Air Flight CO_2 Emissions associated to IETF meetings

Stay Home Meet Only Online 2022-03-24

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Can the IETF continue with business as usual ?

- In-person IETF meetings involve ≈ 1000 international air flights
- Science urges us to reduce our CO_2 emissions
  - The Intergovernmental Panel on Climate Change Sixth Assessment Report (AR6) has partially been published
  - UN Secretary-General António Guterres called it a **"code red for humanity"** *
  - The Guardian described it as "starkest warning yet" of "major inevitable and irreversible climate changes"*

What should we do ? / What can we do ?

We declined this question into sub-questions:

- What happens if we were applying the IPCC recommendations ?
- What is the amount of CO_2 emitted by an IETFer ?
- What if we were applying the trend for a sustainable aviation ?
- How can the IETF being operated in a sustainable way ?

Material:

- Code, publication, data are available here: https://mglt.github.io/co2eq/
- Presented in the Analyzing IETF Data (AID) Workshop.

What does science says ?

The Intergovernmental Panel on Climate Change (IPCC) is an internationally accepted authority on climate change, and its work is widely agreed upon by leading climate scientists as well as governments.

Its reports play a key role in the United Nations Framework Convention on Climate Change (UNFCCC).

- Limiting global warming to 1.5 °C reduces challenging impacts on ecosystems, human health and well-being
- 2 °C temperature increase exacerbates extreme weather, rising sea levels and diminishing Arctic sea ice, coral bleaching, and loss of ecosystems, among other impacts
- To stay below 1.5 °C of global warming, emissions need to be cut by roughly 50% by 2030 and reach net zero by 2050

(very partial) History of the warnings from science

1988: creation of the IPCC

1992 : creation of the UNFCCC

[...]

2010: COP16

- reducing global greenhouse gas emissions so as to hold the increase in global average temperature below 2 °C above pre-industrial levels, and that parties should take urgent action to meet this long-term goal, consistent with science and on the basis of equity; and recognizes the need to consider, in the context of the first review, strengthening in relation to a global average temperature rise of 1.5 °C.

2014 IPCC Fifth Assessment Report (AR5):

- WG3: "(T)he current trajectory of global annual and cumulative emissions of GHGs is not consistent with widely discussed goals of limiting global warming at 1.5 to 2 degrees Celsius above the pre-industrial level."

2015 Paris Agreement

- long-term temperature goal is to keep the rise in mean global temperature to well below 2 °C above pre-industrial levels, and preferably limit the increase to 1.5 °C. To stay below 1.5 °C of global warming, emissions need to be cut by roughly 50% by 2030.

2018: IPCC Special Report on Global Warming of 1.5 °C (SR15)

- "limiting global warming to 1.5 °C compared with 2 °C would reduce challenging impacts on ecosystems, human health and well-being"
- 2 °C temperature increase would exacerbate extreme weather, rising sea levels and diminishing Arctic sea ice, coral bleaching, and loss of ecosystems, among other impacts
- SR15 also has modelling that shows that, for global warming to be limited to 1.5 °C, "Global net human-caused emissions of carbon dioxide (CO2) would need to fall by about 45 percent from 2010 levels by 2030, reaching 'net zero' around 2050."

2021: COP26

> Our fragile planet is hanging by a thread.
> We are still knocking on the door of climate catastrophe.
> It is time to go into emergency mode --- or our chance of reaching net zero will itself be zero. (...)
> Science tells us that the absolute priority must be rapid, deep and sustained emissions reductions in this decade.
> Specifically --- a 45% cut by 2030 compared to 2010 levels.
> But the present set of Nationally Determined Contributions -- even if fully implemented -- will still increase emissions this decade on a pathway that will clearly lead us to well above 2 degrees by the end of the century compared to pre-industrial levels. (...)
> COP 27 starts now.
>
> António Guterres, COP26

2021/2022 IPPC Sixth Assessment Report (AR6):

- It is only possible to avoid warming of 1.5 °C or 2.0 °C if **massive and immediate cuts in greenhouse gas emissions are made**.
- **UN Secretary-General António Guterres called the AR-6 a "code red for humanity"**

