United Nations
Climate Change

Towards Net-Zero Emissions: Science Perspective

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MODERATOR
Dr. Ruta Bubniene
Transparency Division UNFCCC

COP28UAE

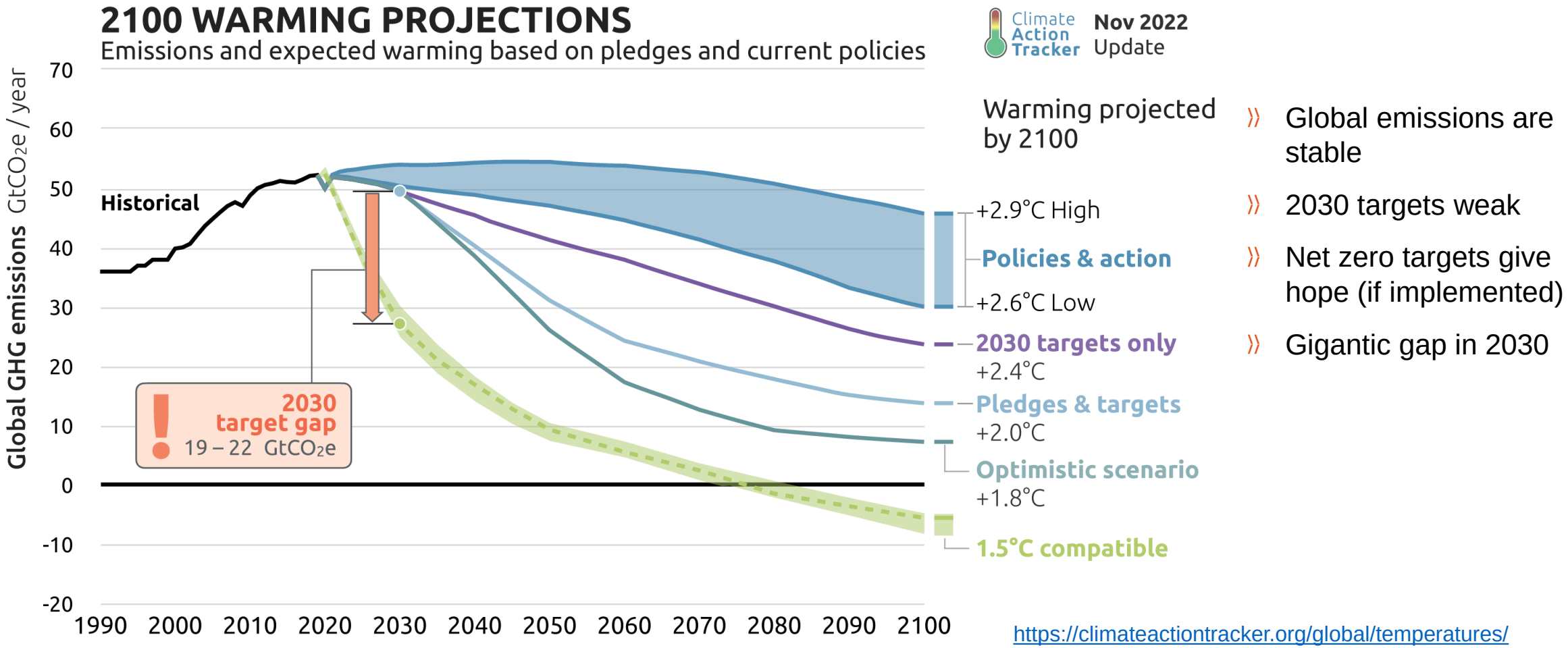
LIVESTREAM AVAILABLE
5 December
15:00 - 16:00 GST (Local time)
Meeting Room 36
Blue Zone

#Together4Transparency

Towards net zero: science perspective

Niklas Höhne, n.hoehne@newclimate.org
5 Dec 2023

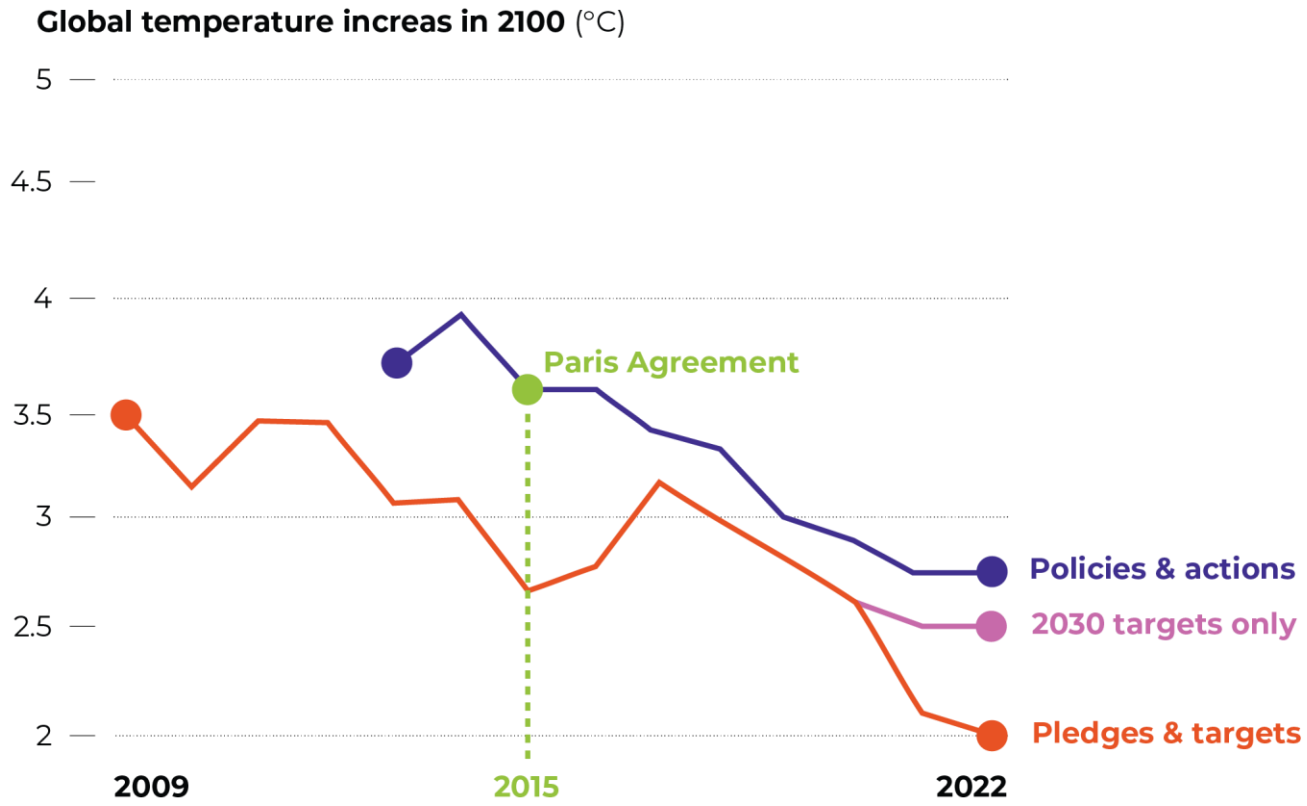
Temperature increase to 2100



- Global emissions are stable
- 2030 targets weak
- Net zero targets give hope (if implemented)
- Gigantic gap in 2030

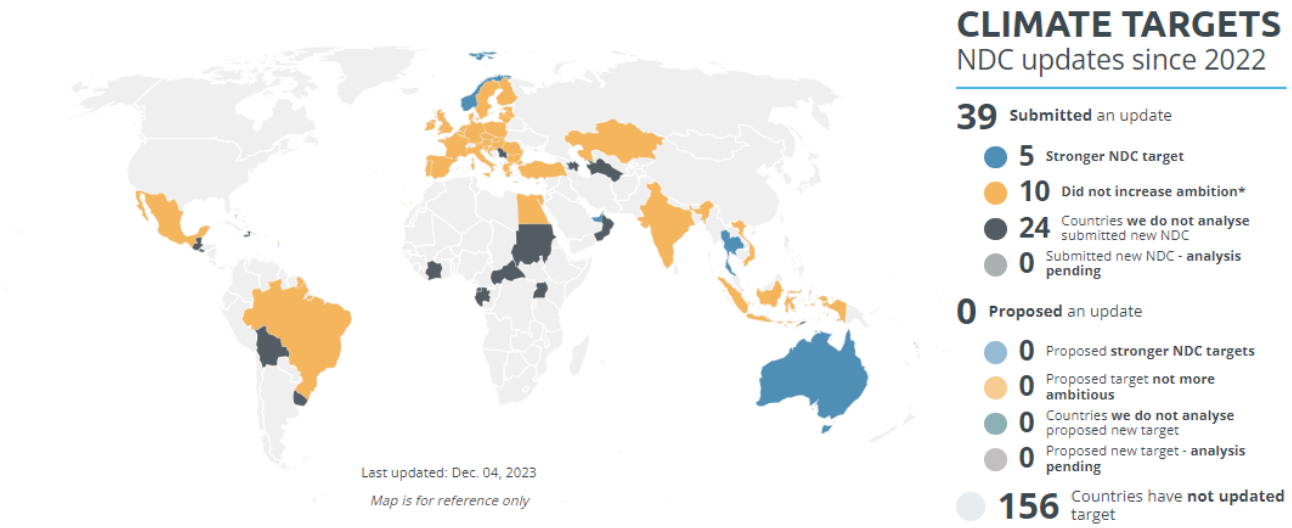
https://climateactiontracker.org/global/temperatures/

Projected temperature has improved



Quelle: Climate Action Tracker, 2022 https://climateactiontracker.org/publications/massive-gas-expansion-risks-overtaking-positive-climate-policies/

Almost no new NDCs in 2022 and 2023



28.3% GLOBAL EMISSIONS COVERED BY NEW NDC SUBMISSIONS

40.1% GLOBAL POPULATION COVERED BY NEW NDC SUBMISSIONS

COUNTRIES WE ANALYSE

1.5C COMPATIBLE TARGET	SUBMITTED A STRONGER NDC TARGET	PROPOSED A STRONGER NDC TARGET	DID NOT INCREASE AMBITION*	WILL NOT PROPOSE A MORE AMBITIOUS TARGET
2022/2023 UPDATES				
-	AUSTRALIA NORWAY SINGAPORE UAE THAILAND	-	BRAZIL EU INDIA INDONESIA KAZAKHSTAN MEXICO TÜRKIYE UNITED KINGDOM VIET NAM EGYPT	-

- 2021 Glasgow COP26 agreed that counties should revise and strengthen their NDCs
- But almost nothing happened

https://climateactiontracker.org/climate-target-update-tracker-2022/

Five major shifts since 2015

SHIFT 5

Electrification & industry

Electrification in transport and buildings **has progressed significantly** and all industry is now working on zero carbon strategies.

