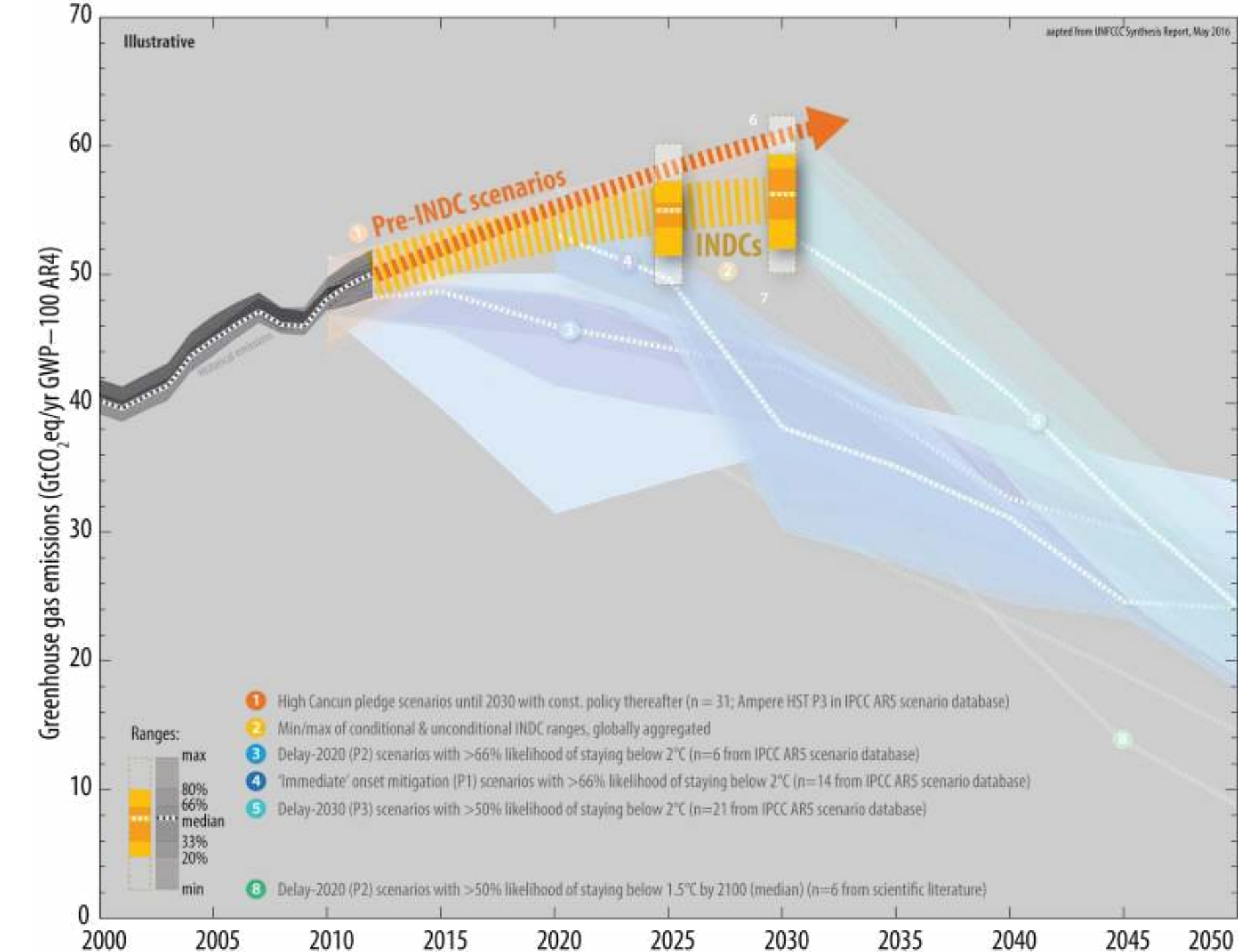
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Pre-INDC scenarios
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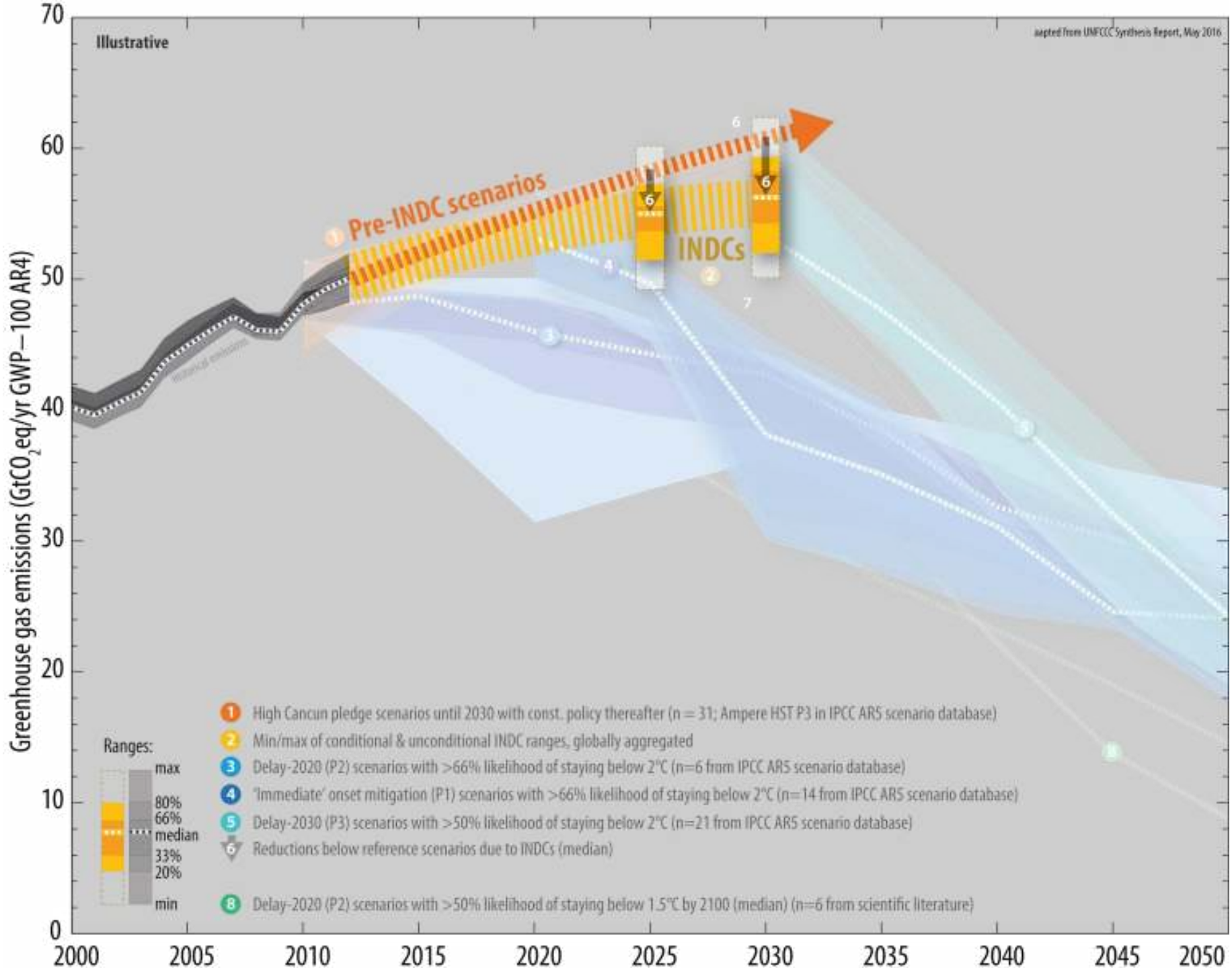
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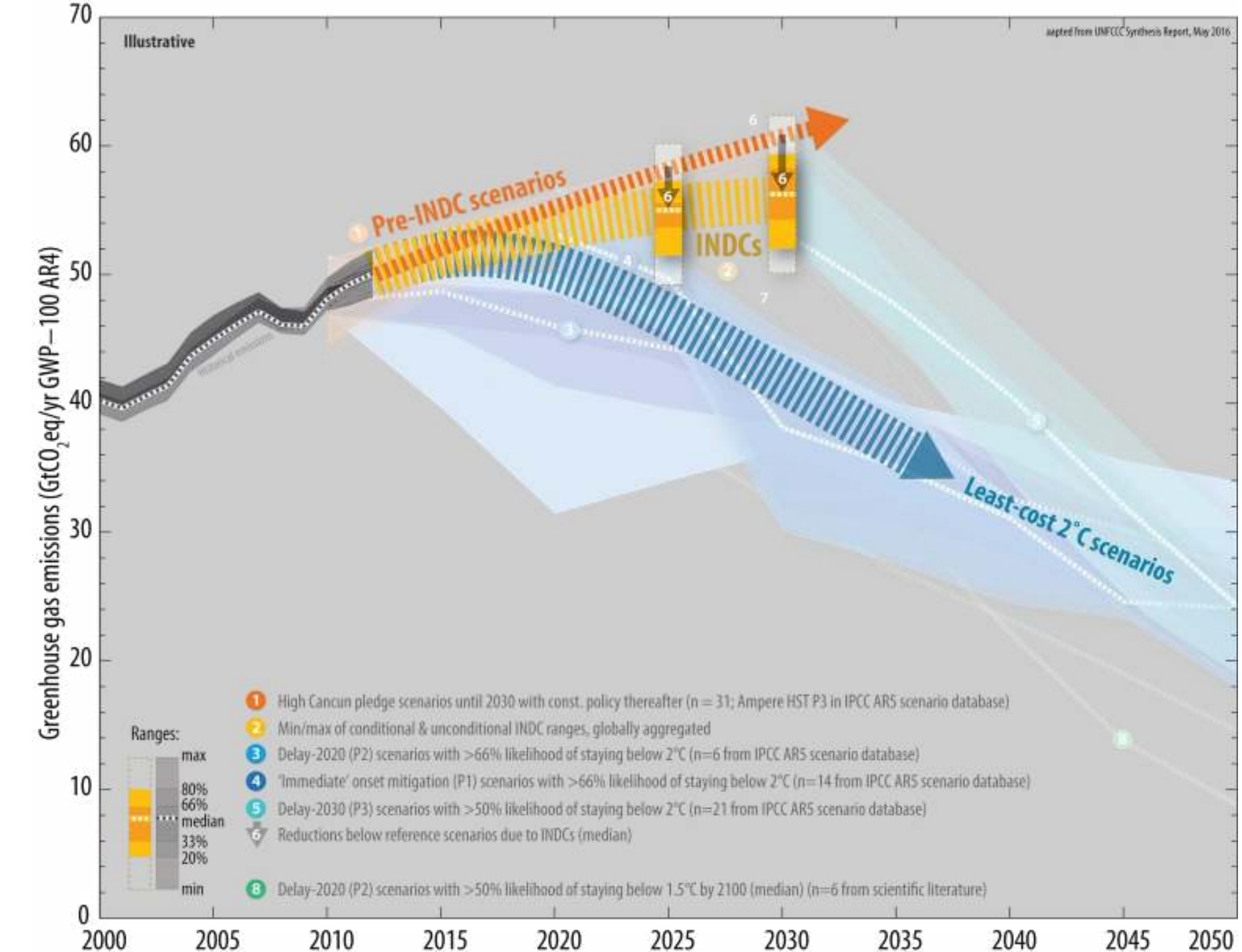
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Pre-INDC scenarios
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Least-cost 2°C scenarios
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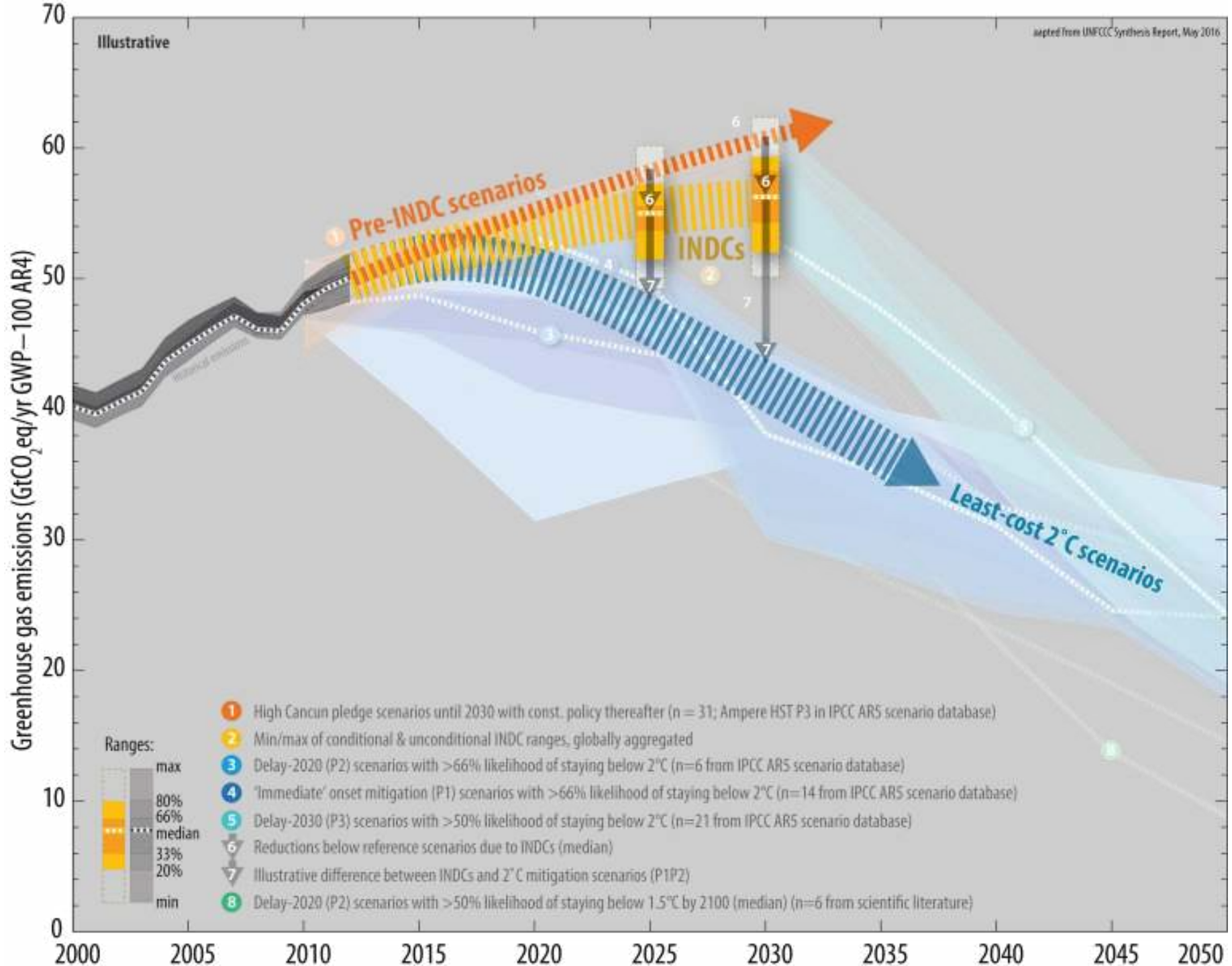
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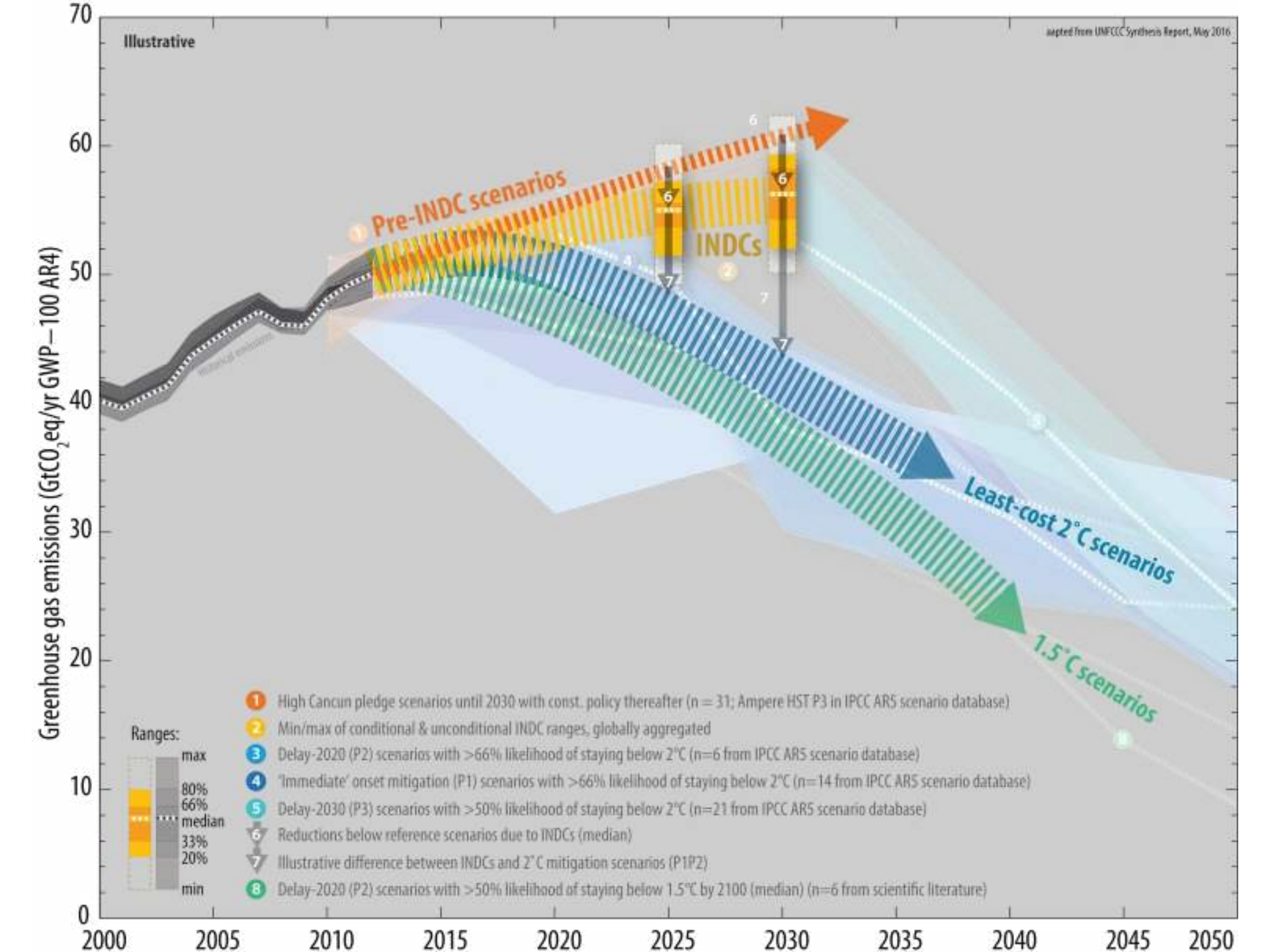
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Findings on Pathways