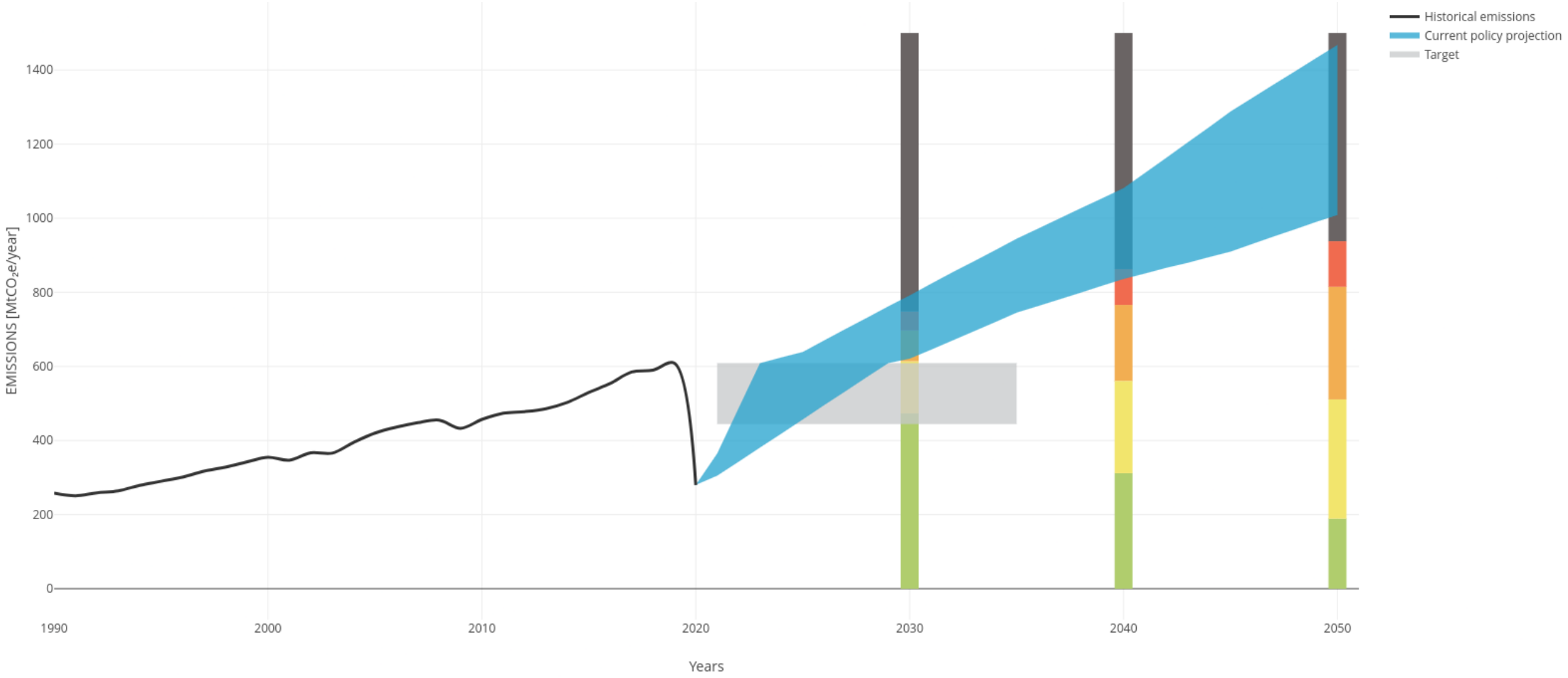
Projections are that we will be around 3.6 °C

Aviation is a major contributor to global warming

Aviation contributed approximately 4% to global warming

- despite being responsible for 2.4% of global annual emissions of CO_2

Aviation is projected to cause a total of about 0.1 °C of warming by 2050



source: https://climateactiontracker.org/

Positioning air flight in our meetings

IETF meetings require air flights and as such contribute to global warming

- Approach 1: Following IPCC recommendations
- Approach 2: Estimation of CO_2 emissions for IETF
- Approach 3: IETF meeting applied to air traffic evolution