SHIFT 1

Awarness & civil action

Climate change discourse has become mainstream. **Civil and legal action** pushes governments and companies.

SHIFT 4

Energy supply

Renewables reached cost parity with fossils and power systems are **shifting to decentralised, flexible models.**

SHIFT 3

Investors & business

Every investor and every business feels **pressure to act on climate.**

SHIFT 2

Vision, goals & policies

Widely recognised that **emissions have to be reduced** to zero by every country across the economy.

Source: [Five major shifts since the Paris Agreement that give hope in a just, Paris-compatible transition | NewClimate Institute]

ELEVATE
supporting international climate policy

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ENGAGE
FEASIBILITY OF CLIMATE PATHWAYS

Increasing global and national ambition beyond Glasgow

Detlef van Vuuren, Isabela Tagomori Schmidt and many others

Supporting international climate policy

ELEVATE

supporting international climate policy

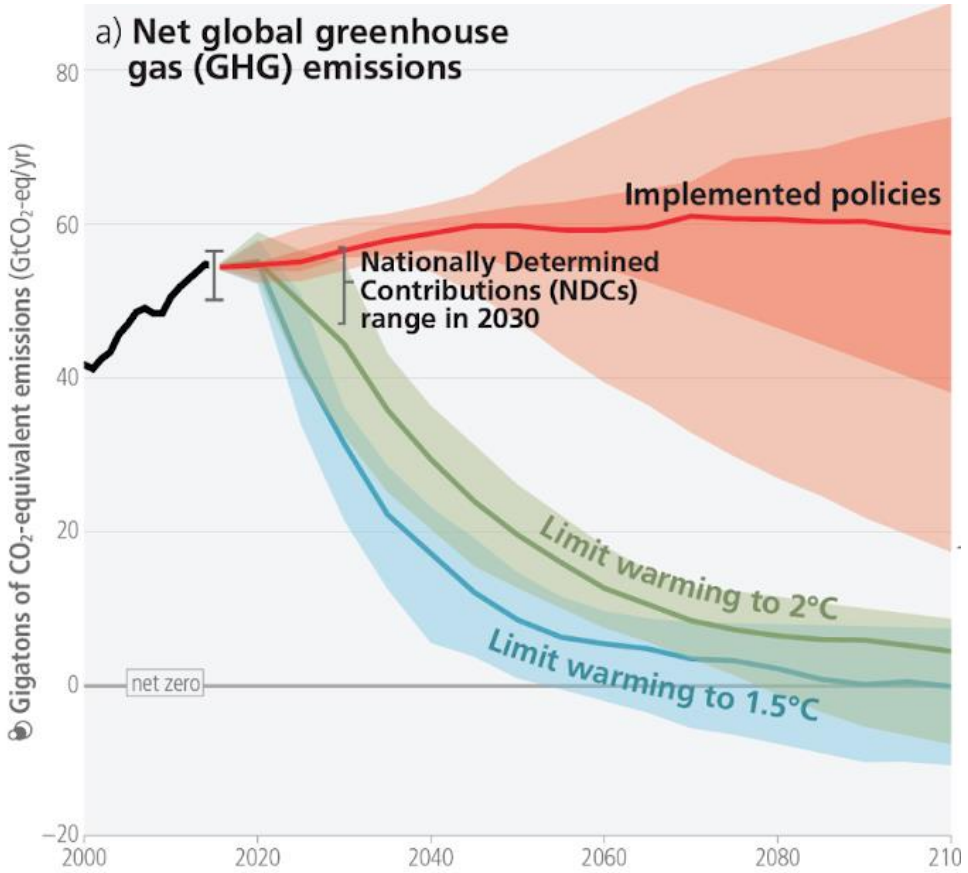
Policy analysis

Political economy

Net zero scenarios

International cooperation

Justice



- The **Paris Agreement** aims to limit the increase of global mean temperature to well below 2°C and pursue efforts to stay below 1.5°C
- → Net zero emissions:
  - 1.5 CO2: 2050; GHG : 2070
  - <<2 CO2: 2070; GHG : later

  Since the Conference of the Parties (COP26), in Glasgow, in 2021, many nations have also set long-term goals, notably the **net-zero emissions targets**.

How close do these ambitions take us toward the Paris goals?

How can we increase ambition to close the gap?

Evaluating the net-zero pledges

The **ENGAGE project** aims to answer this question, through a collaboration of global and national modelling groups assessing how current targets and policies affect emissions.

Integrated Assessment Models (IAMs) are useful to calculate plausible emissions pathways, globally and regionally, including an overview of mitigation options that could bring us closer to the Paris goals.

Scenarios

Current policies scenario: assuming all climate policies that are already implemented

NDC scenario: fully implementing all NDCs to 2030, with ambition levels remaining constant after that

Glasgow scenario: fully implementing NDCs and the net-zero pledges

Glasgow+ scenario: fully implementing and expanding the net-zero pledges to all countries/regions

Glasgow++ scenario: fully implementing and expanding the net-zero pledges to all countries/regions, and anticipating climate action by 10 years

2°C and 1.5°C scenarios: models calculate global cost-optimal ways of meeting these temperature goals in 2100.

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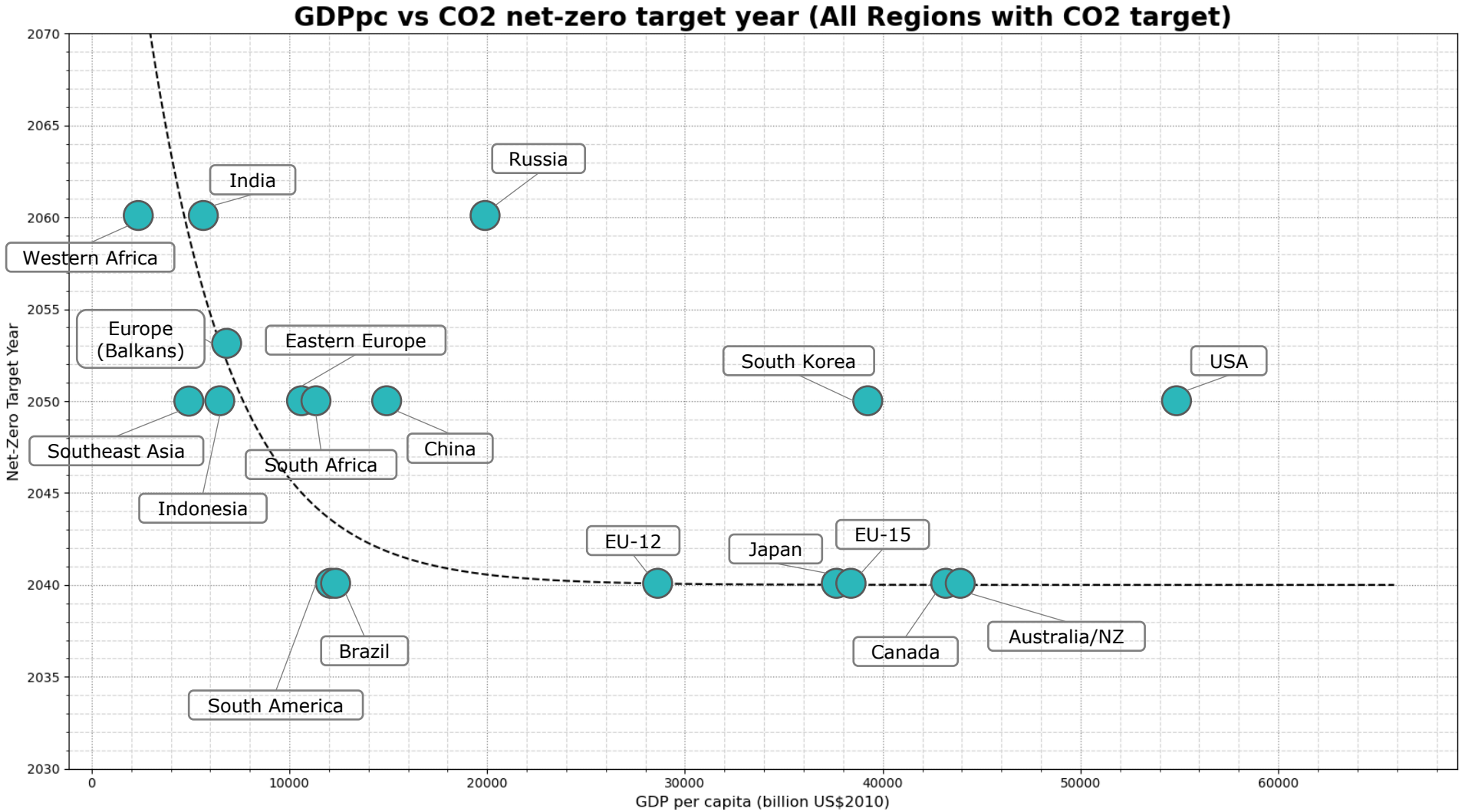
ENGAGE FEASIBILITY OF CLIMATE PATHWAYS