- **2030 gap** towards least-cost scenarios is substantial.
- **Annual reduction efforts double** after 2030 if we don't ratchet up before
- **2025 gap is half** compared to the 2030 gap.

* UNFCCC Synthesis Report Figure 10, paragraph 223.

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- Country-by-country factsheets available at climatecollege.unimelb.edu.au/indc-factsheets

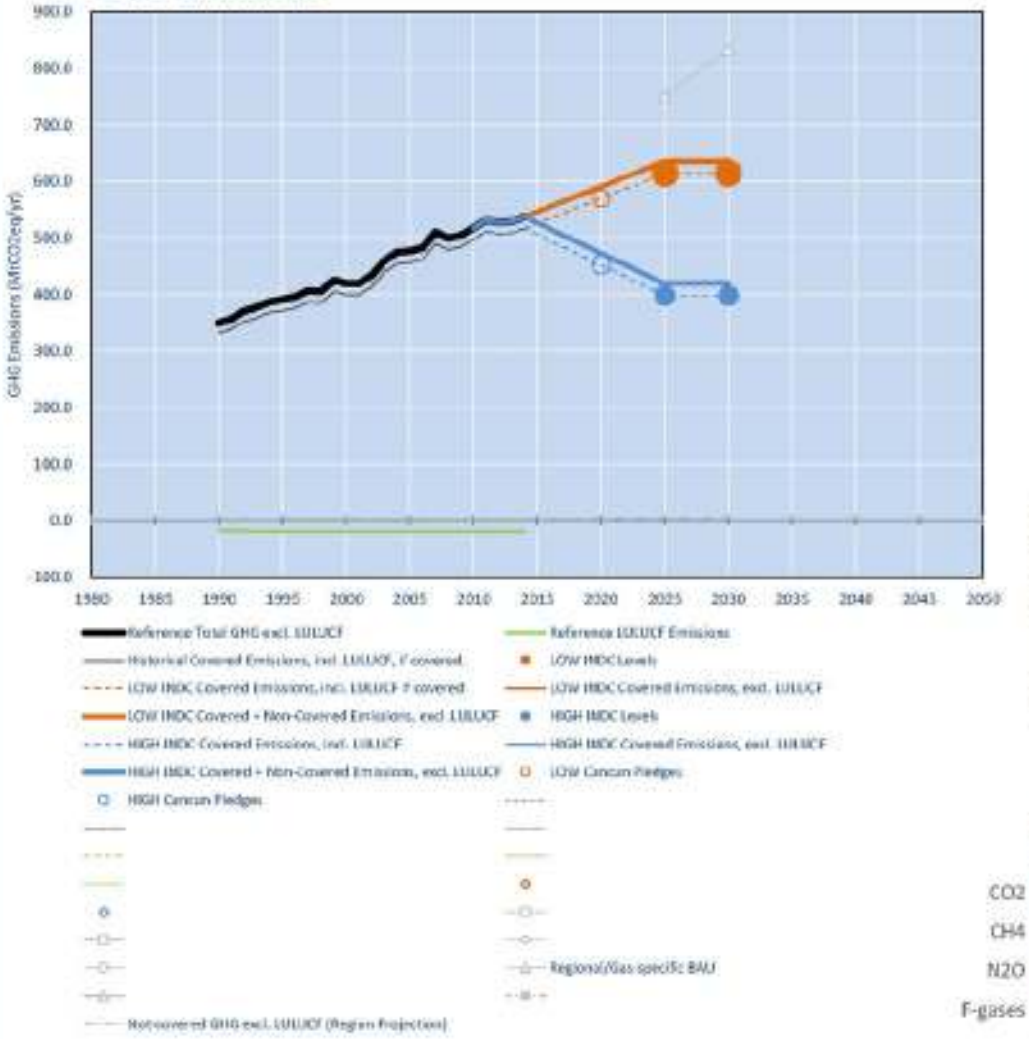
South Africa

Per-Capita Emissions in 2030 rel. 2010 (excl. LULUCF): -12%

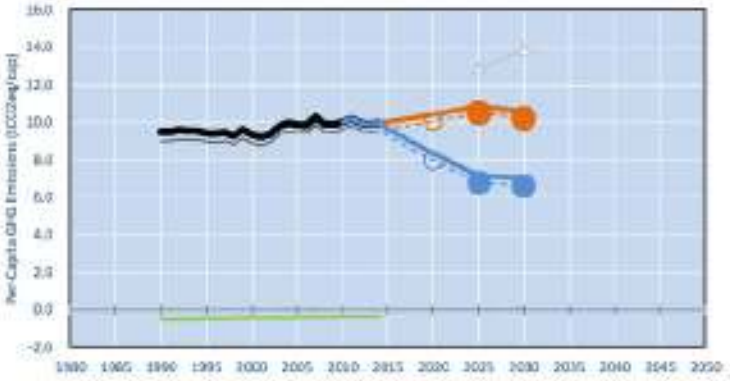
Cancun 2020	INDC 2025	INDC 2030	2010 World Rank	2025 World Rank	2030 World Rank
		Share of World Emissions excl. LULUCF (Rank)	1.1% #19	1.0% #20	0.9% #21
		Per-Capita Emissions (tCO2eq/cap)	10t #41	9t #38	8.8t #41

INDC: Peak, plateau and decline GHG emissions trajectory range, which will be between 398 and 614 MtCO2-eq in 2036Peaking year will be between 2020 and 2025. (CarbP AR4)

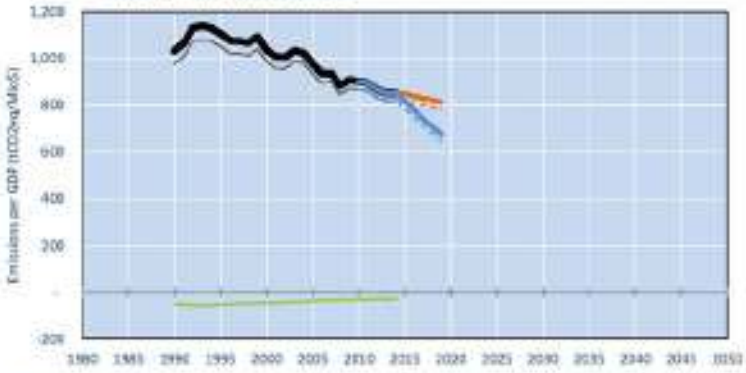
GHG Emissions



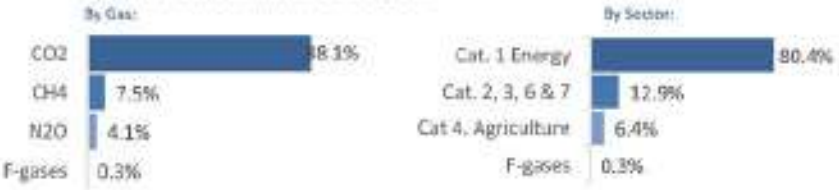
Per-Capita Emissions



GHG Emissions per GDP



2010 Total GHG Emissions excl. LULUCF



Germany

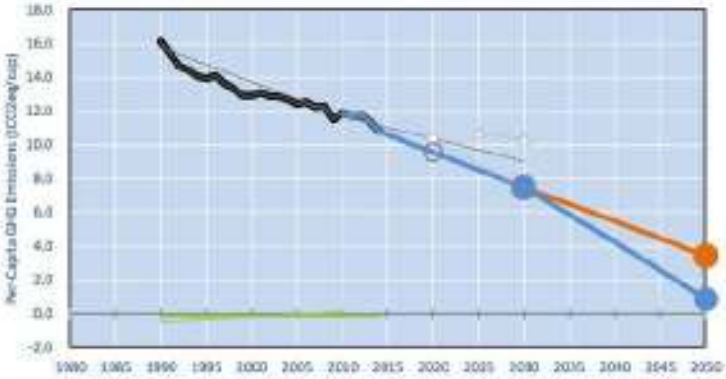
Per-Capita Emissions in 2030 rel. 2010 (excl. LULUCF): -37%

Cancun 2020	INDC 2025	INDC 2030		2010 World Rank	2025 World Rank	2030 World Rank
		-55% rel.1990	Share of World Emissions excl. LULUCF (Rank)	2.1% #8	1.2% #15	1.1% #17
			Per-Capita Emissions (tCO2eq/cap)	11.9t #27	8.5t #45	7.5t #57