Approach 1: Following IPCC recommendations

Cutting the emissions by 50%:

$$\frac{(3 \text{ in-person meetings})_{CO_2}}{2} \approx 1(\text{ in-person meeting})_{CO_2} + 2(\text{virtual meeting})_{CO_2}$$

net zero:

$$0(3\text{in-person meetings})_{CO_2} \approx 3(\text{virtual meetings})_{CO_2}$$

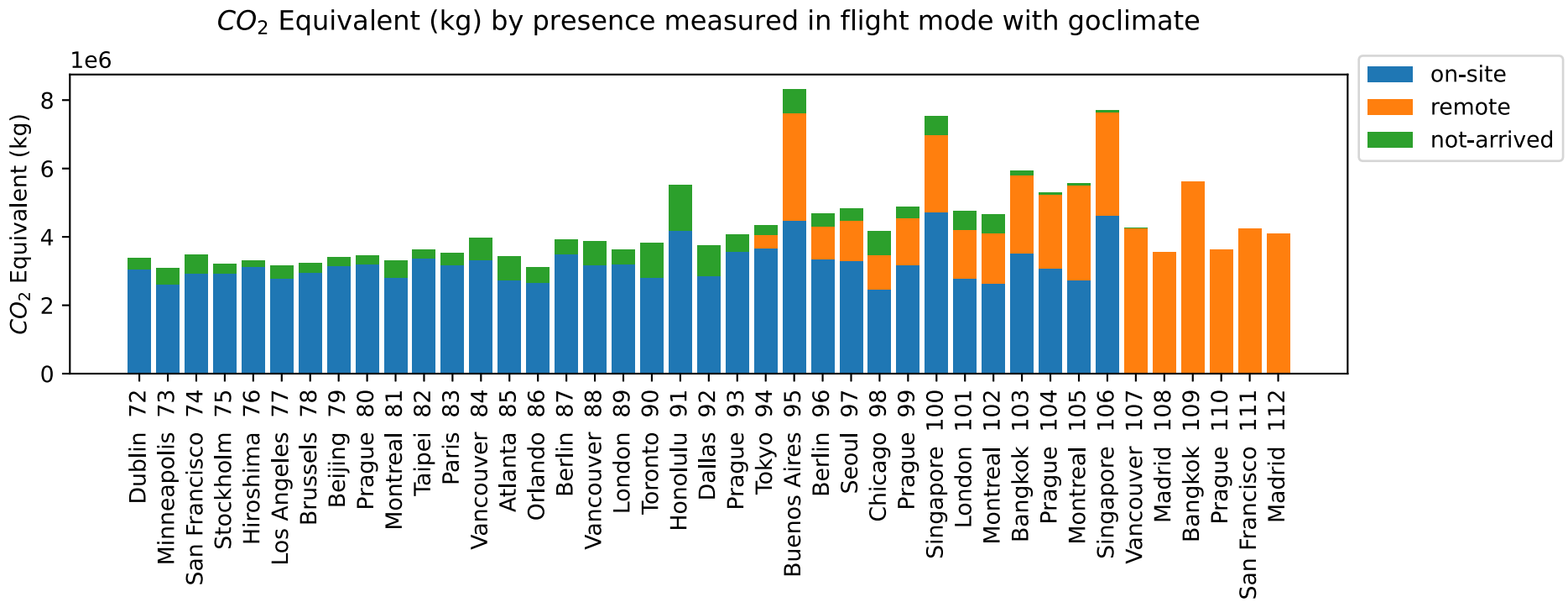
Conclusion: 1 in-person meeting a year

Approach 2: Estimation of CO_2 emissions for IETF

We developed `co2eq` a tool that computes CO_2 emissions

- Takes a real flight itinerary
- Estimates CO_2 emissions via myclimate and goclimate
  - We thank Go Climate for giving us access to their service!
- Origin is extrapolated from the country (capital or most important city)