Glasgow

Expanding the net-zero coverage



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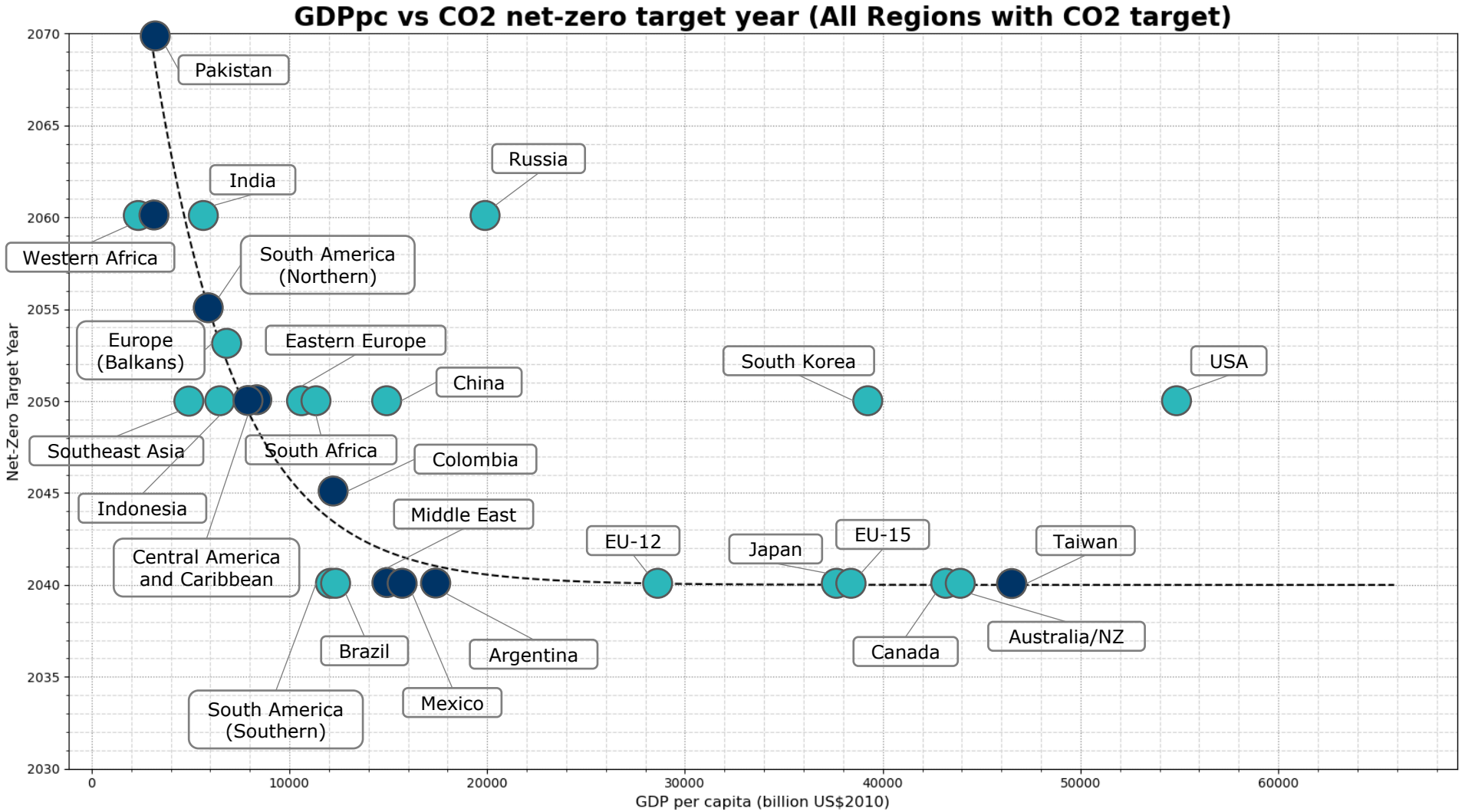
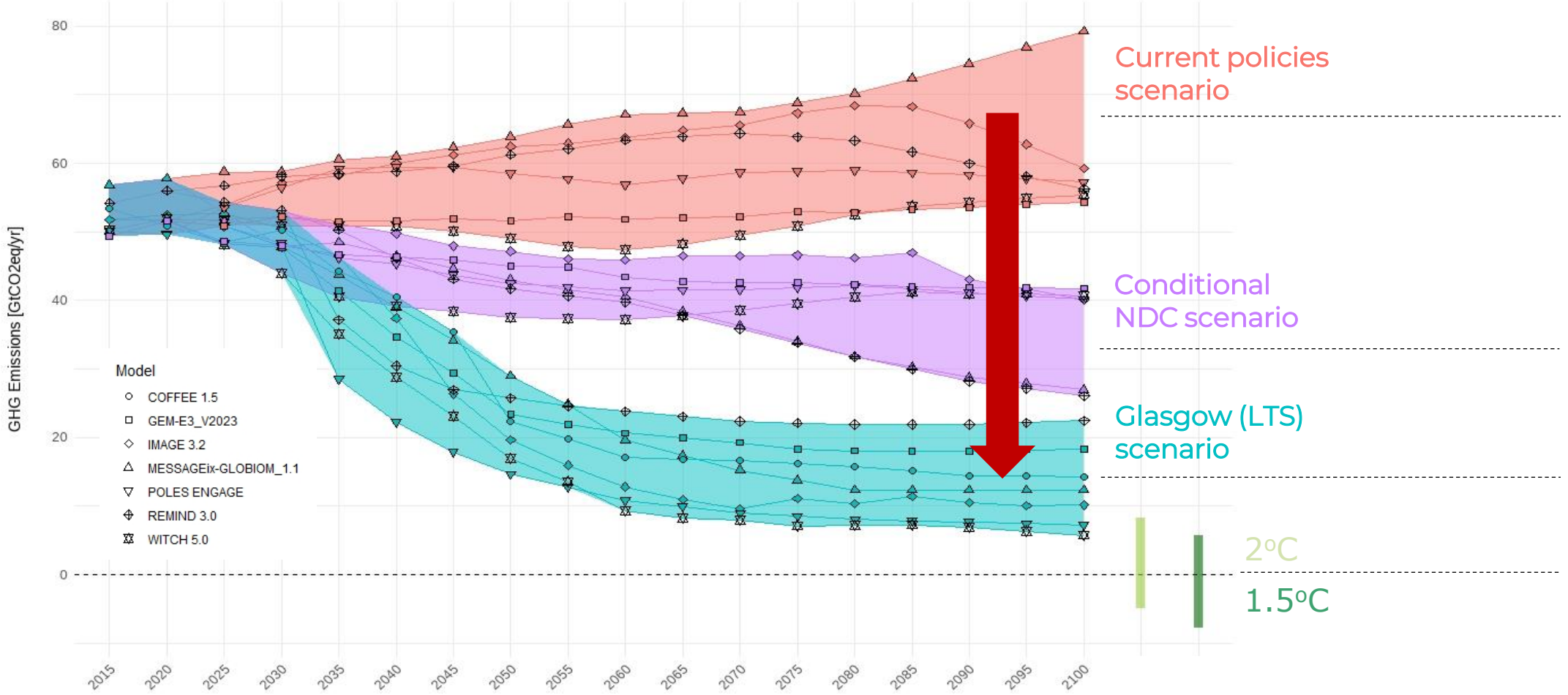
ENGAGE FEASIBILITY OF CLIMATE PATHWAYS

Expanding the net-zero coverage

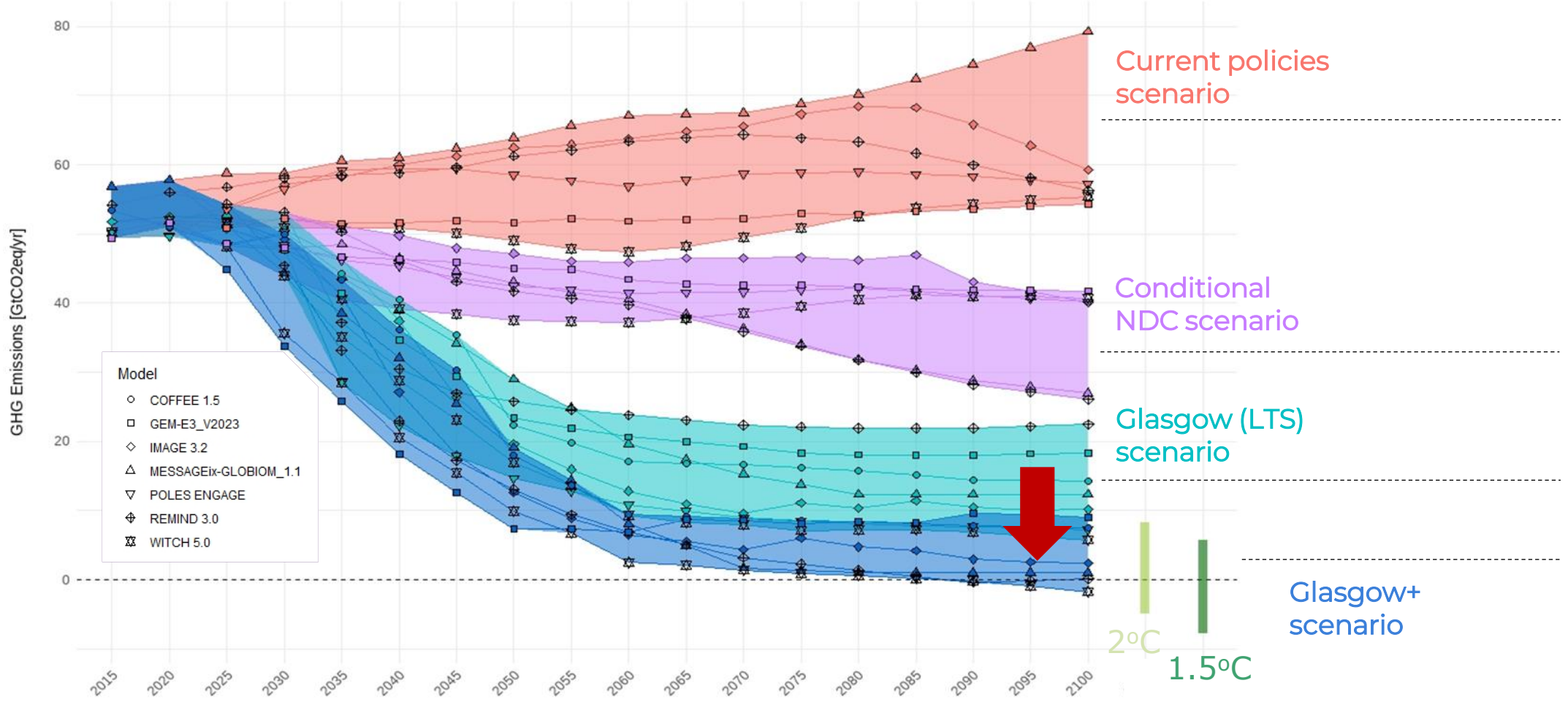


Possible futures

Implementing net-zero targets could make a difference!