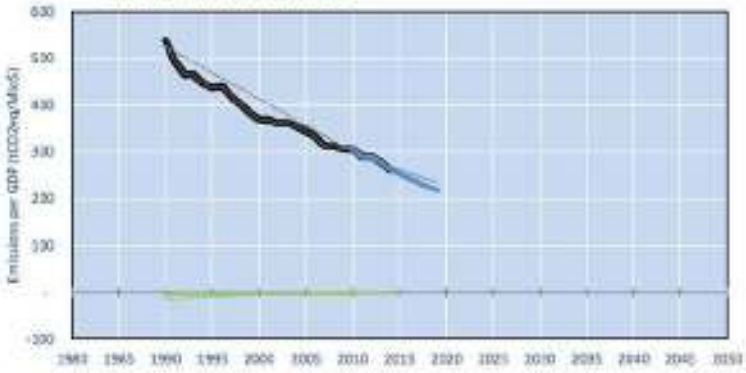
INDC: Contributing to the joint EU28 INDC with intra-EU split up of Emission Trading System and Effort Sharing Sectors. (GWP AR4)

GHG Emissions

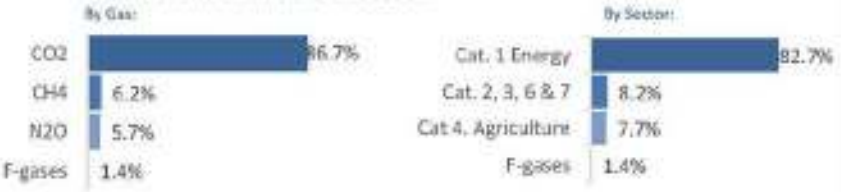
Per-Capita Emissions



GHG Emissions per GDP



2010 Total GHG Emissions excl. LULUCF



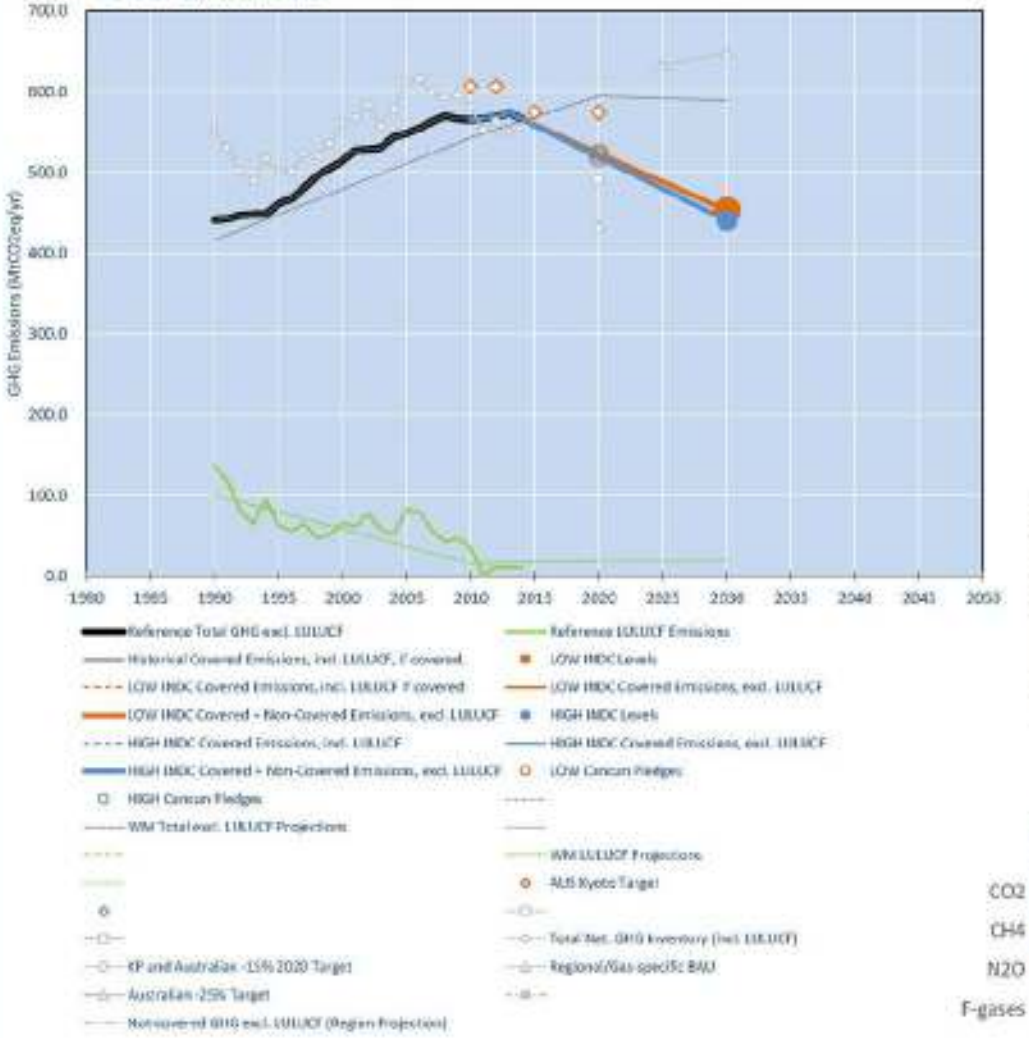
Australia

Per-Capita Emissions in 2030 rel. 2010 (excl. LULUCF): -38%

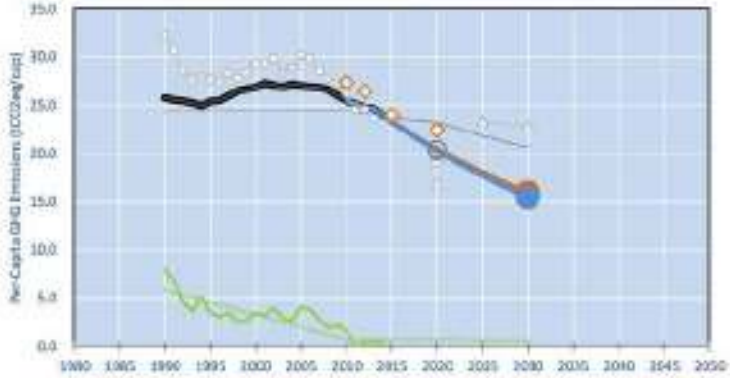
Cancun 2020	INDC 2025	INDC 2030		2010 World Rank	2025 World Rank	2030 World Rank
		-26% -28% rel.2005	Share of World Emissions excl. LULUCF (Rank)	1.2% #17	0.9% #22	0.8% #25
			Per-Capita Emissions (tCO2eq/cap)	25.5t #7	17.9t #15	15.7t #14

INDC: Economy-wide target to reduce greenhouse gas emissions by 26-28% below 2005 levels by 2030. (GWP AR4)

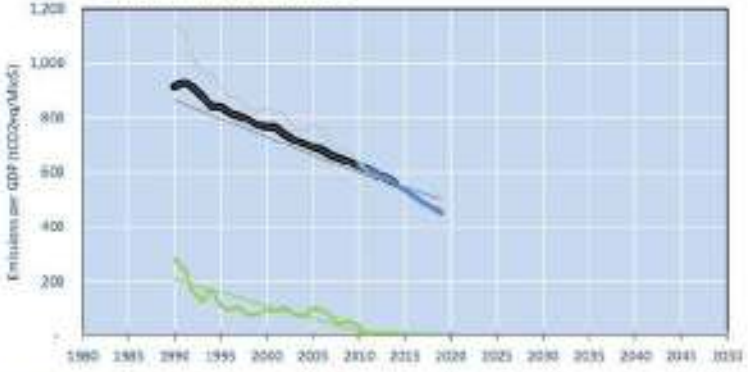
GHG Emissions



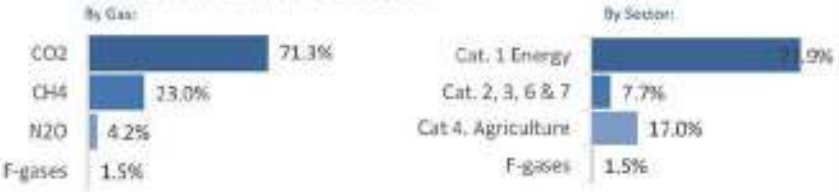
Per-Capita Emissions



GHG Emissions per GDP



2010 Total GHG Emissions excl. LULUCF



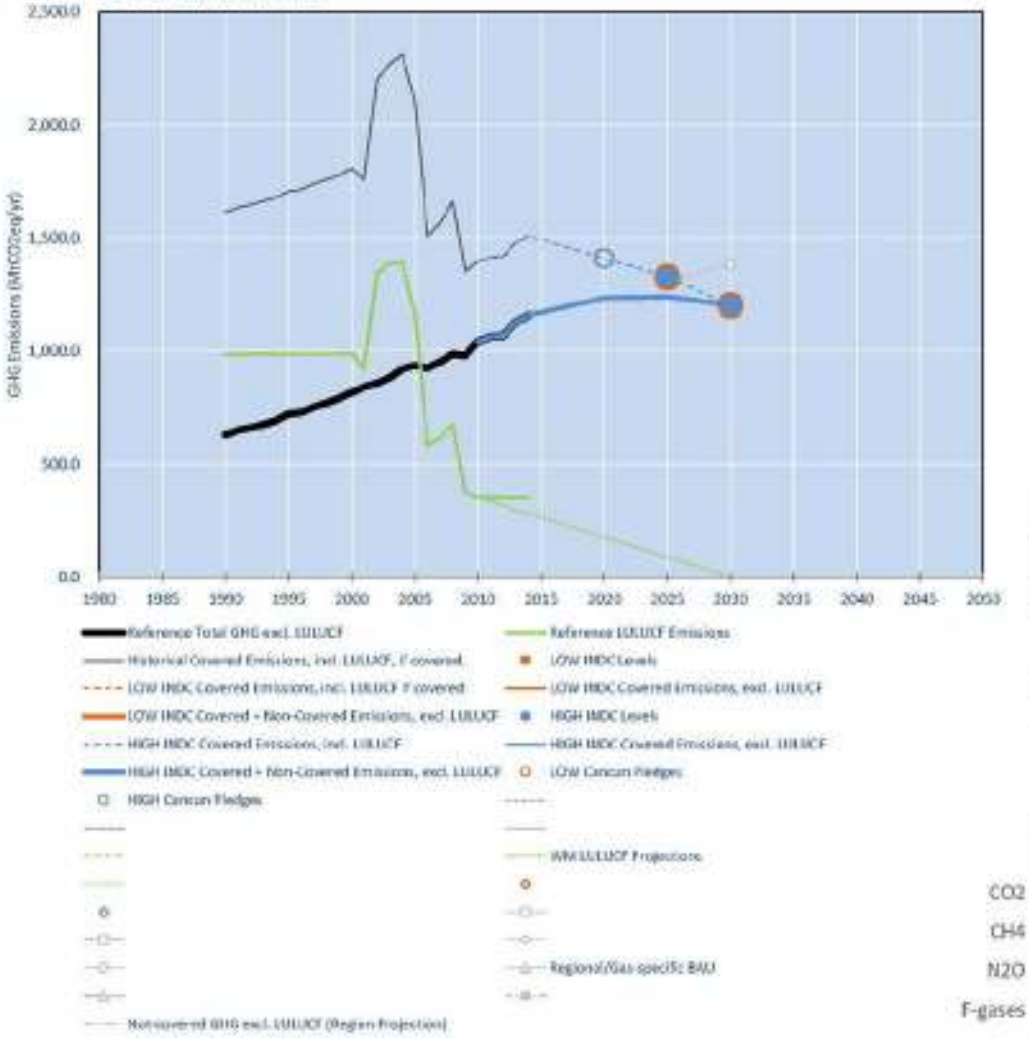
Brazil

Per-Capita Emissions in 2030 rel. 2010 (excl. LULUCF): → +0%

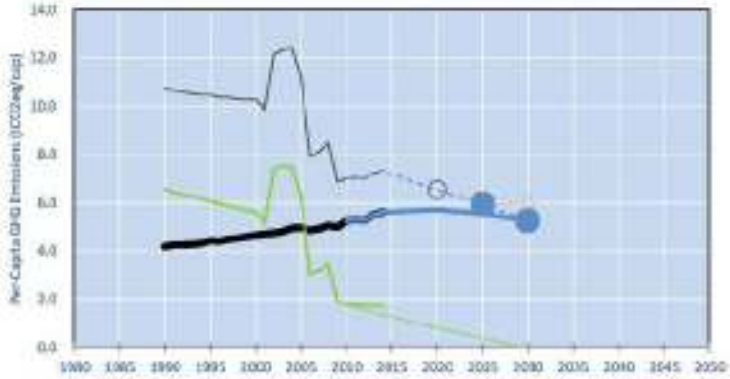
Cancun 2020	INDC 2025	INDC 2030		2010 World Rank	2025 World Rank	2030 World Rank
	-37% rel.2005	-43% rel.2005	Share of World Emissions excl. LULUCF (Rank)	2.3% #7	2.3% #6	2.1% #6
			Per-Capita Emissions (tCO2eq/cap)	5.2t #89	5.6t #85	5.3t #90

INDC: Committed to reduce GHG emissions by 38% below 2005 levels in 2025Indicative target for 2030 43% reduction below 2005 levels. (GWP AR5)