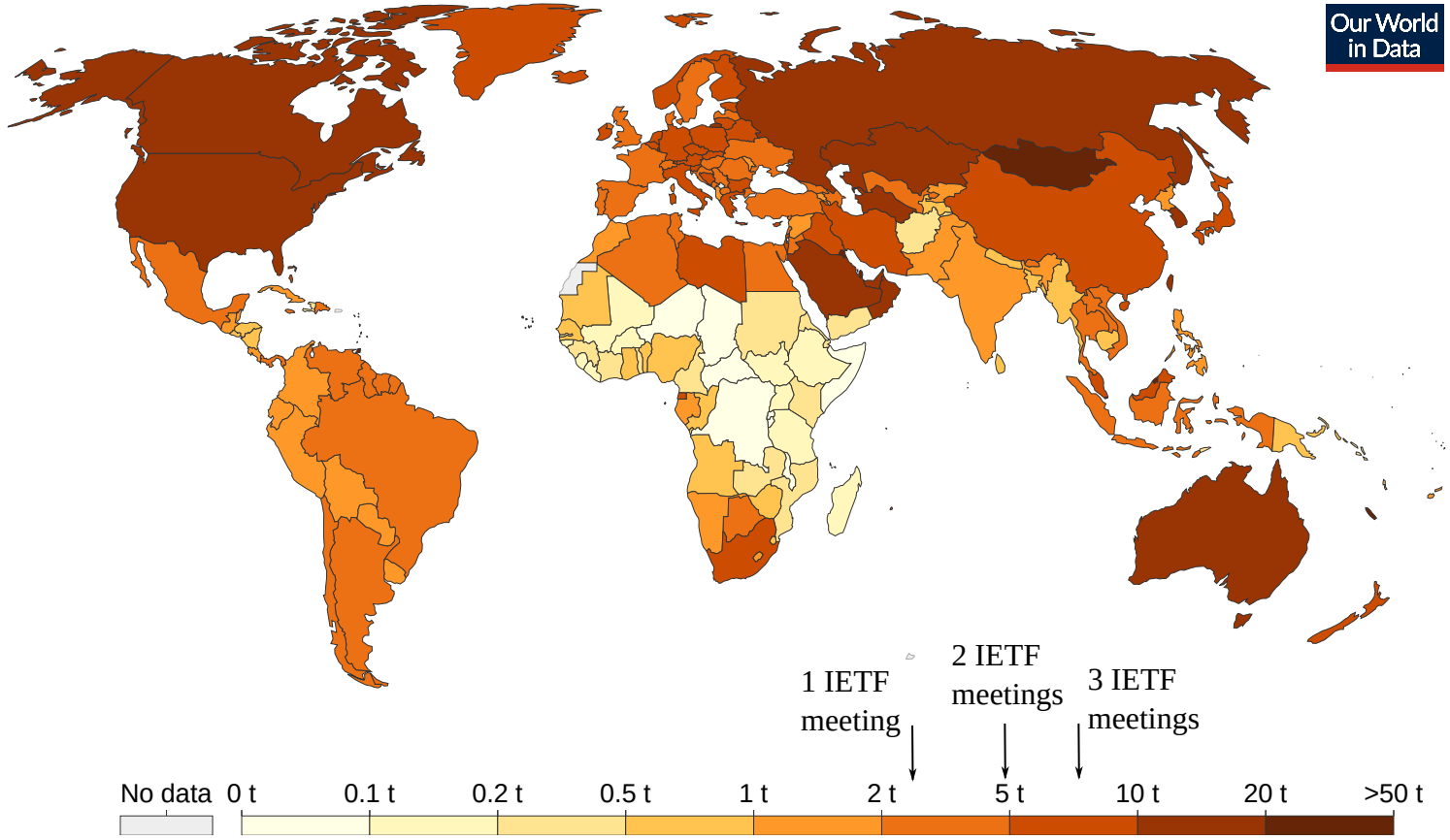
Emissions associated to an IETF meeting?