Possible futures



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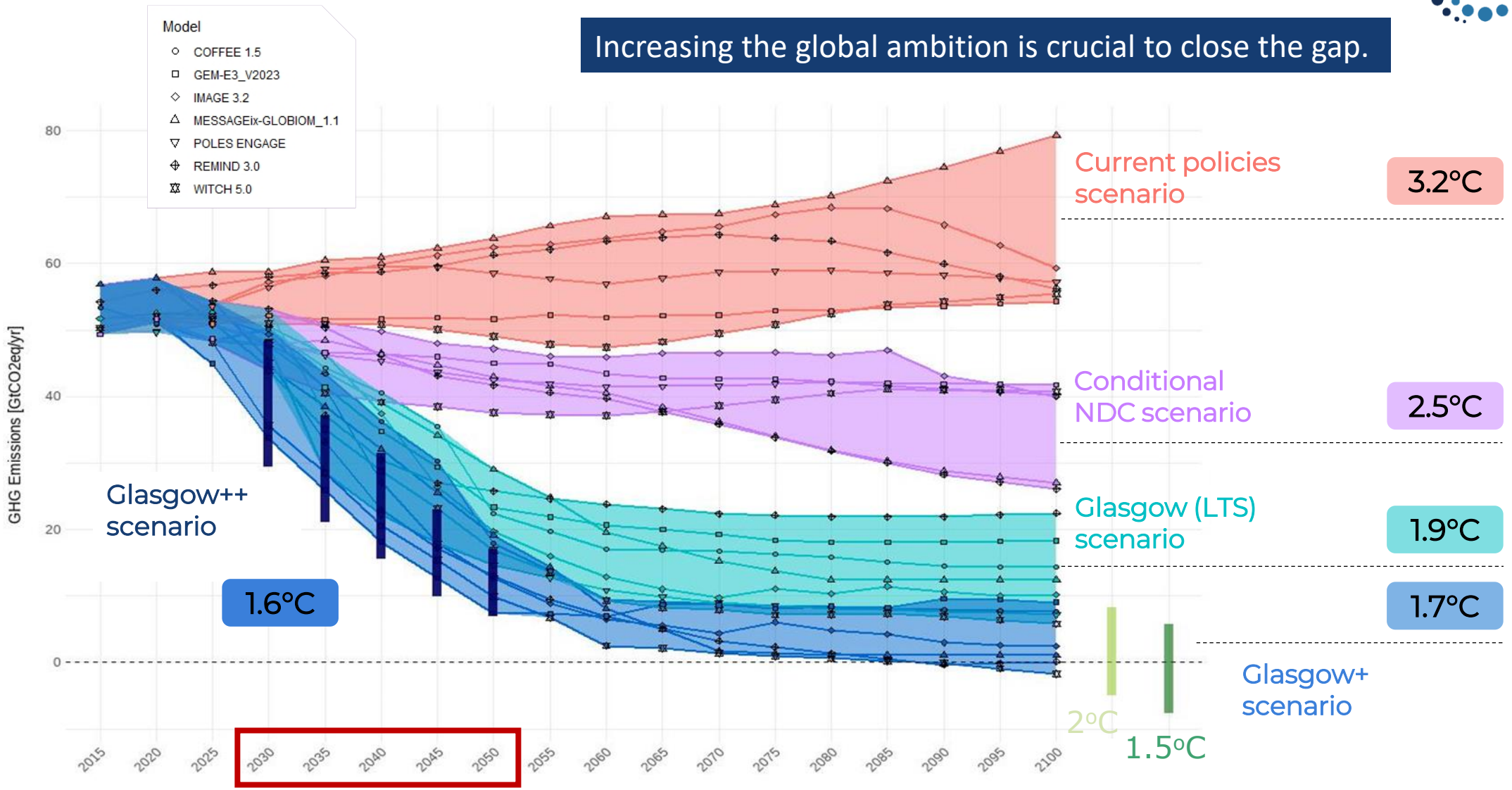
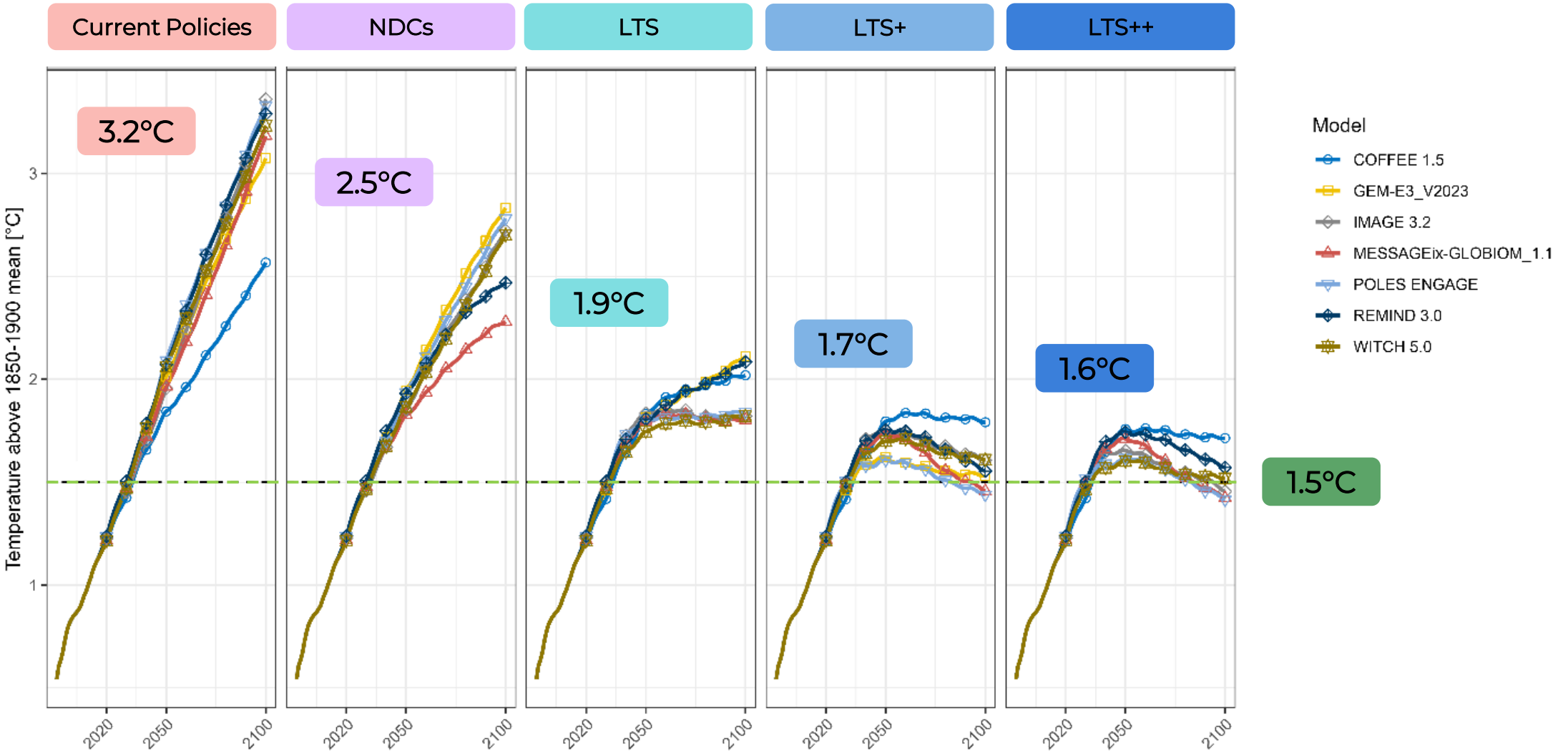
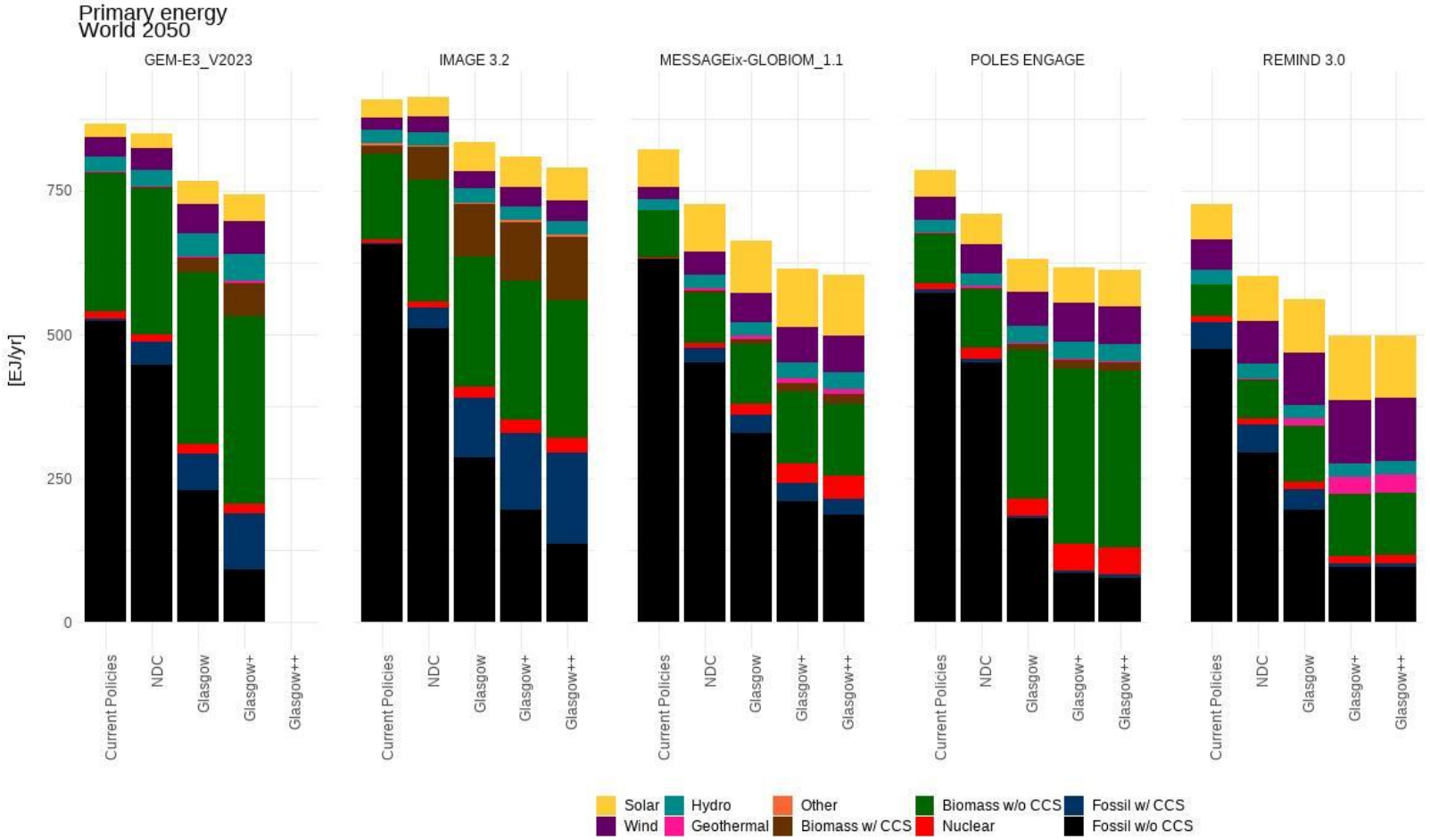
ENGAGE FEASIBILITY OF CLIMATE PATHWAYS

Increasing the global ambition is crucial to close the gap.