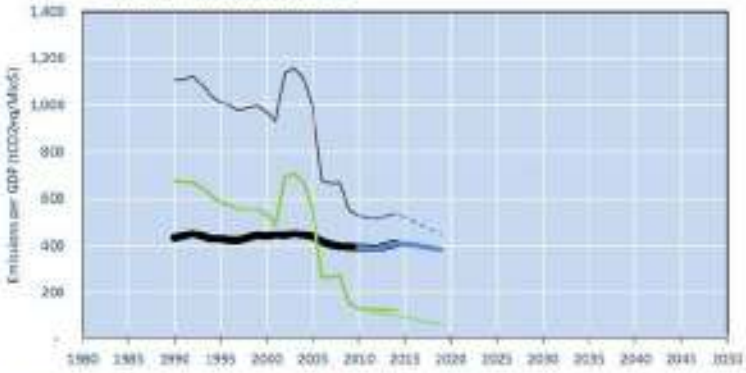
GHG Emissions



Per-Capita Emissions



GHG Emissions per GDP



2010 Total GHG Emissions excl. LULUCF

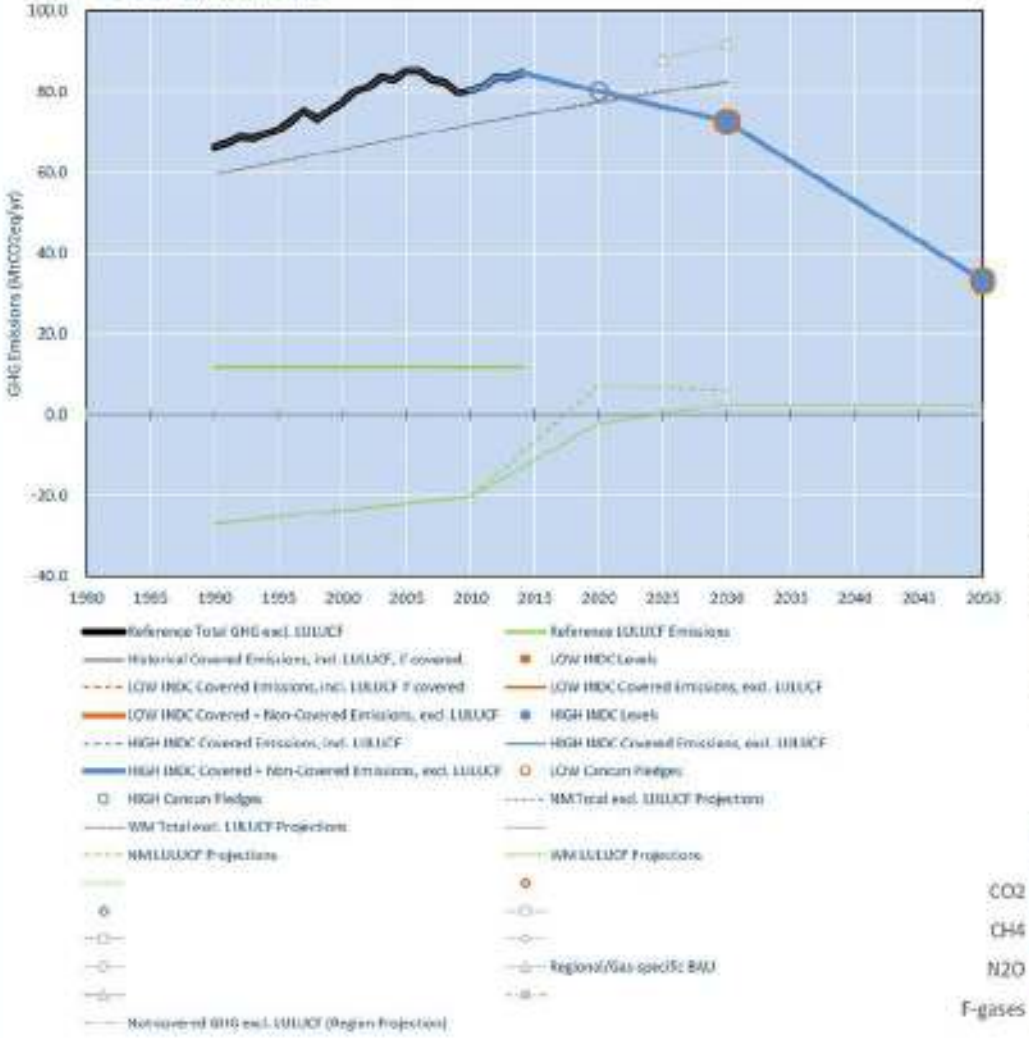
New Zealand

Per-Capita Emissions in 2030 rel. 2010 (excl. LULUCF): -22%

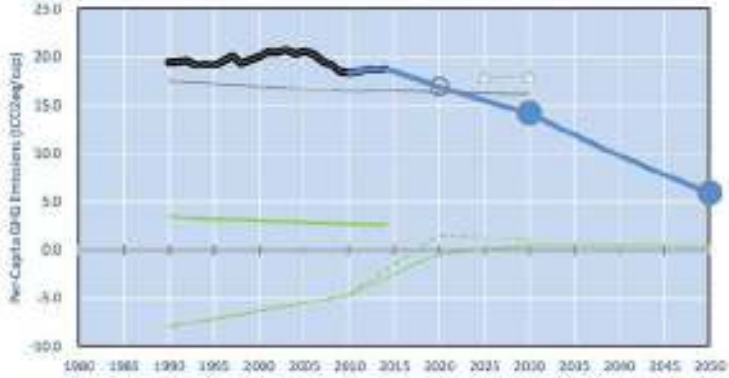
Cancun 2020	INDC 2025	INDC 2030		2010 World Rank	2025 World Rank	2030 World Rank
		-30% rel.2005	Share of World Emissions excl. LULUCF (Rank)	0.2% #60	0.1% #71	0.1% #77
			Per-Capita Emissions (tCO2eq/cap)	18.4t #13	15.5t #17	14.2t #19

INDC: Commits to reduce GHG emissions to 30% below 2005 levels by 2030remains provisional pending confirmation of approaches to be taken in accounting for land sector and confirmation of access to carbon markets (CAIT AR4)

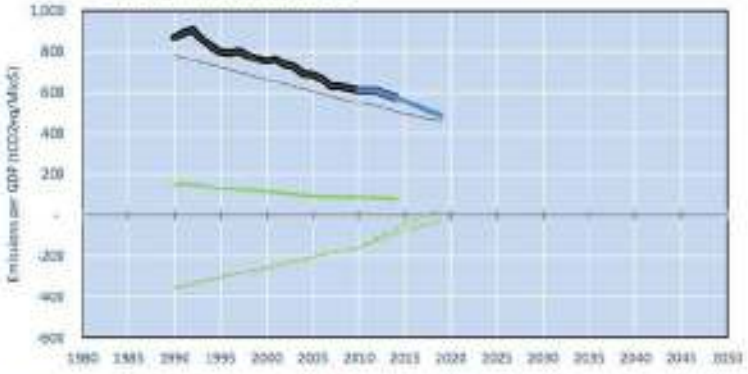
GHG Emissions



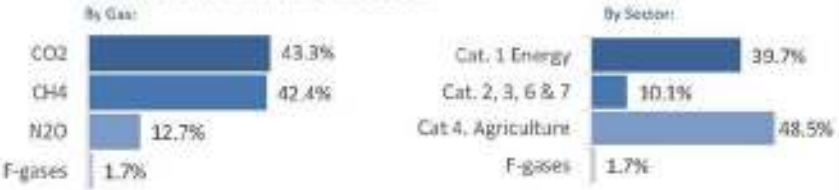
Per-Capita Emissions



GHG Emissions per GDP



2010 Total GHG Emissions excl. LULUCF



INDC Factsheet

EU28

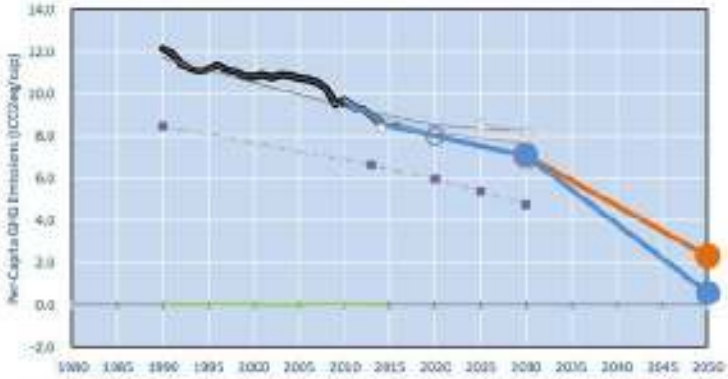
Per-Capita Emissions in 2030 rel. 2010 (excl. LULUCF): -27%

Cancun 2020	INDC 2025	INDC 2030		2010	2025	2030
		-40% rel.1990	Share of World Emissions excl. LULUCF (%eq)	10.6%	7.0%	6.4%
			Per-Capita Emissions (tCO2eq/cap)	9.7t	7.6t	7.1t

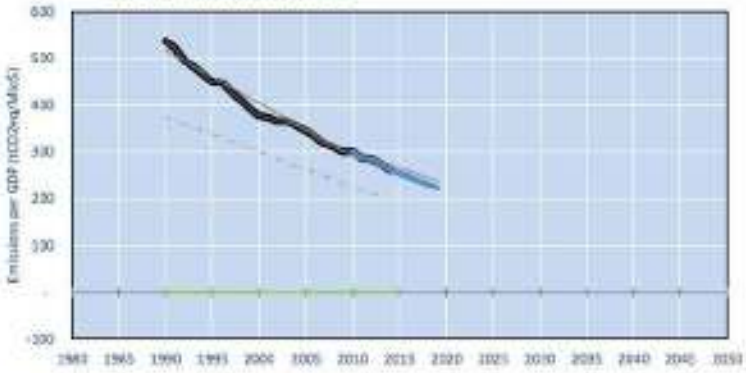
INDC: At least 40% red.ction of GHG emissions by 2030 compared to 1990 ()

GHG Emissions

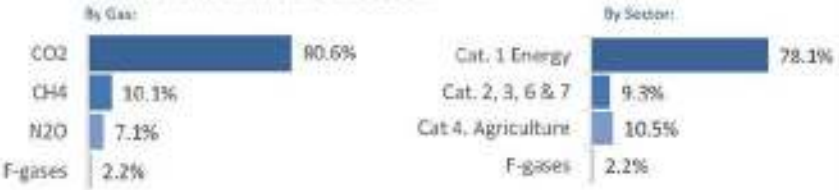
Per-Capita Emissions



GHG Emissions per GDP



2010 Total GHG Emissions excl. LULUCF



United States of America

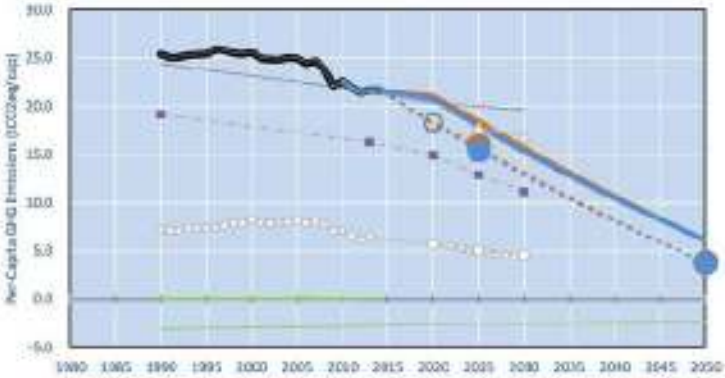
Per-Capita Emissions in 2030 rel. 2010 (excl. LULUCF): -31%

Cancun 2020	INDC 2025	INDC 2030		2010 World Rank	2025 World Rank	2030 World Rank
	-26% -28% rel.2005		Share of World Emissions excl. LULUCF (Rank)	15.2% #2	11.5% #2	9.8% #3
			Per-Capita Emissions (tCO2eq/cap)	22.6t #10	18.2t #13	15.5t #15

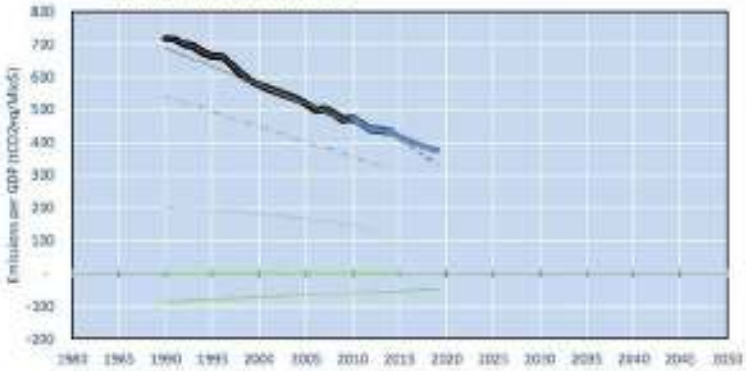
INDC: Reduce GHG emissions by 26-28 per cent below its 2005 level in 2025 and to make best efforts to reduce its emissions by 28% . (GWP AR4)