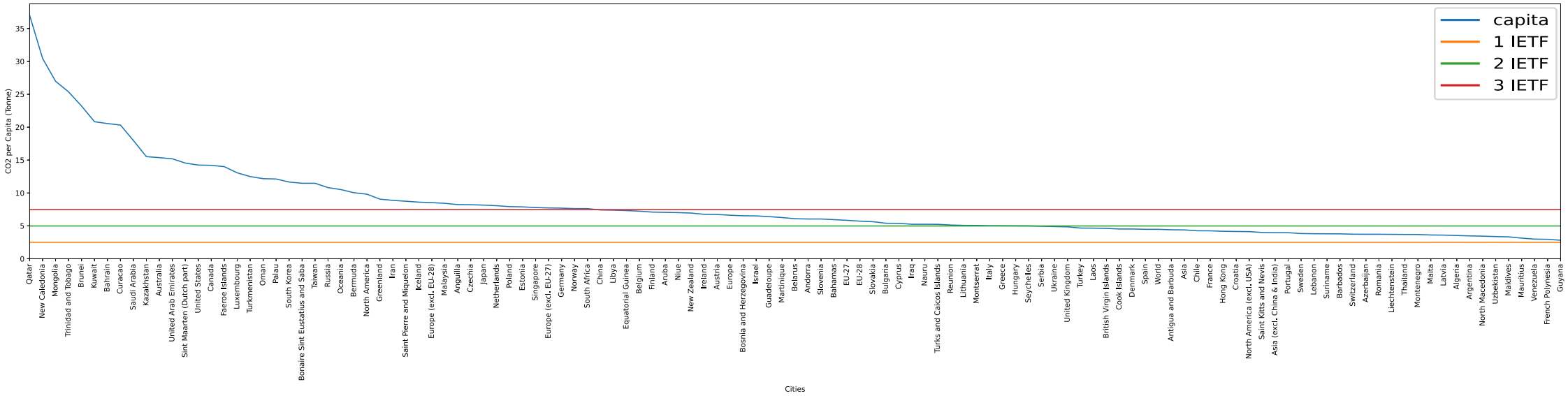
For IETF 72-106 Go Climate estimates the average emission of CO_2 equivalent to:

- 3.2 Gg of CO_2 for an IETF meeting
- 2.7 tonnes of CO_2 per attendee.

IETF CO_2 emission versus CO_2 per capita



Emissions per capita



- 3 IETF meetings ≈ Germany, Poland
- 2 IETF meetings ≈ Greece, Italy, UK
- 1 IETF meetings ≈ Mauritius, Venezuela

Conclusion:

- IETF participation hardly justify European annual per capita CO_2 emissions
- Transition to 1 meeting per year is recommended