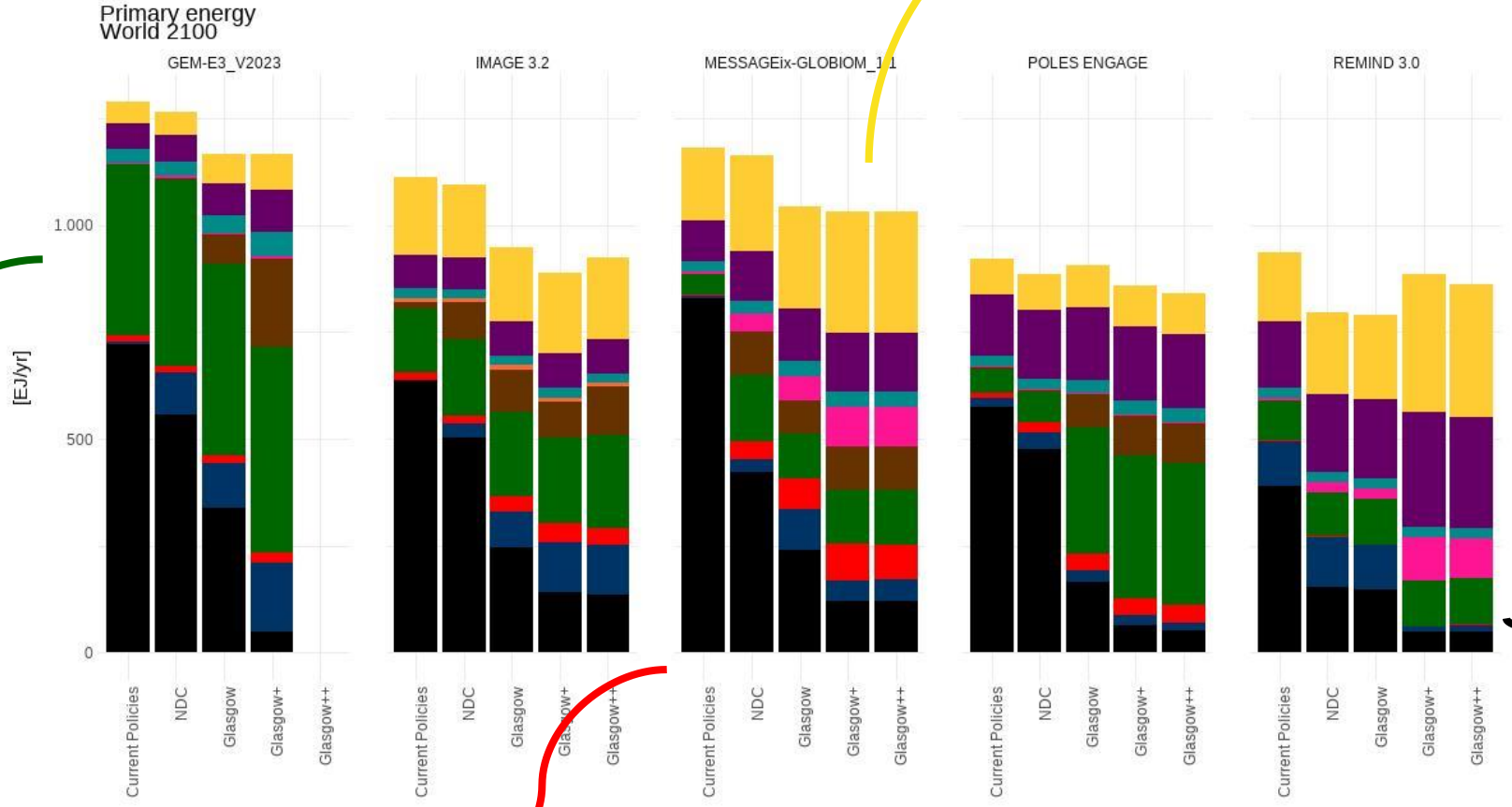

Current Policies
NDCs
LTS
LTS+
LTS++
3.2°C
2.5°C
1.9°C
1.7°C
1.6°C
1.5°C
Temperature above 1850-1900 mean [°C]
1
2
3
2020
2050
2100
Model
COFFEE 1.5
GEM-E3_V2023
IMAGE 3.2
MESSAGEix-GLOBIOM_1.1
POLES ENGAGE
REMIND 3.0
WITCH 5.0

Different pathways



Different pathways

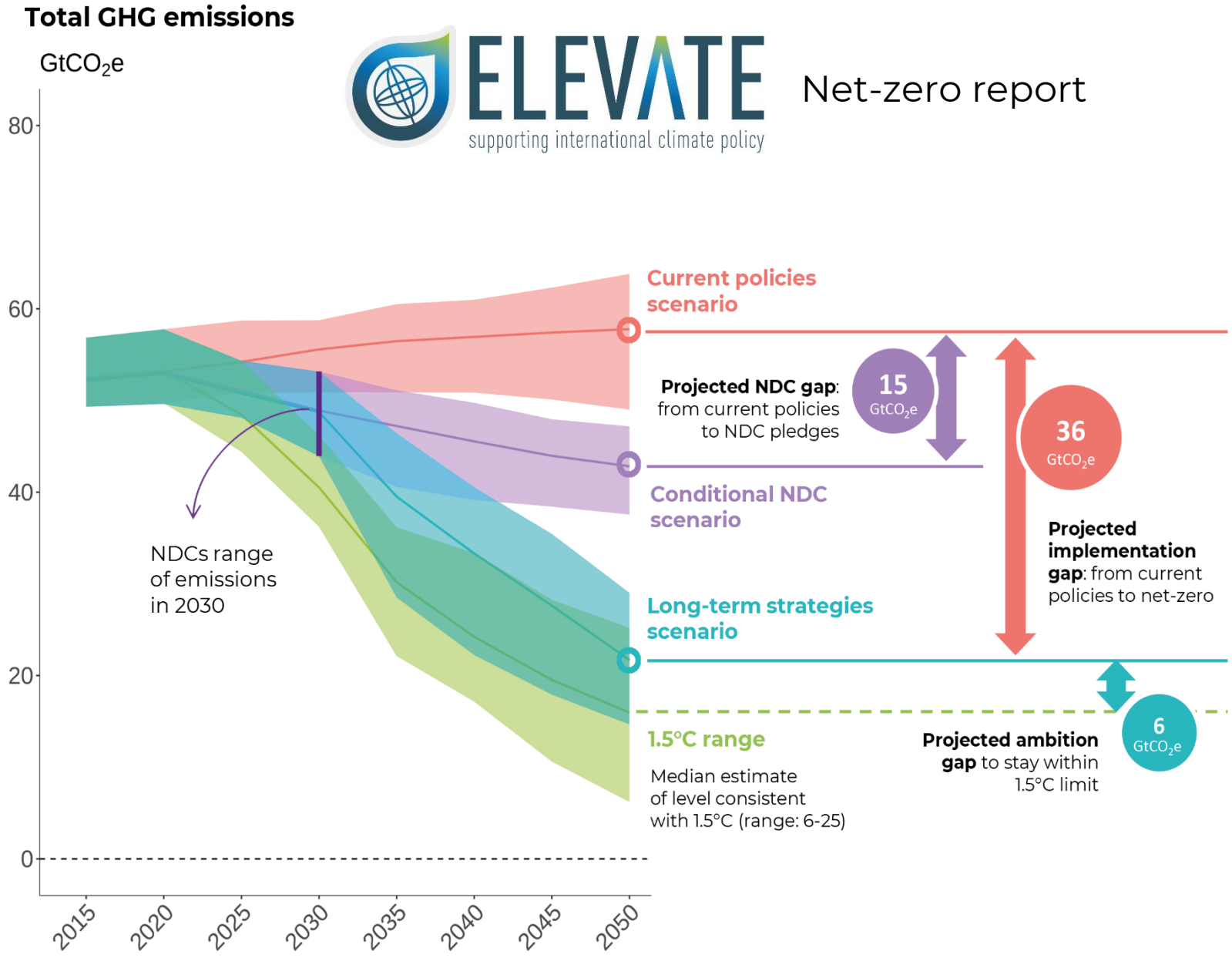
expanding the use of renewables



biomass

nuclear

reduction in the use of fossils



- If countries start implementing pathways towards the self-selected net-zero targets immediately, this would significantly reduce expected warming. But further effort is still required.
- Implementation of current climate policies is not enough to achieve the net-zero targets on a global level — Countries need to increase their effort in implementing policies and underpinning their long-term goals, if they want to achieve their targets.
- Timing of net-zero is strongly dependent on the emission pathway towards and following the target year. This means that if emission levels are higher earlier in the century (such as in 2030), they will need to be compensated
- Further clarity on net-zero targets is often needed.

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Carbon Budget Explorer

This website is currently in beta and is subject to frequent updates. Please see the About page for more information

ABOUT

Carbon Budget Explorer

Exploring fair climate policy in three steps

1. ***Set global targets***

   Defining the global carbon budget and emissions pathway

2. ***Choose your effort-sharing principle***

   Implicating each country's "fair" emissions

3. ***Observe individual country results***

   Indicating the pathway for each country in more detail

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Carbon Budget Explorer

This website is currently in beta and is subject to frequent updates. Please see the About page for more information

ABOUT

Global carbon budget
1060
Gt CO_2

That amounts to
28x
the current annual emissions

Global budget

How much do we have left?

Limit global warming to (°C) ⓘ

1.4 1.5 1.6 1.7 1.8 **1.9** 2 2.1 2.2 2.3 2.4

Acceptable risk of exceeding global warming limit ⓘ

0.17 0.33 **0.5** 0.67 0.83

Global pathway

How do we spend these emissions over time?