GHG Emissions

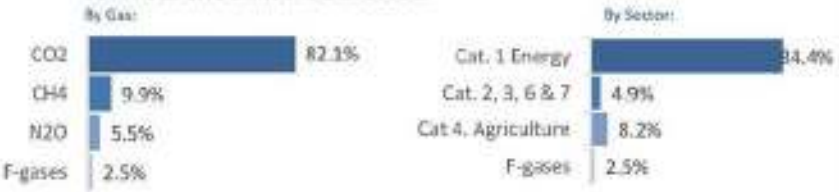
Per-Capita Emissions



GHG Emissions per GDP



2010 Total GHG Emissions excl. LULUCF



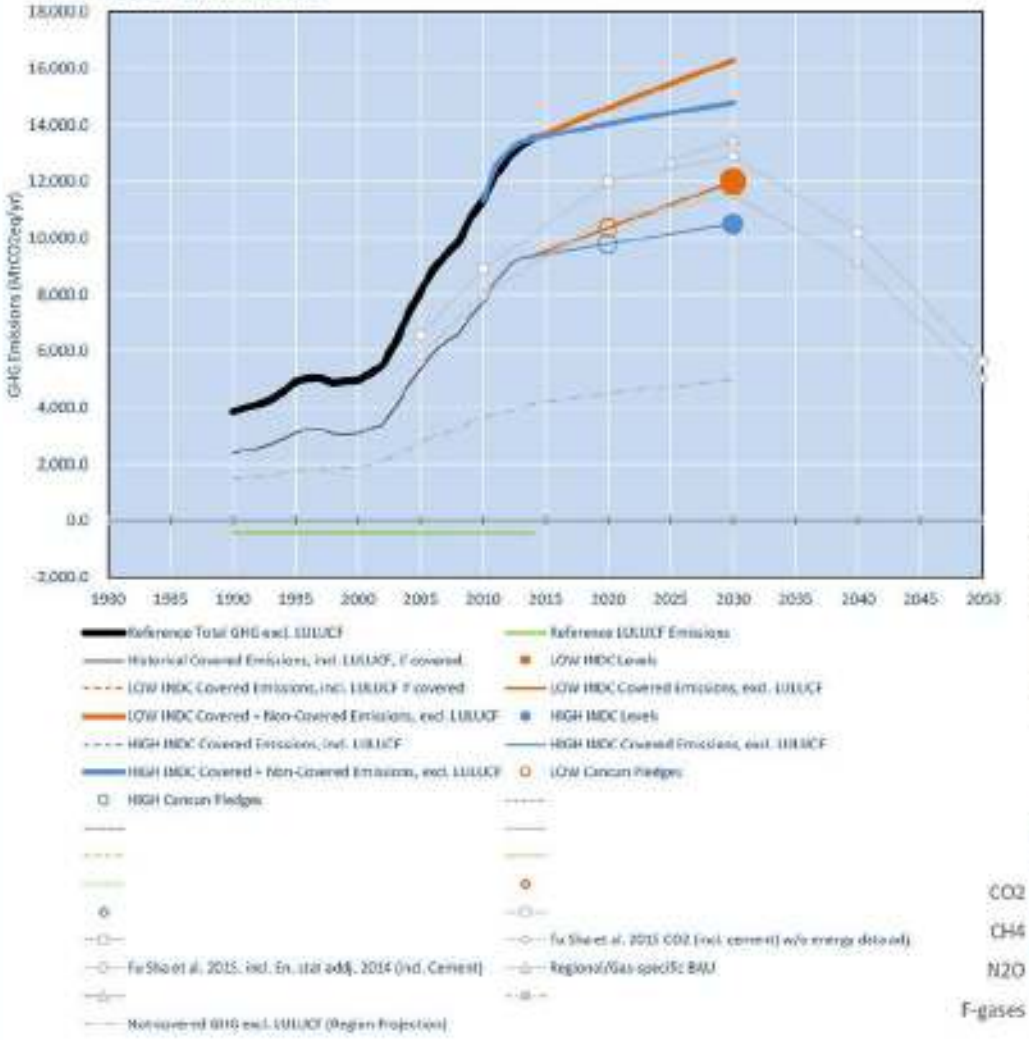
China

Per-Capita Emissions in 2030 rel. 2010 (excl. LULUCF): +30%

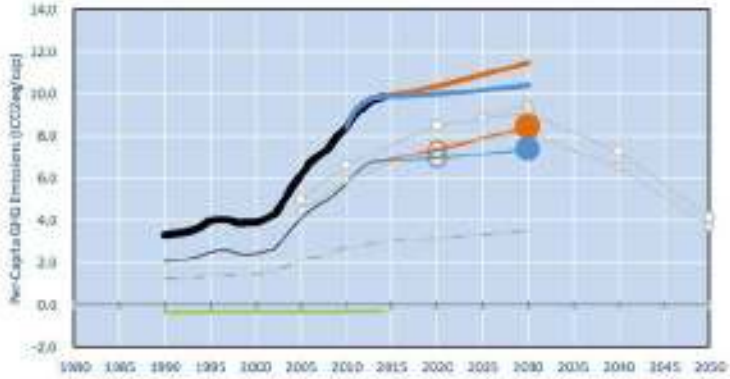
	Cancun 2020	INDC 2025	INDC 2030	2010 World Rank	2025 World Rank	2030 World Rank
			-60% -65% Intensity Target rel. 2005	Share of World Emissions excl. LULUCF (Rank)	24.5% #1	27.3% #1	27.5% #1
				Per-Capita Emissions (tCO2eq/cap)	8.4t #54	10.6t #28	11t #25

INDC: Achieve peaking of carbon dioxide emissions around 2030 and making the best effort to peak early;Lower carbon dioxide emissions per unit of GDP by 60-65% from 2005 level;Increase share of non-fossil fuel in primary energy consumption to

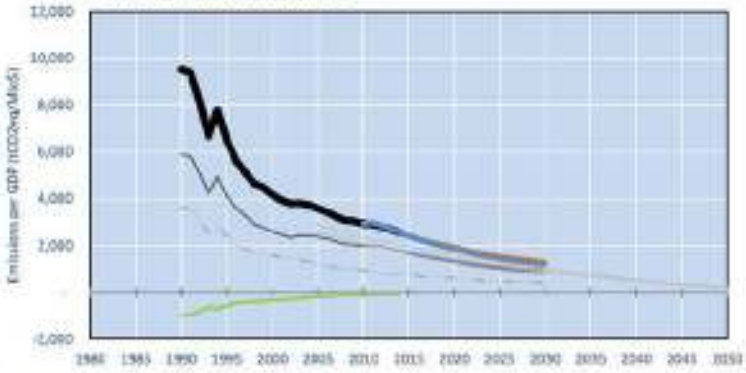
GHG Emissions



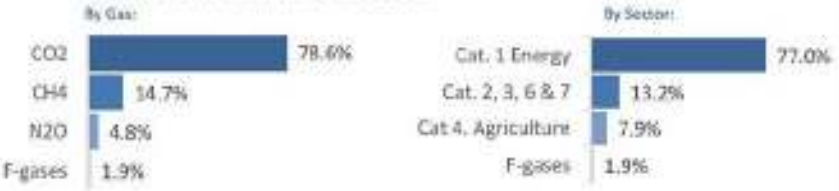
Per-Capita Emissions



GHG Emissions per GDP



2010 Total GHG Emissions excl. LULUCF



INDC Factsheet

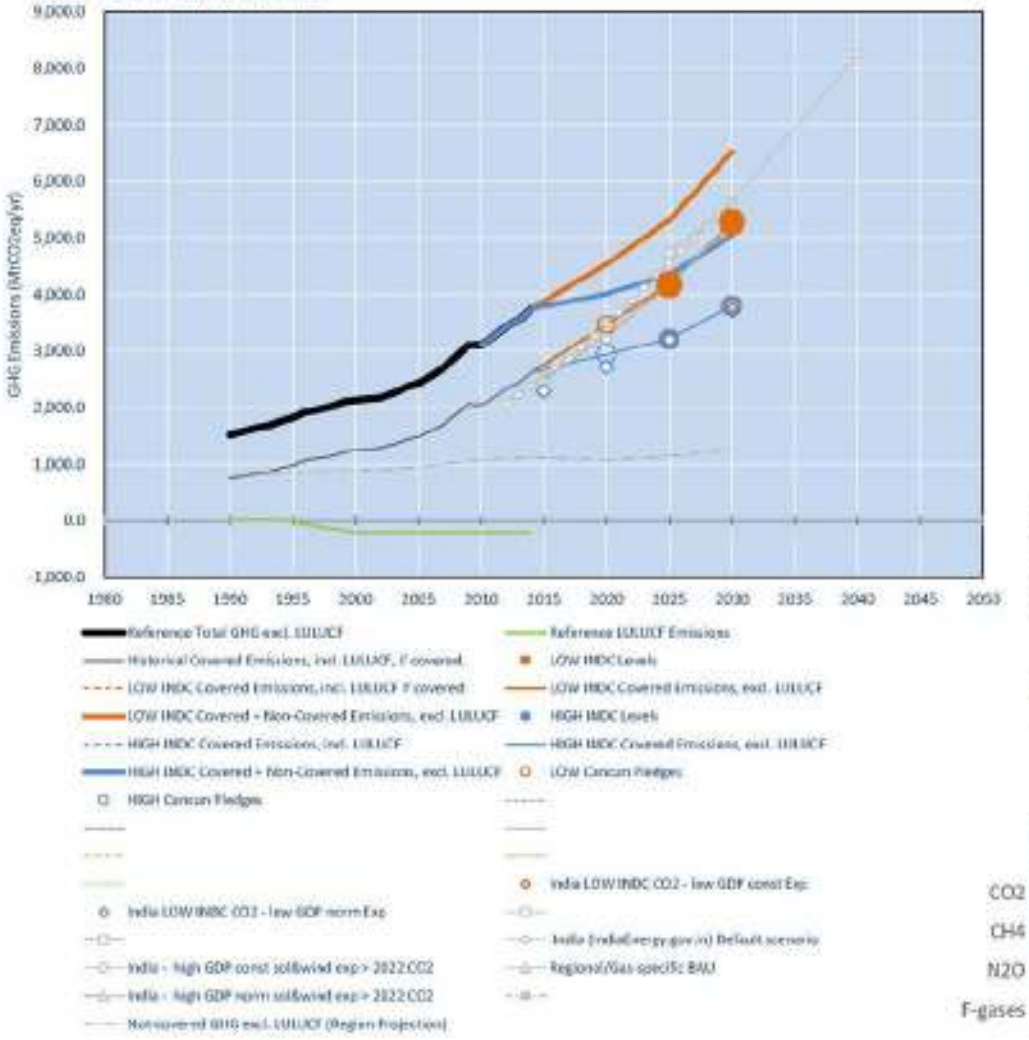
India

Per-Capita Emissions in 2030 rel. 2010 (excl. LULUCF): +50%

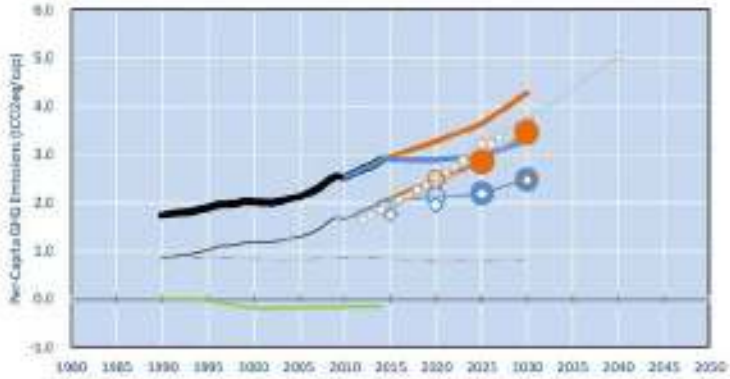
Cancun 2020	INDC 2025	INDC 2030	2010 World Rank	2025 World Rank	2030 World Rank
		Share of World Emissions excl. LULUCF (Rank)	6.8% #4	8.8% #3	10.2% #2
		Per-Capita Emissions (tCO2eq/cap)	2.5t #139	3.3t #121	3.8t #112

INDC: Reduction of emissions intensity of its GDP by 33- 35% from 2005 levels by 2030; achieve about 40% cumulative electric power installed capacity from non-fossil fuel based energy resources; create additional carbon sink of 2.5-3 billion tonne.

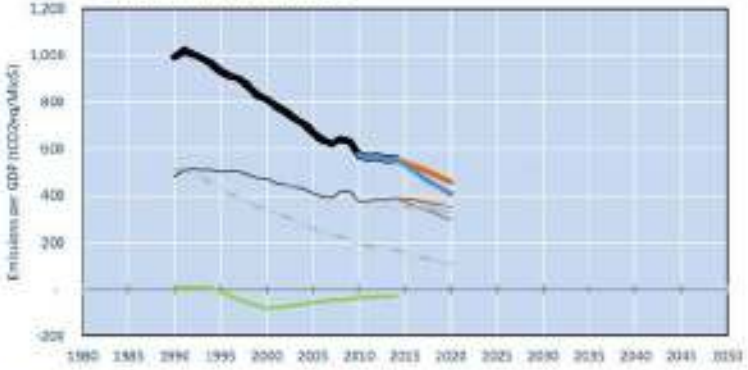
GHG Emissions



Per-Capita Emissions



GHG Emissions per GDP



2010 Total GHG Emissions excl. LULUCF

Intl. Aviation

Per-Capita Emissions in 2030 rel. 2010 (excl. LULUCF): +28%

Cancun 2020 | INDC 2025 | INDC 2030

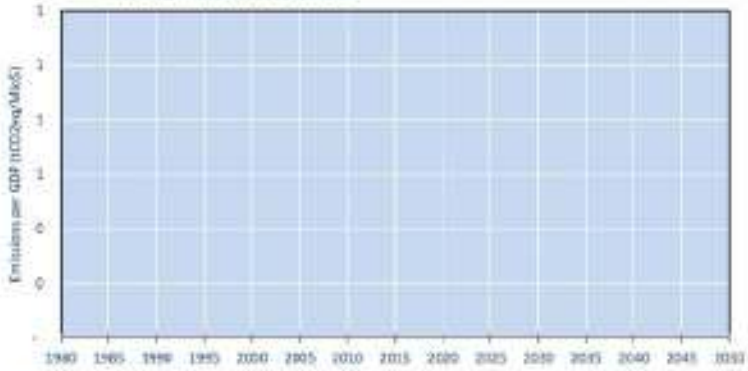
	2010 World Rank	2025 World Rank	2030 World Rank
Share of World Emissions excl. LULUCF (Rank)	1.0% #21	1.3% #14	1.3% #14
Per-Capita Emissions (tCO2eq/cap)	1.3t #173	1.8t #161	1.7t #162

NDC/INDC: Carbon Neutral Growth Target by ICAO from 2020 onwards with range of emissions between 632 and 756 MtCO2. (GWP unspecified)

GHG Emissions

Extra emis for top 5% global pop.