Approach 3: IETF meeting applied to air traffic evolution

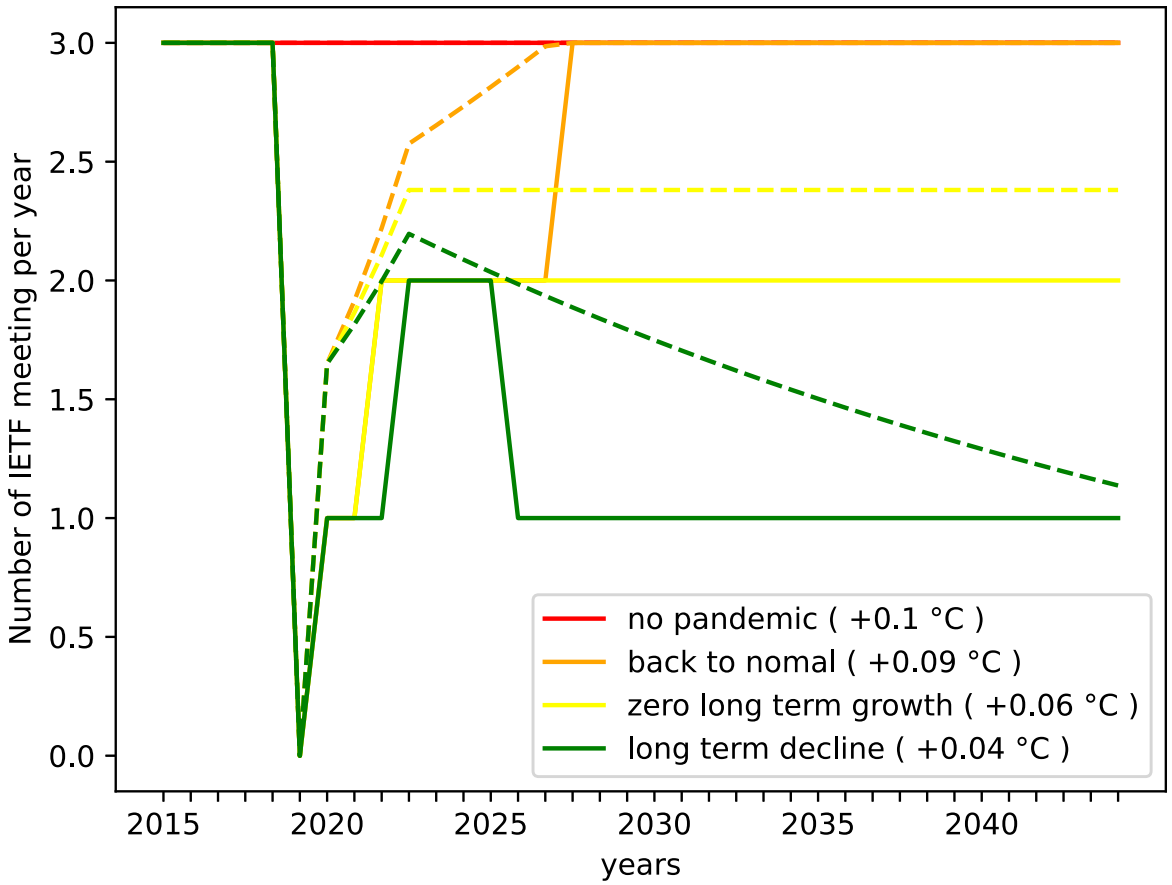
Aviation contributed approximately 4% to observed human-induced global warming

Studies of COVID-19 impact of aviation's emissions considers the scenarios below:

scenario	post-COVID growth until 2024	post 2024 growth until 2050	temperature increase
`no pandemic`	3 %	3 %	0.1 C
`back to normal`	16 %	3 %	0.09 C
`zero long term growth`	13 %	0 %	0.06 C
`long term decline`	10 %	-2.5 %	0.04 C

Reduction due to COVID-19 is small (at most a 5 year delay)

`long term decline` results in emissions 50% lower in 2050 compared with 2019 -- consistent with no additional aviation-induced warming



Applying these scenarios indicates 1 meeting per year

Conclusion

1. Limiting 'on-site' IETF meeting to a maximum of 1 meeting a year:

- CO_2 resulting from attending 3 'on-site' IETF meetings is equivalent to the CO_2 per capita of European countries that generate energy using coal.
- `long term decline` scenario for aviation suggests 1 meeting per year.
- Science urges us to reduce our emissions by 45% by 2030 compared to 2010

2. Increasing effort to improve the 'remote' IETF meetings user experience

3. Ensure the IETF aligns its strategy and report progress toward sustainability

- ex: UN Global Compact and the caring for climate initiative
- contact an advisor to set a strategy

Reference:

`co2eq` : https://github.com/mglt/co2eq

MyClimate: http://www.myclimate.org

Go Climate: https://goclimateneutral.org

M. Klöwer, M. R. Allen, D. S. Lee, S. R. Proud, L. Gallagher, and A. Skowron, “Quantifying aviation’s contribution to global warming,” vol. 16, no. 10, p. 104027, oct 2021. https://doi.org/10.1088/1748-9326/ac286e

“United Nations Global Compact,” 2021. https://www.unglobalcompact.org/

CARING FOR CLIMATE: THE BUSINESS LEADERSHIP PLATFORM https://d306pr3pise04h.cloudfront.net/docs/publications%2FC4C Statement.pdf

Thanks!