End-of-century negative emissions ⓘ

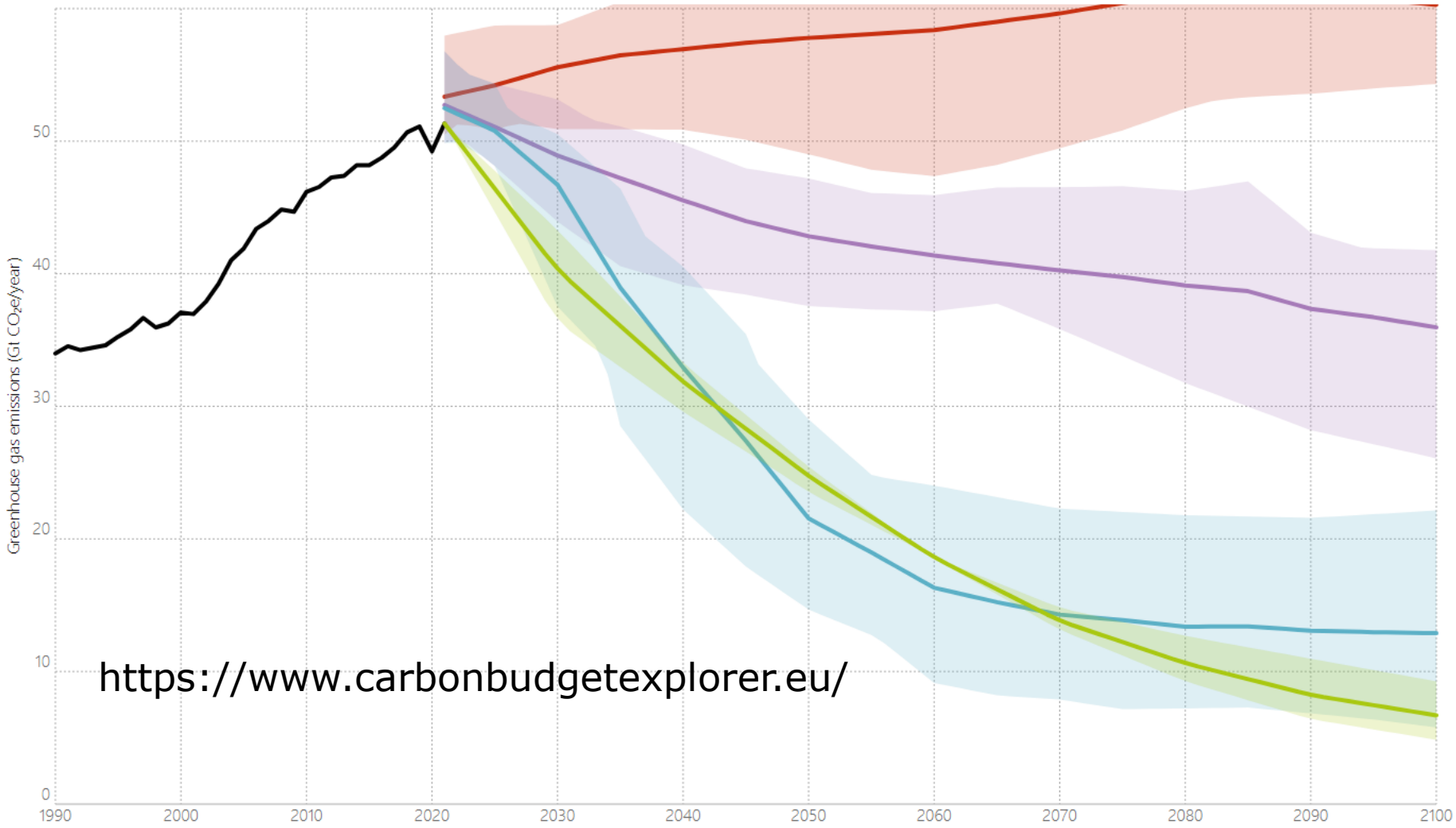
0.2 0.3 0.4 **0.5** 0.6 0.7 0.8

Reference pathways

Use the checkboxes below to compare your pathway with common references. Of particular interest is the implementation ⓘ gap.

- [x] Your pathway
- [x] Projections of current policies
- [x] Projections of nationally determined contributions (NDCs)
- [x] Projections of net-zero pledges

Global budget | World map with shares



https://www.carbonbudgetexplorer.eu/

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ENGAGE FEASIBILITY OF CLIMATE PATHWAYS

Closing the gap

- **To close the remaining gap, we must cut fossil fuels sharply, and further extend the reach of renewables.**
- **The optimum mix of mitigation approaches differs a lot for each country,** with varying combinations of solar, wind, biomass, hydro, geothermal, carbon capture, wave and tide power.

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Thank you!

More info can be found at:

ENGAGE (http://www.engage-climate.org/)

@Engage-Climate

ELEVATE (http://www.elevate-climate.org/)

@ElevateClimate

Just Transition scenarios

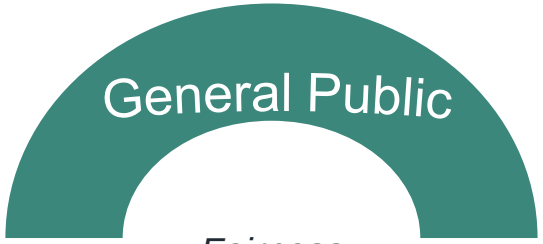
Bas van Ruijven, Elina Brutschin

Towards net-zero emissions – Science perspective

Many different communities…

Forms of justice, patterns of justice, etc.

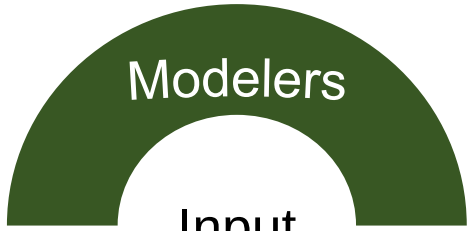
Sustainable Development, CBDR, Loss & Damages, etc.



Fairness

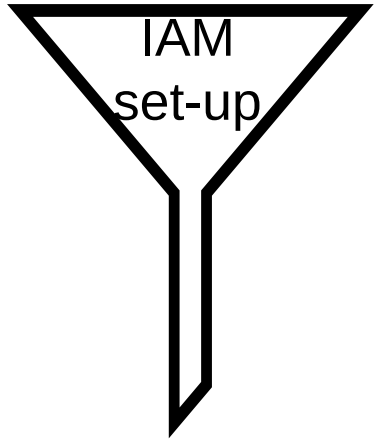
Is justice considered in scenarios?

Temperature goals



Input

Assumptions about population growth, GDP, etc..



Output

Time series of emissions, investments, etc.

Justice has always been at the core of IAMs…

Modelers

Input

Assumptions about population growth, GDP, etc..

IAM set-up

Output

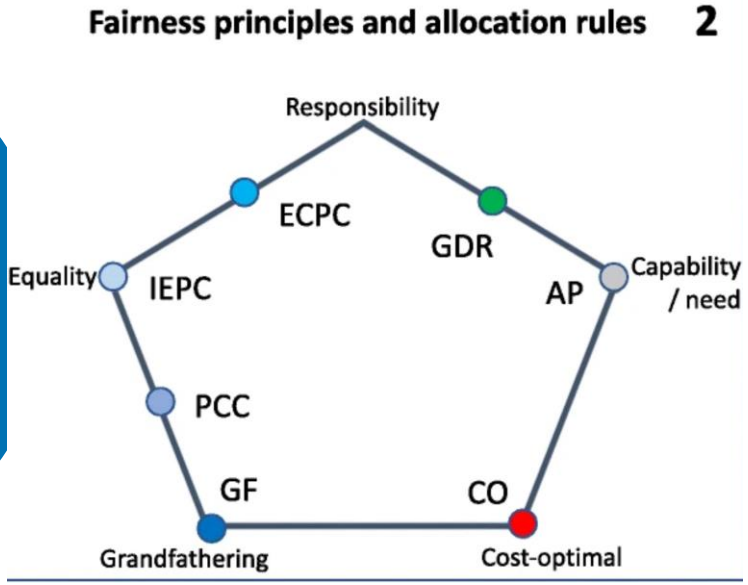
Time series of emissions, investments, etc.

Quantification of…

Impacts
Mitigation
Adaptation

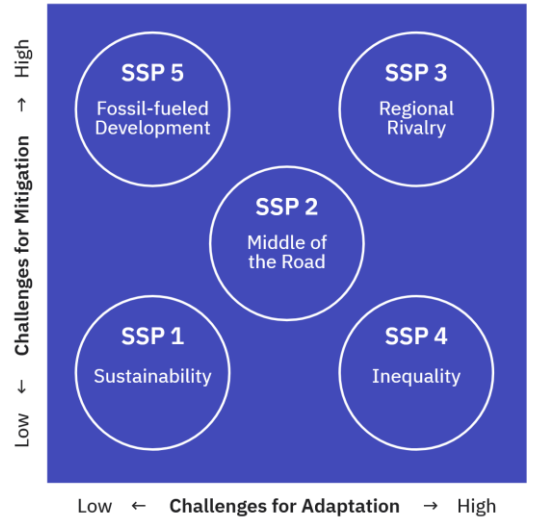
Socio-economic development

Regional distribution of global carbon budget/ investments following different fairness principles