GHG Emissions per GDP



2010 Total GHG Emissions excl. LULUCF

By Gas:

CO2	100.0%
CH4	0.0%
N2O	0.0%
F-gases	0.0%

By Sector:

Cat. 1 Energy	100.0%
Cat. 2, 3, 6 & 7	0.0%
Cat 4. Agriculture	0.0%
F-gases	0.0%

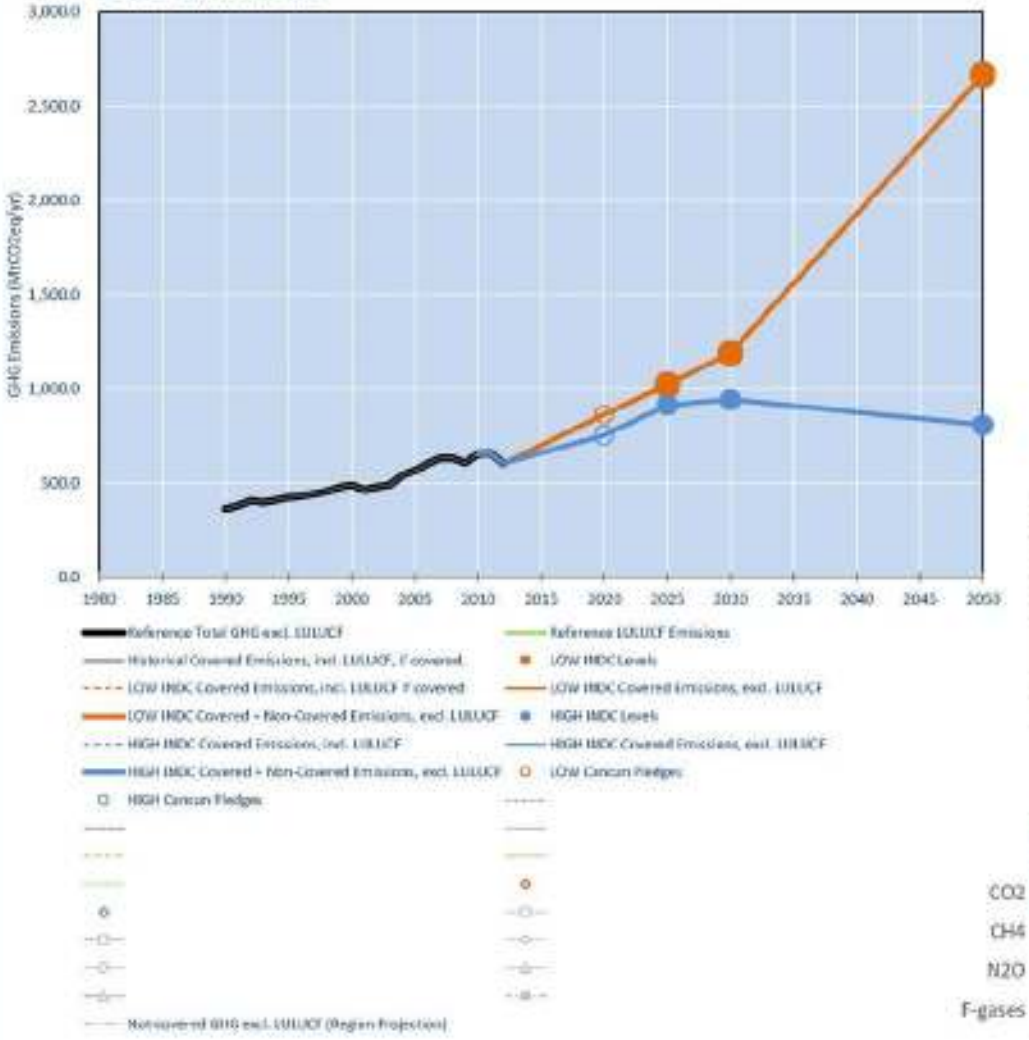
Intl. Maritime Transport

Per-Capita Emissions in 2030 rel. 2010 (excl. LULUCF): +33%

Cancun 2020	INDC 2025	INDC 2030	2010 World Rank	2025 World Rank	2030 World Rank
		Share of World Emissions excl. LULUCF (Rank)	1.4% #13	1.8% #10	1.9% #8
		Per-Capita Emissions (tCO2eq/cap)	0.1t #198	0.1t #198	0.1t #198

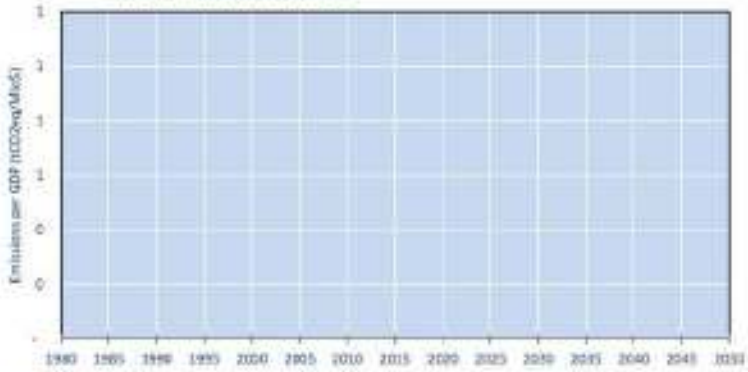
INDC Submitted: NOT YET

GHG Emissions



Extra emis for evry person on globe

GHG Emissions per GDP



2010 Total GHG Emissions excl. LULUCF

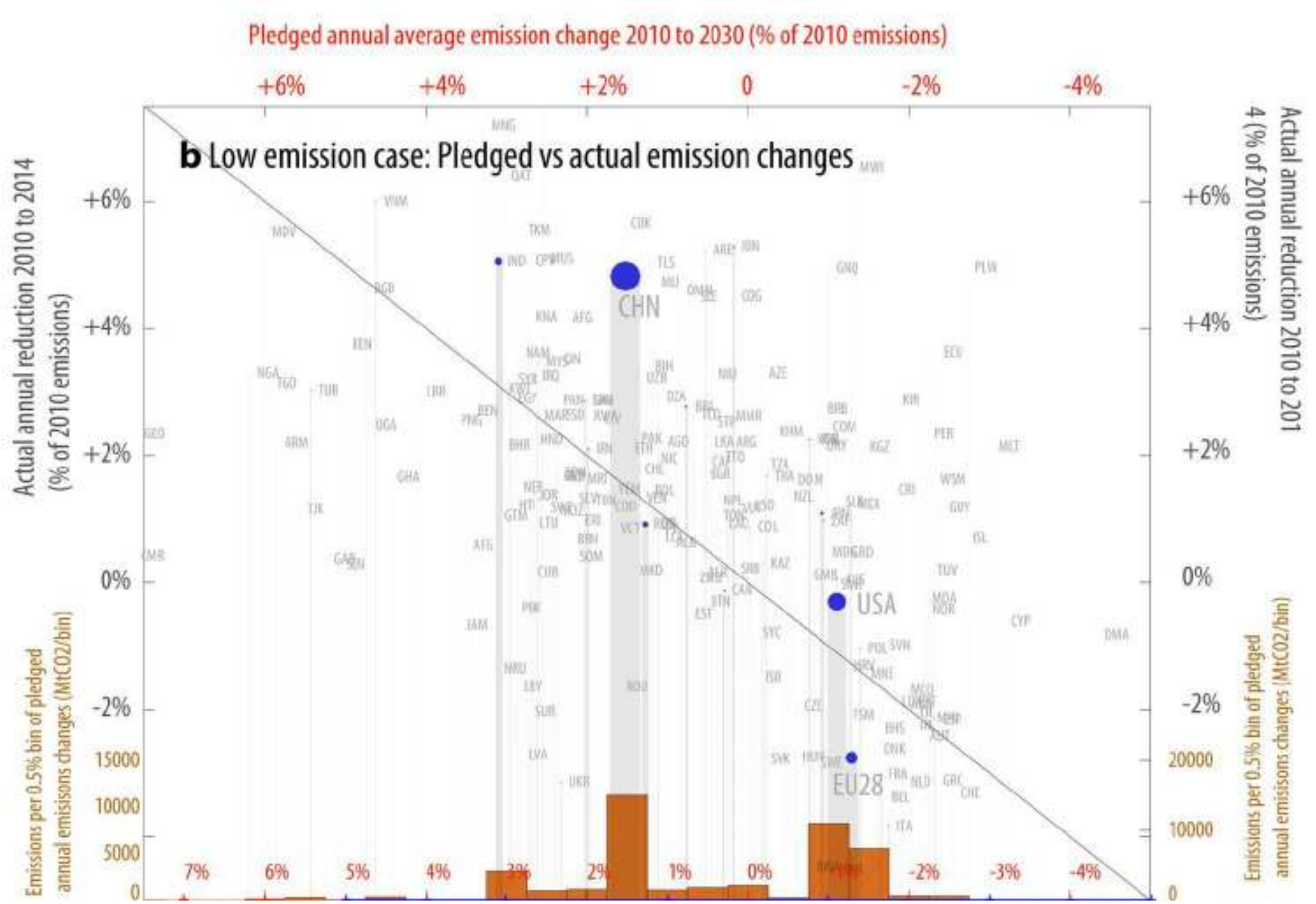
By Gas:		By Sector:	
CO2	100.0%	Cat. 1 Energy	100.0%
CH4	0.0%	Cat. 2, 3, 6 & 7	0.0%
N2O	0.0%	Cat 4. Agriculture	0.0%
F-gases	0.0%	F-gases	0.0%

AUSTRALIAN-GERMAN CLIMATE & ENERGY COLLEGE

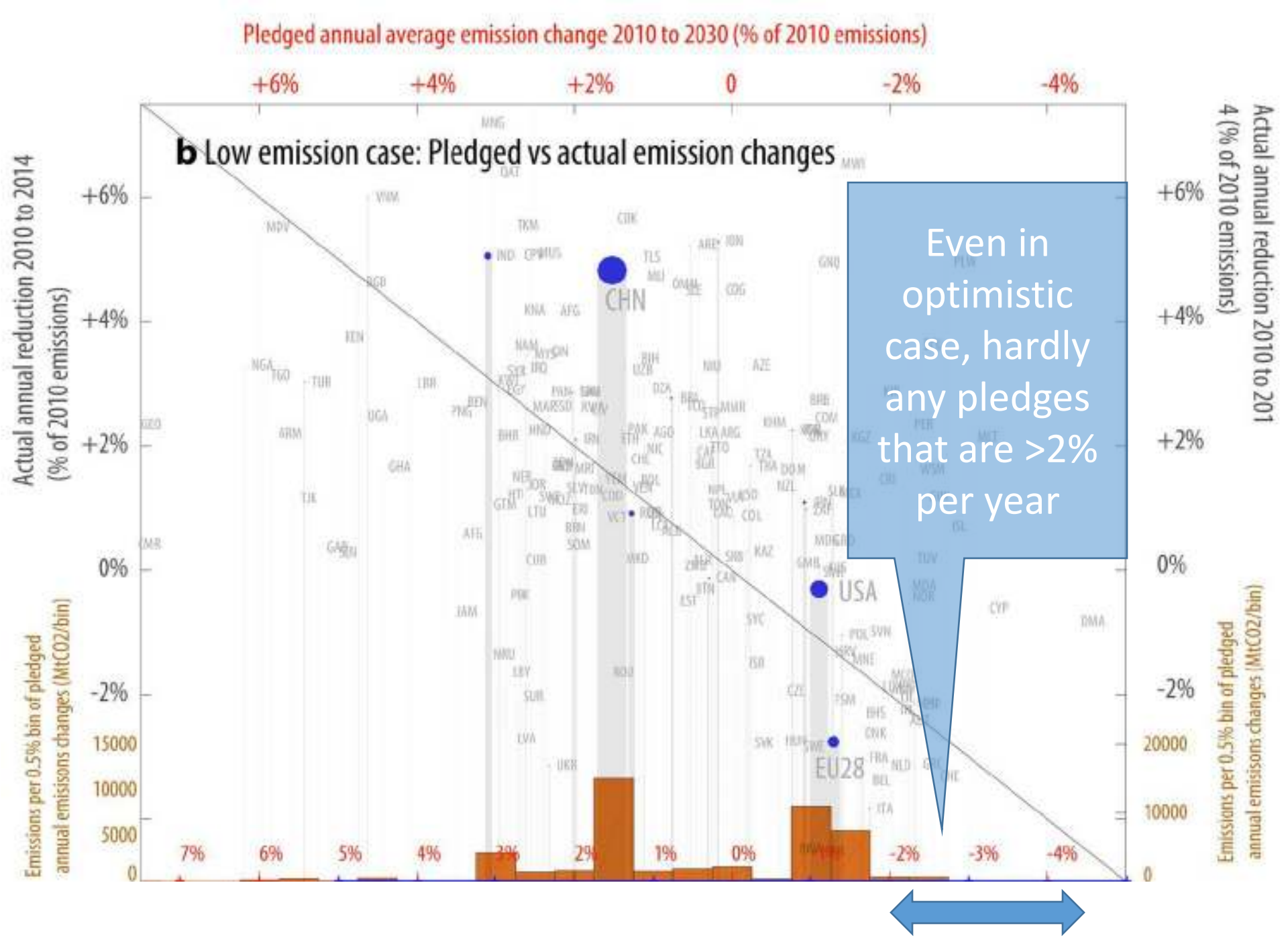
THE UNIVERSITY OF MELBOURNE

Outline

- Part I: Aggregate effect of NDCs
- Part II: Individual NDCs
- Part III: Issues arising…
  ratcheting up / carbon markets.