Shared socio-economic pathways

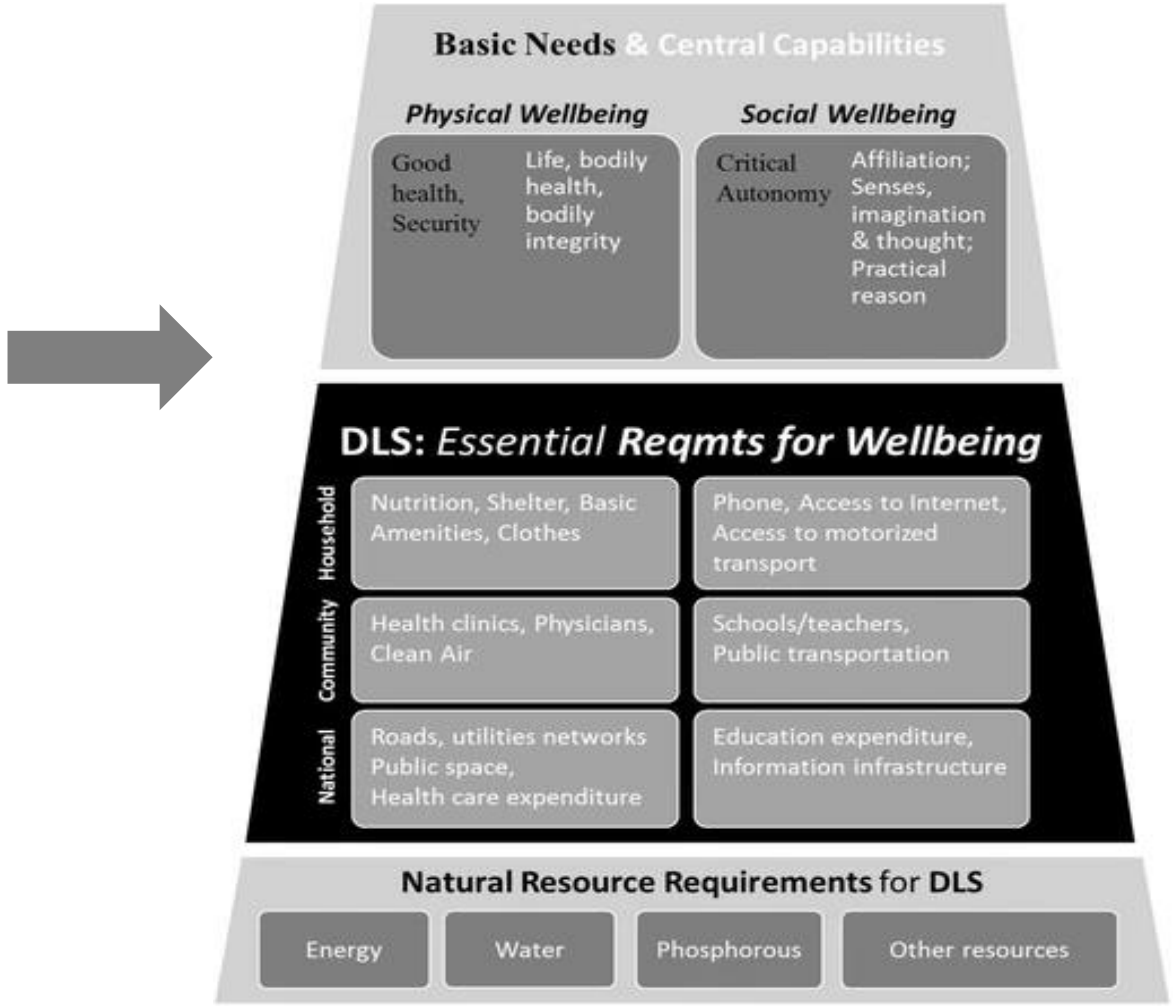
…



Focus on provision of services in energy models allows going beyond GDP as a measure of development…

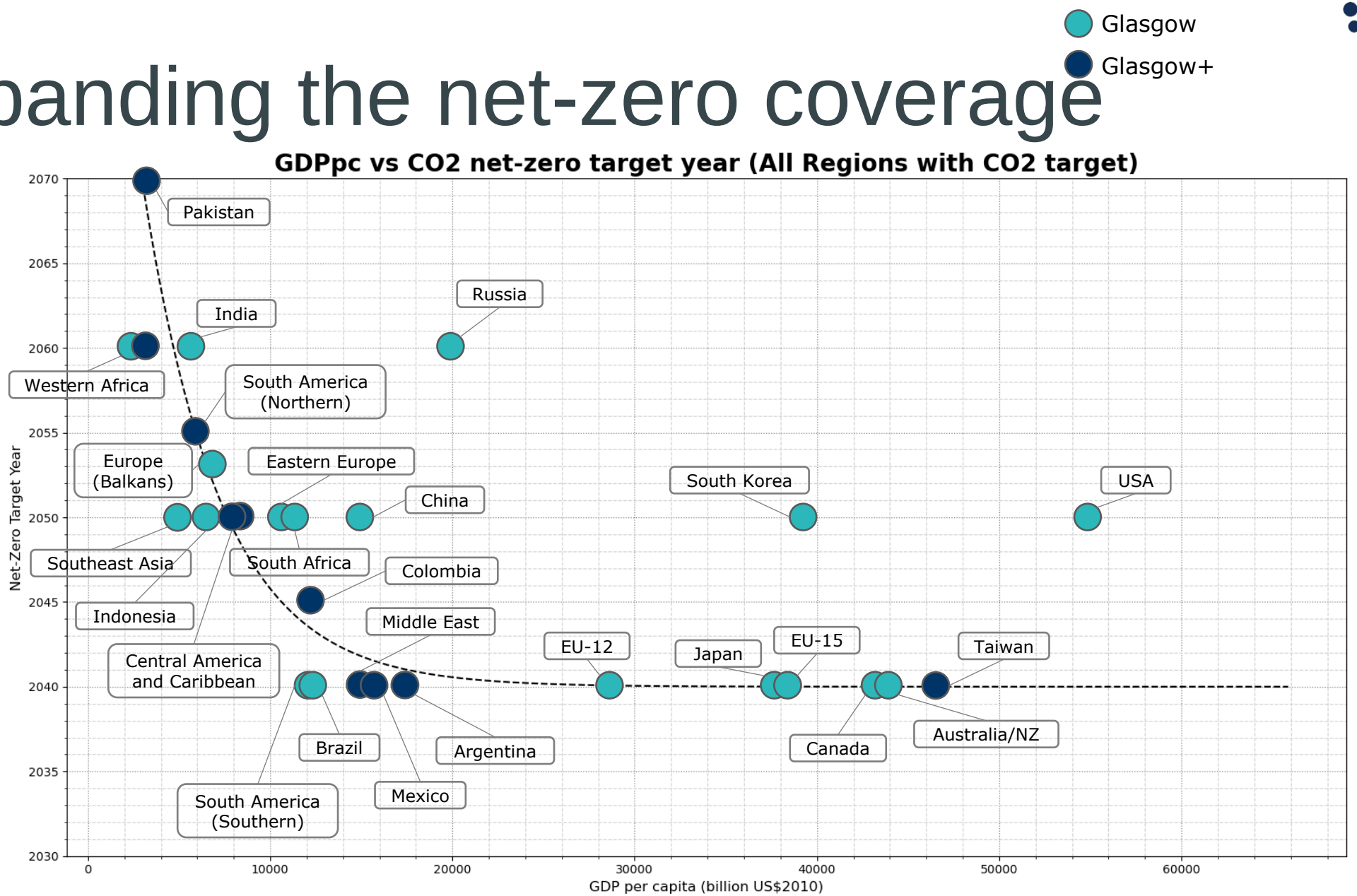
Quantification of…

- Impacts
- Mitigation
- Adaptation
- **Socio-economic development**

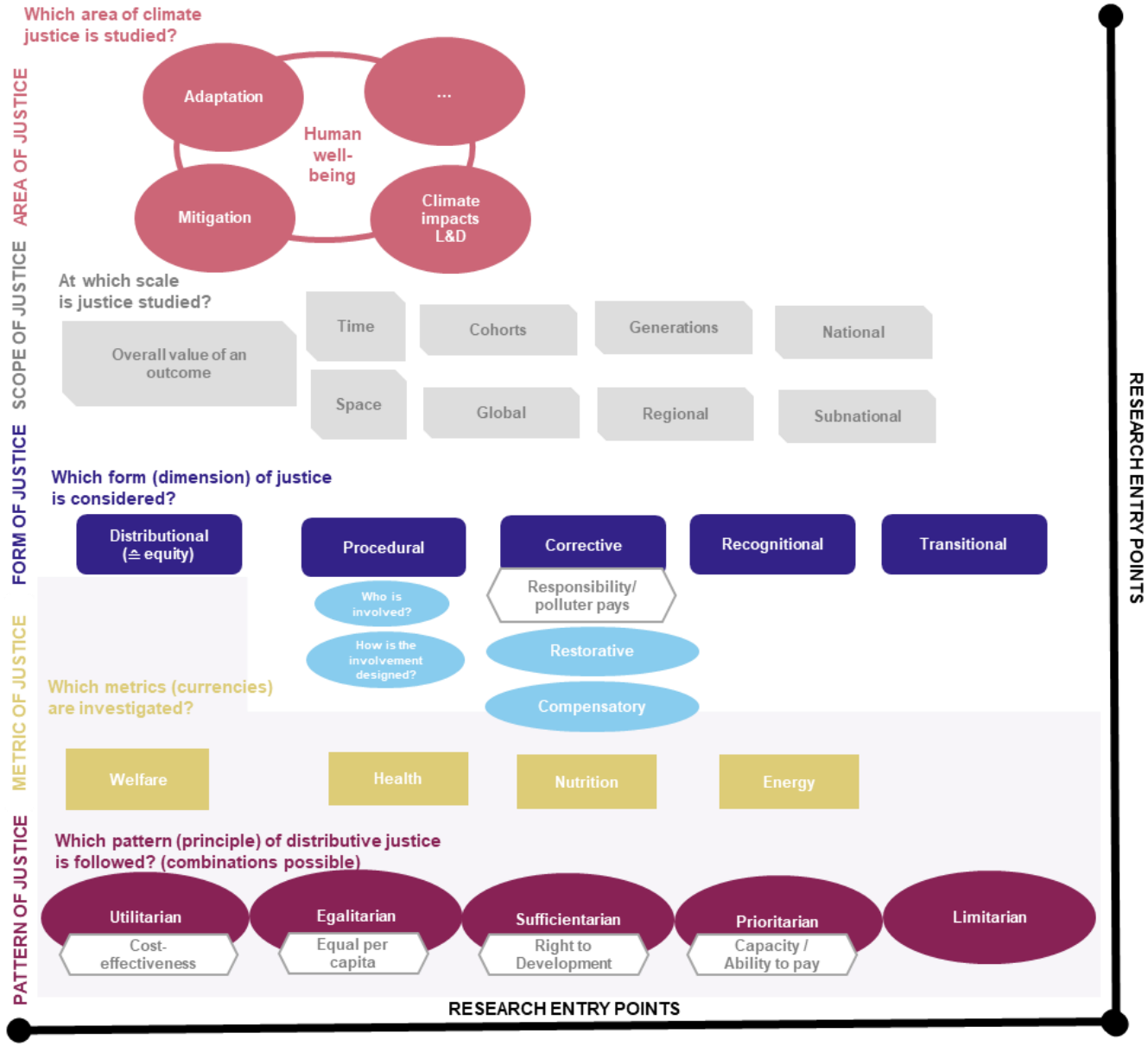


Rao & Min (2018).

Expanding the net-zero coverage



Unifying framework



Based on Zimm et al. (forthcoming in Nature Climate Change)

- Which area of climate justice is studied?
- At which scale?
- Which dimension of justice?
- Which metrics are investigated?
- Which patterns are followed?

Example implementation…

- Which area of climate justice is studied?

Access to services

- At which scale?

IAM regions over time

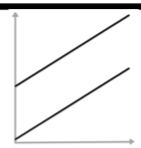
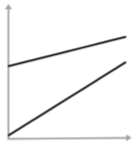
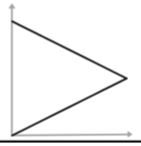
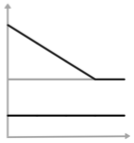
- Which dimension of justice?

Distributional

- Which metrics are investigated?

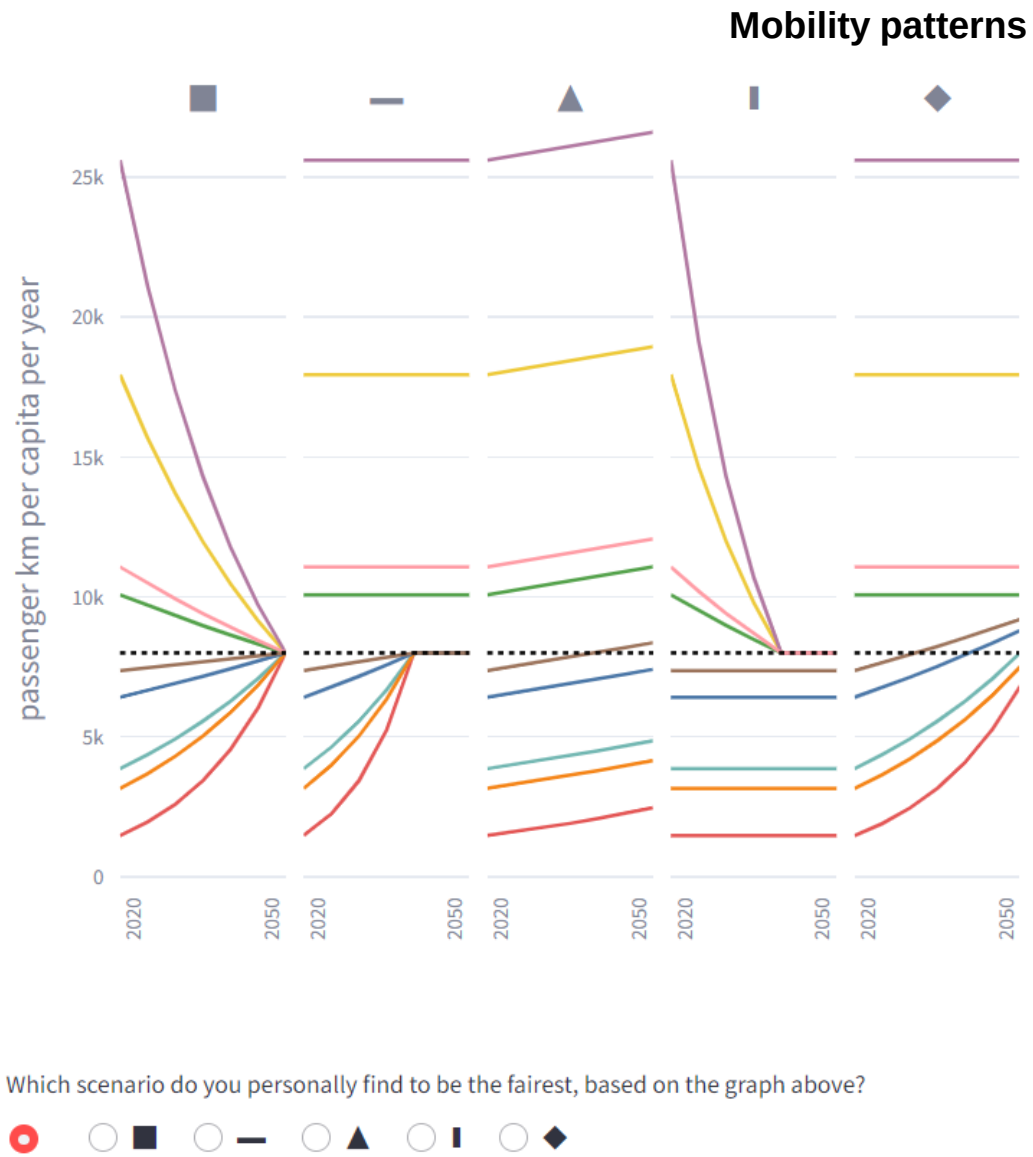
Consumption levels

Which patterns are perceived as fair?

Justice Pattern	Core idea	Observed IAM trajectory	Examples
Aggregate Utilitarian	Overall consumption increased	All regions grow	
Prioritarian	Those worse off have gained most	Lower regions catch up	
Egalitarian	Everyone has the same	All regions converge to same point	
Sufficientarian	Everyone is above a certain threshold	Lower regions grow to floor	
Limitarian	Everyone is below a certain threshold	Higher regions reduce to ceiling	

Based on Scheifinger et al. (in preparation)

Creating a tool to connect general public with quantified trajectories…



Questions that can be explored using this tool:

- Which patterns are preferred and why?
- Which patterns are missing from the current scenario narratives?
- How does inclusion of new patterns interact with other key mitigation indicators?

Access to the interactive tool:

https://tinyurl.com/COPIIASA

UN environment programme

Methane data for enhanced transparency and action

Side Event: Towards net zero: science perspective

Miriam Hinostroza Suarez
5 December 2023

Transparency is critical to climate action

Transparency means tracking progress in a visible, credible manner

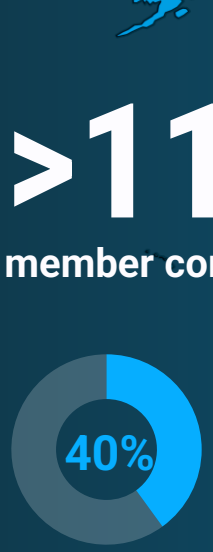
Many challenges to tracking methane mitigation

New methods and standards can support enhanced transparency in methane action

UNEP's IMEO is driving transparency through growing OGMP 2.0

>115

member companies



Representing nearly 40% of global oil and gas production

UN environment programme

Methane Alert and Response System

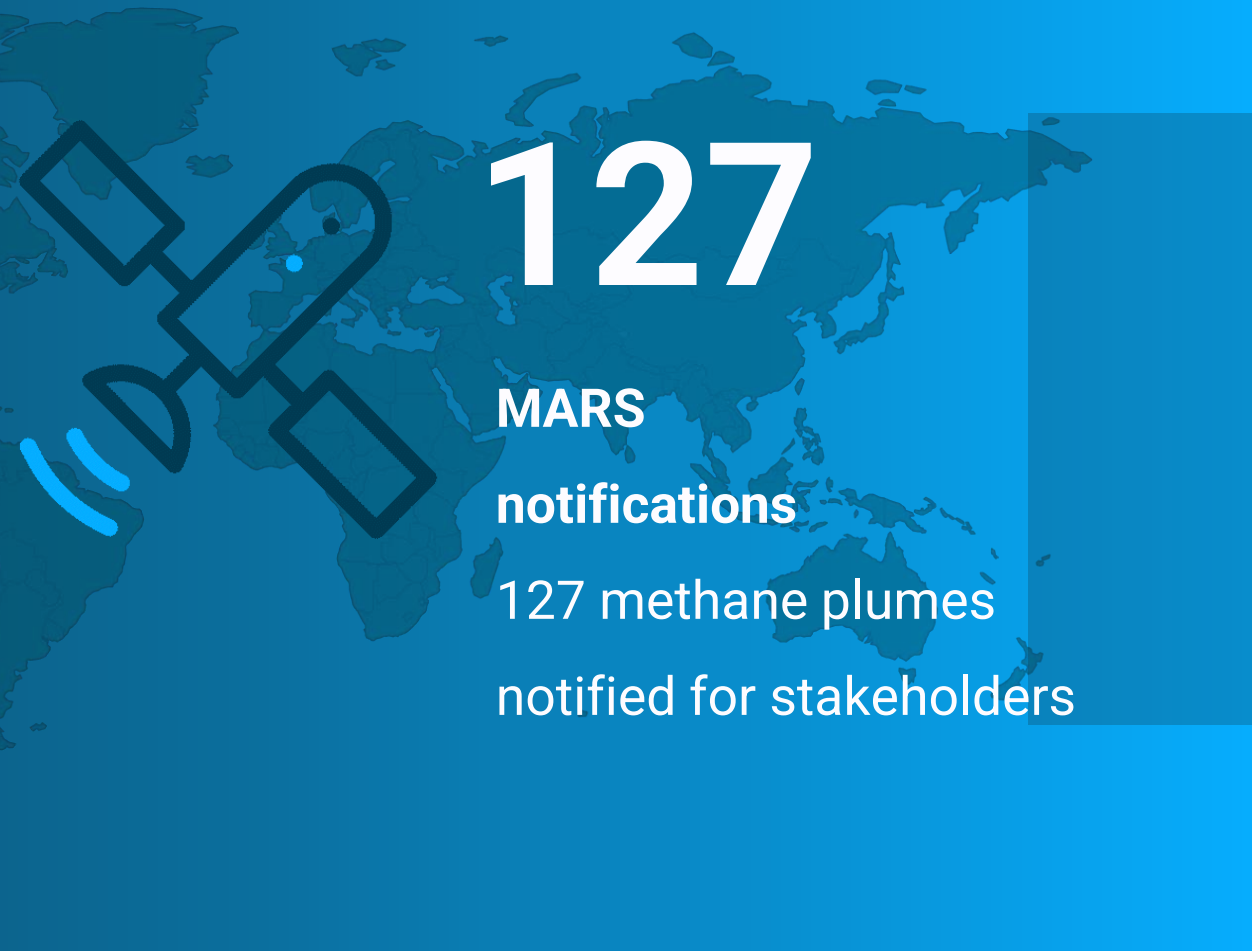
New global system to enable methane action is now fully operational

METHANE → Detect and Attribute

ALERT → Notify and Engage Stakeholders

RESPONSE → Stakeholders Take Action

SYSTEM → Track, Learn, Collaborate, Improve



127

MARS notifications

127 methane plumes notified for stakeholders

IMEO Science Studies are closing knowledge gaps and furthering data integration for methane action

In conclusion

Improved data can facilitate transformational methane action

These data can inform national planning processes

Trust is essential to transparency

Thank you

UN environment programme

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