Please do not share. Graph: M. Meinshausen & R. Alexander, in preparation



Please do not share. Graph: M. Meinshausen & R. Alexander, in preparation

Required reductions per year to achieve (from 2010 on)….

2060 Phase-out: **2.0%** per year

2050 Phase-out: **2.5%** per year

2040 Phase-out: **3.3%** per year

Pre- and post-2030 reductions

- Global net emissions have to be **zero** during the second half of the century
- **For domestic purposes**, a linear phase-out trajectory to zero is a good proxy to spread the effort across time (and avoid stranded assets implied by rise-then-strong-decline pathways).
- **Who supports / enables** mitigation action is a different question. Not all would consider linear convergence to zero NOT a fair approach.

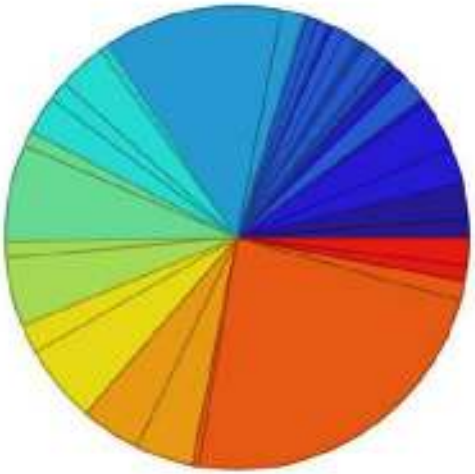
- Basically nobody yet on phase-out trajectory. → **Ratcheting up**

What could be **leadership**?

1. Go ahead…
2. Ensure that others follow you…
3. …in a pace commensurate with their own understanding of fairness.
4. … so that the global goal is achieved.

Meinshausen et al., Nature Climate Change, 2015

2010: Global GHG Emissions



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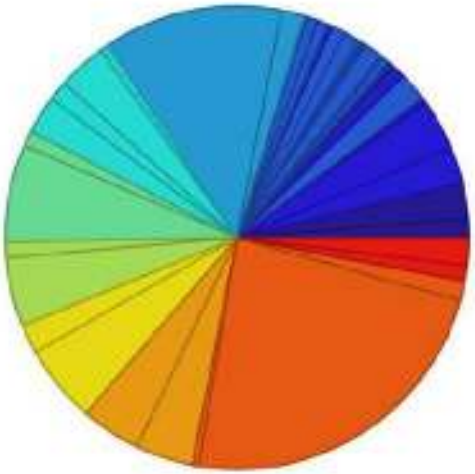
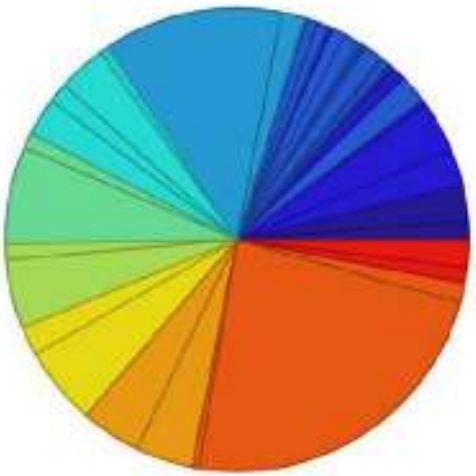
2010: Global GHG Emissions



China

Meinshausen et al., Nature Climate Change, 2015

2010: Global GHG Emissions



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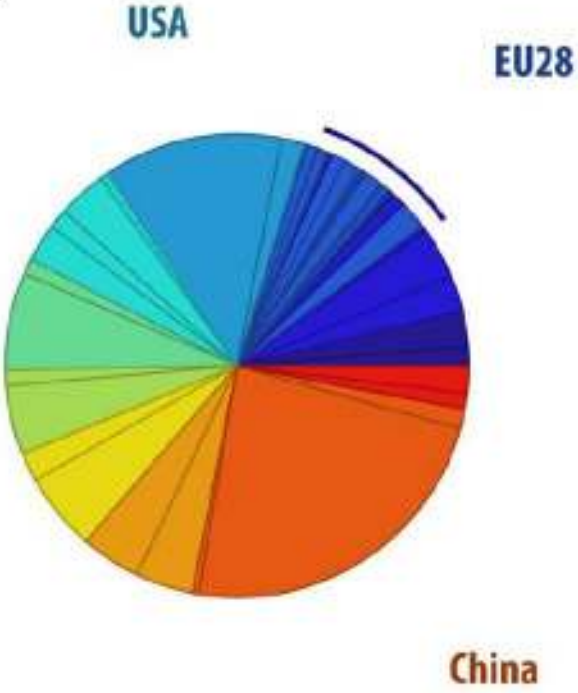
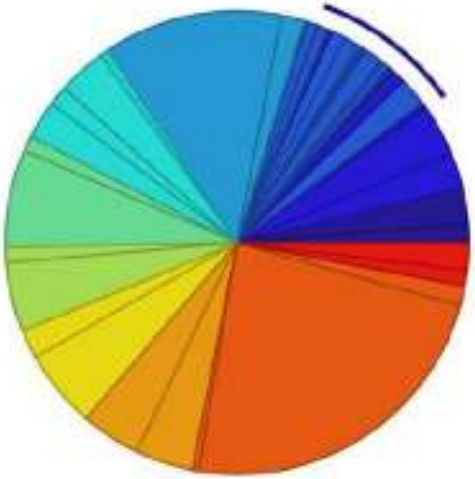
2010: Global GHG Emissions

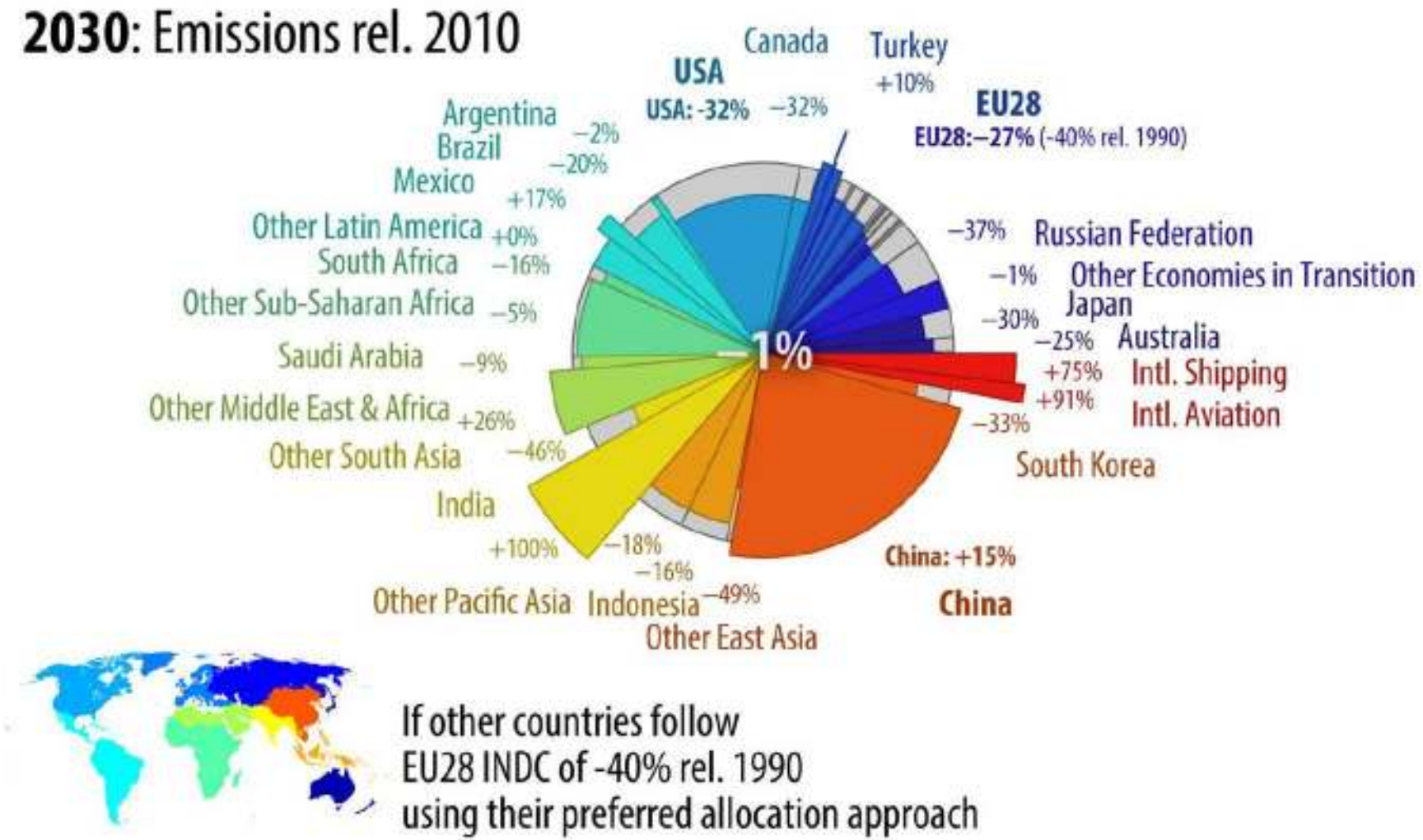


Meinshausen et al., Nature Climate Change, 2015

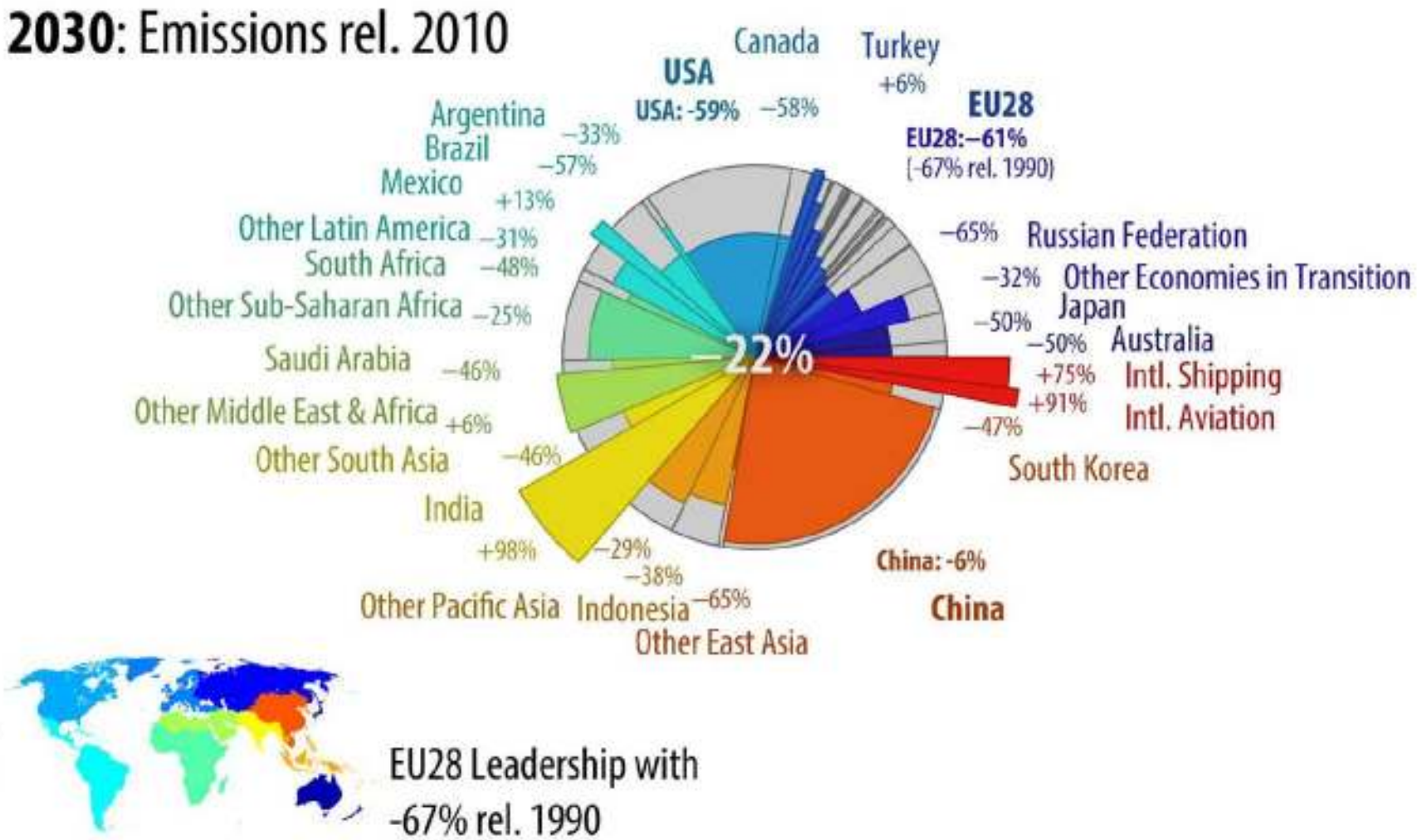
2010: Global GHG Emissions



Meinshausen et al., Nature Climate Change, 2015



Meinshausen et al., Nature Climate Change, 2015



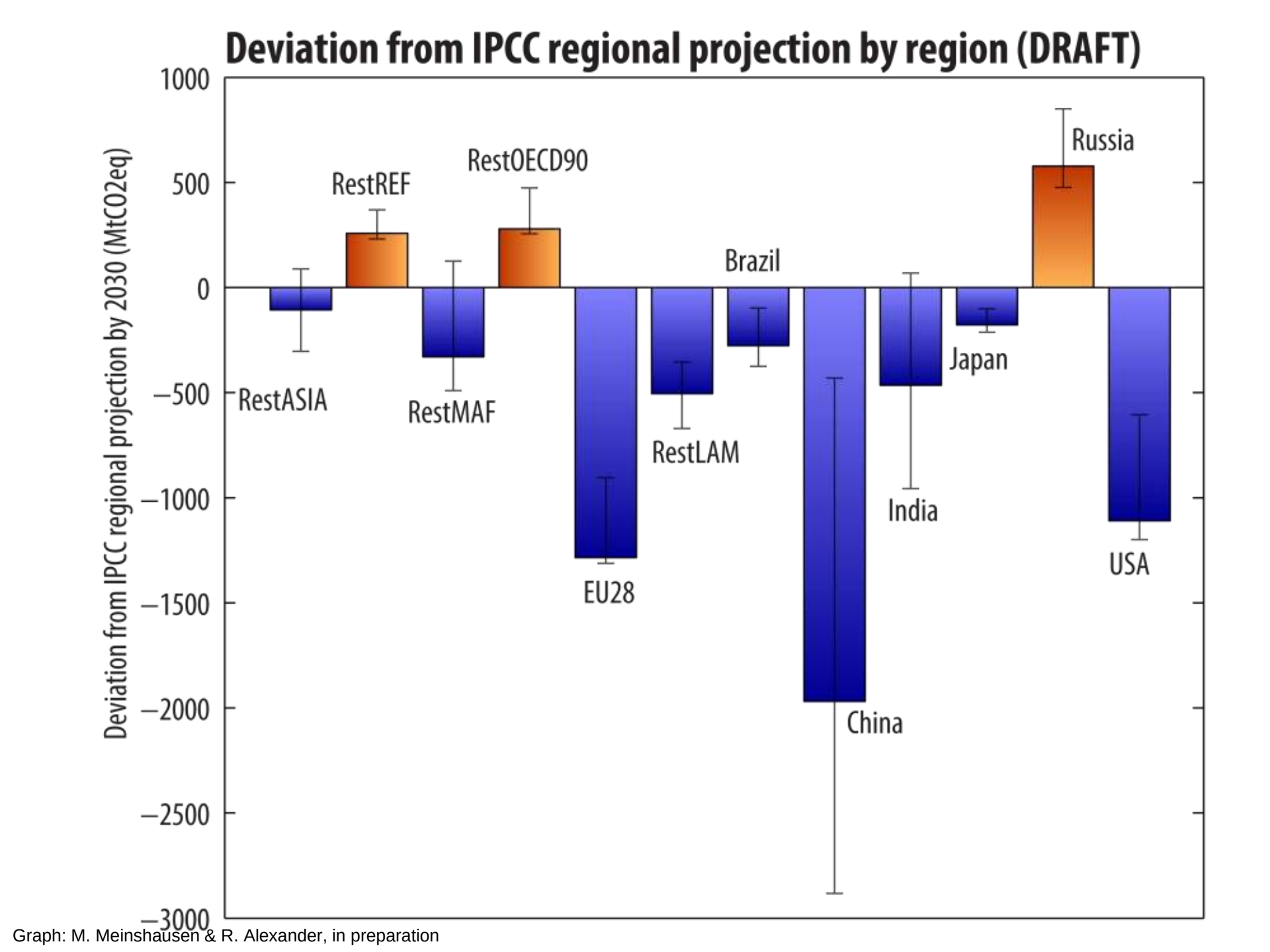
Meinshausen et al., Nature Climate Change, 2015

The world needs leaders:

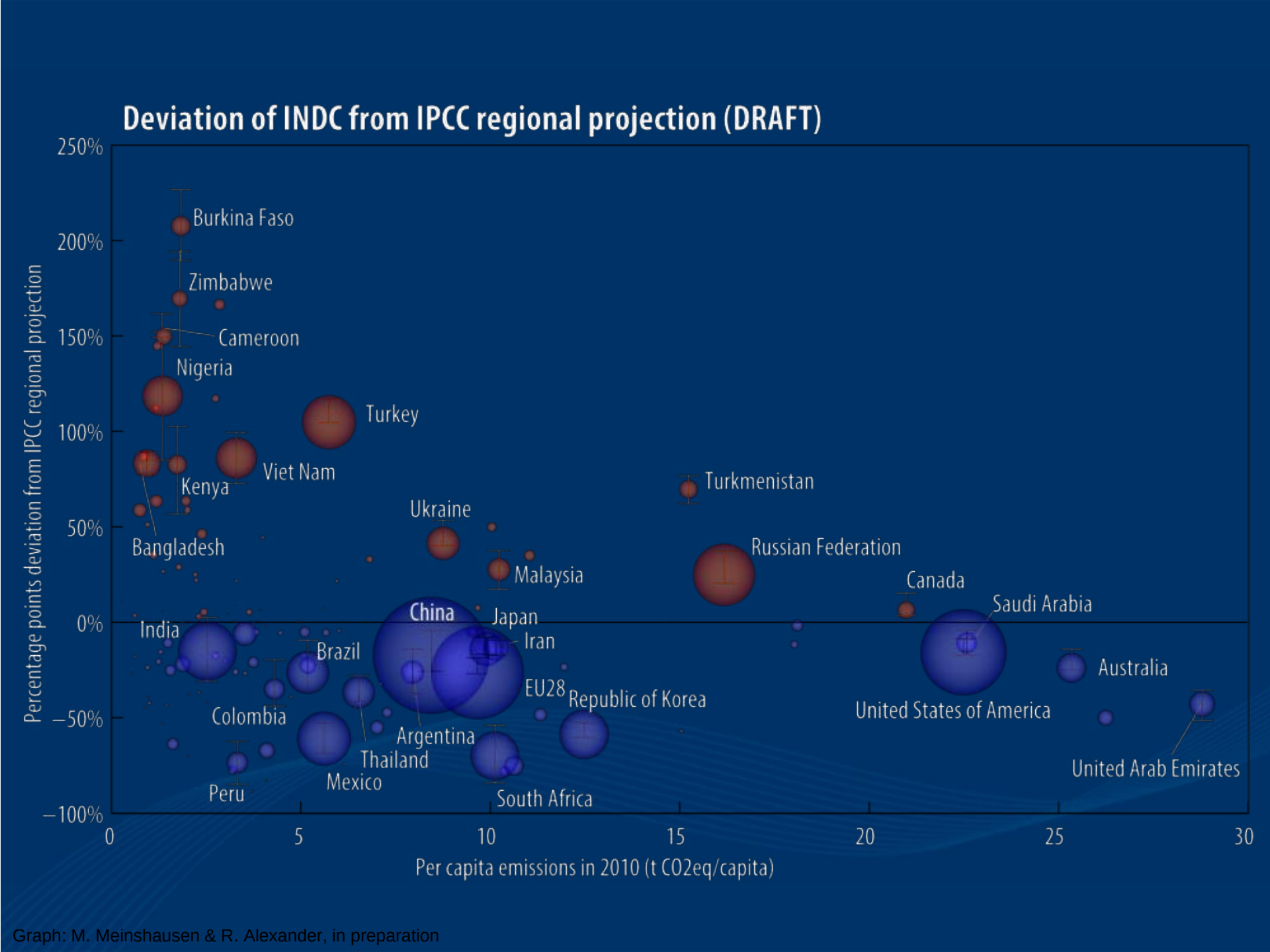
EU or US doubling their efforts below 2010… or China lowering a third rather than increasing a third…

Carbon Market implications

- How much **‘hot air’** in the system and where?
  - Baseline are always hypothetical.
  - Here: comparison to the range of IPCC WG3 scenario database regional ‘current policy’ projections
  - Not definite judgement about ‘hot air’, just indication.



Graph: M. Meinshausen & R. Alexander, in preparation



Graph: M. Meinshausen & R. Alexander, in preparation

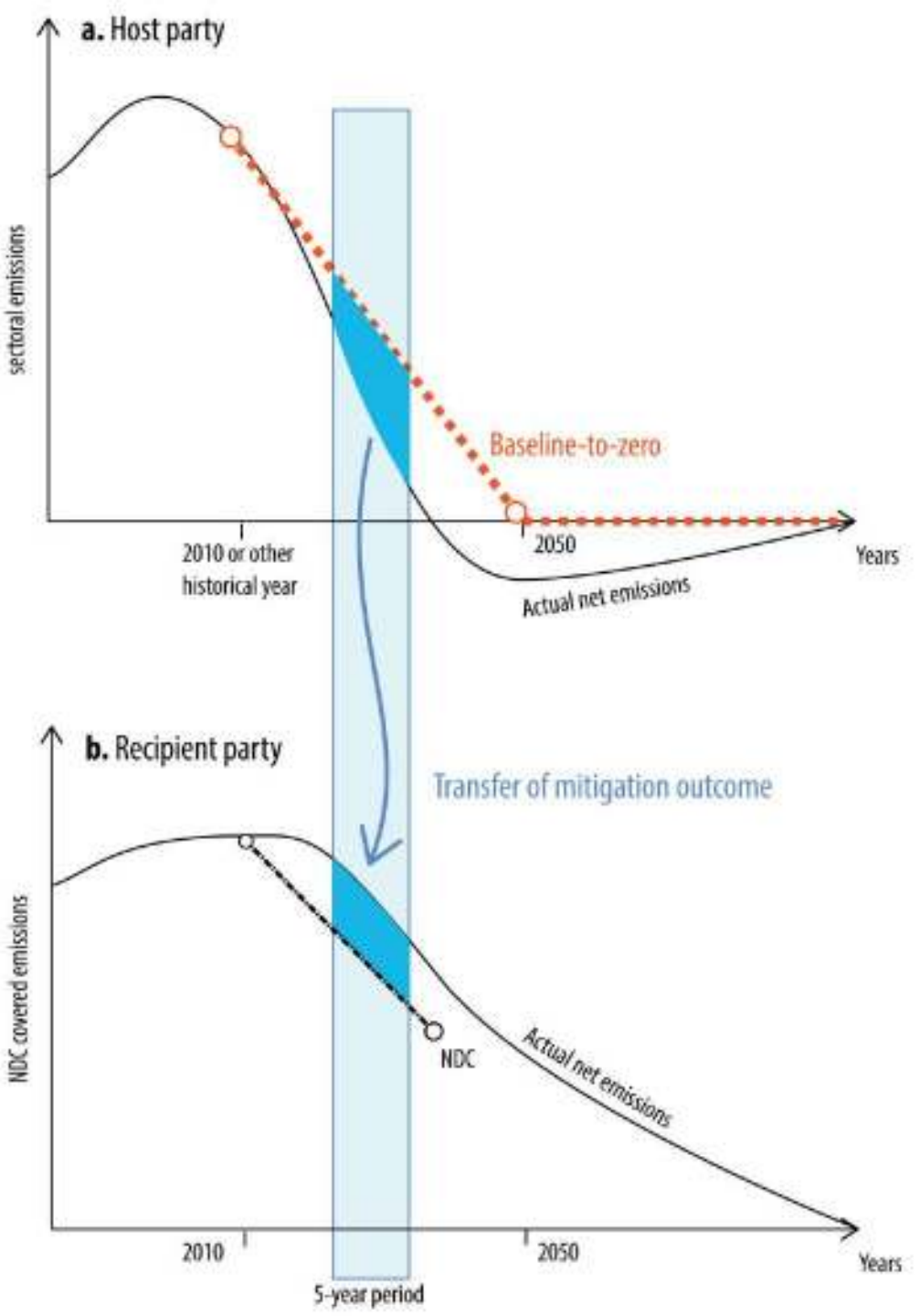
- One more idea…

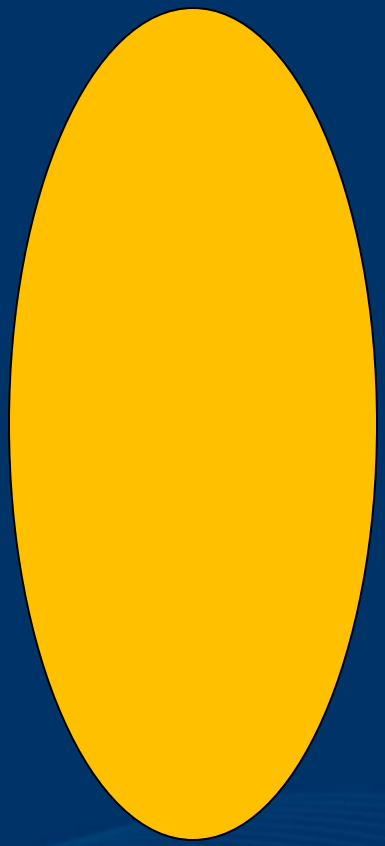
- Trading:
  How to support rather than disincentivize the most ambitious NDCs?

How should post-2020 international carbon markets be designed?

A baseline-to-zero scheme as one of the elements within a multi-mechanism world ...

→ Trading should support ambitious NDCs rather than reward unambitious ones.





The golden side of the coin

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Thank you