Why Methane Matters

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Berlin, 14 October 2026

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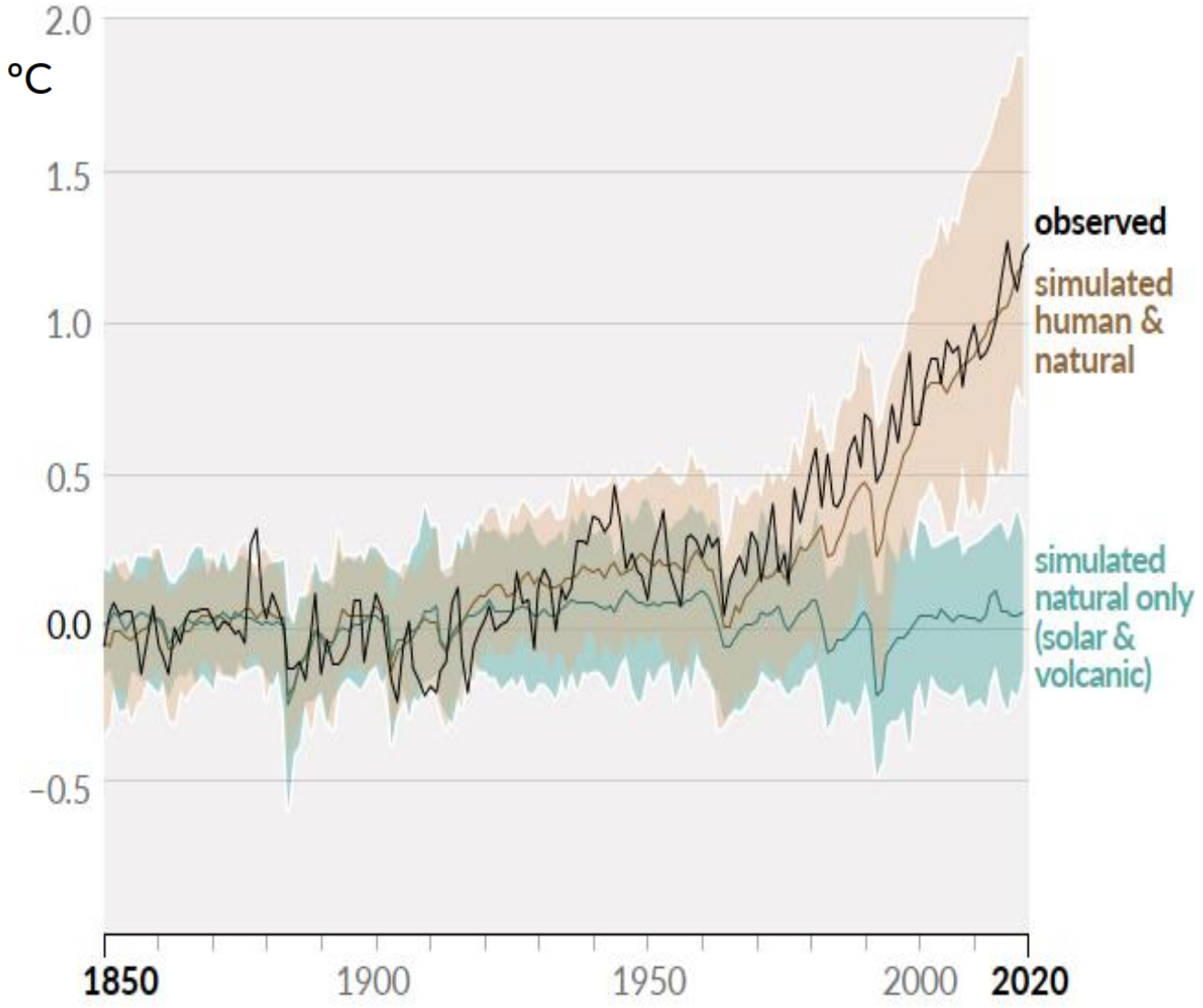
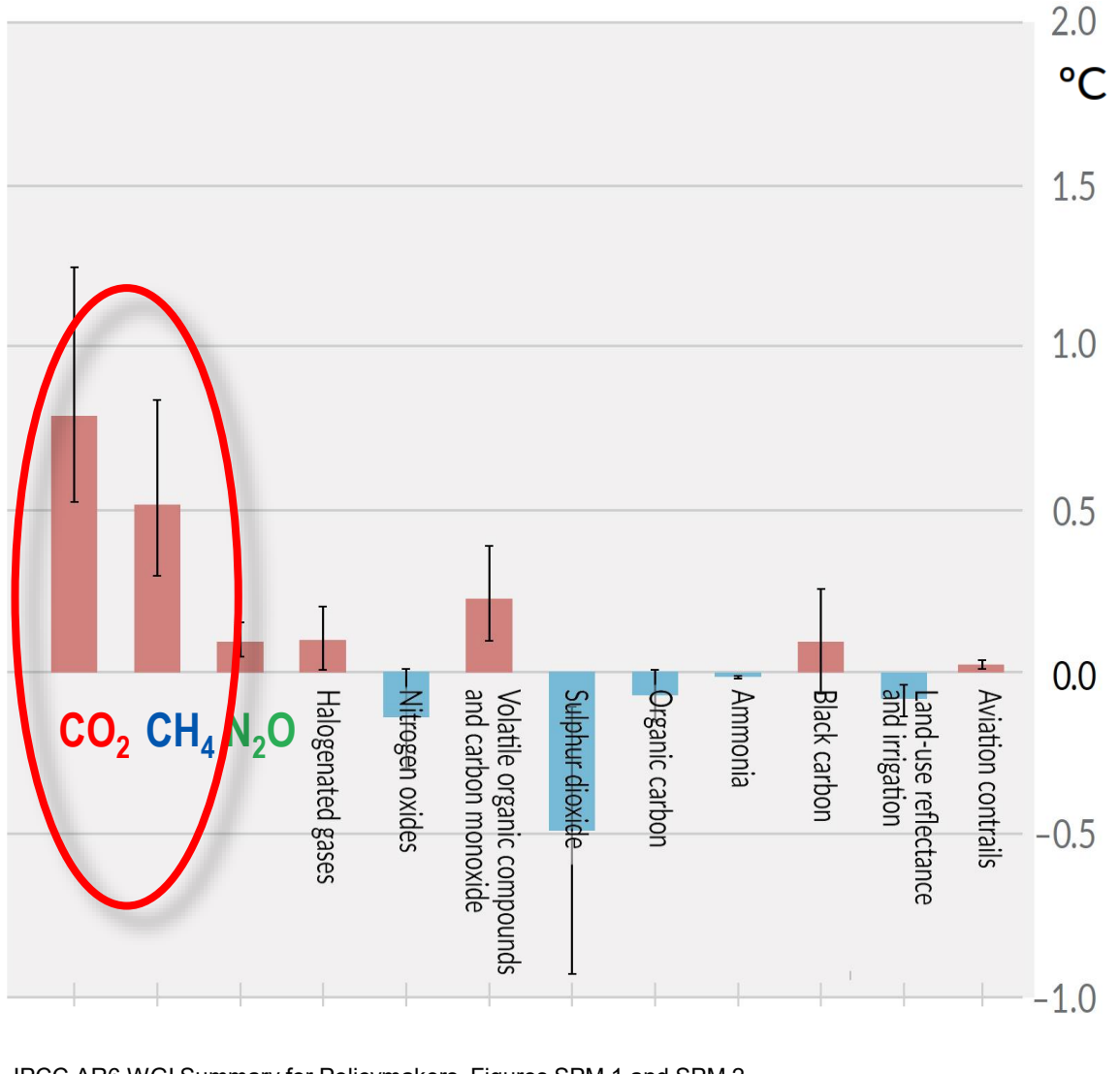
- Methane and global climate change
- Similarities and differences to CO_2
- Biogenic and fossil methane
- Past emissions and future choices
- The EU’s contribution to global warming
- Conclusions

Methane (CH_4) and global climate change

Carbon dioxide and methane dominate warming



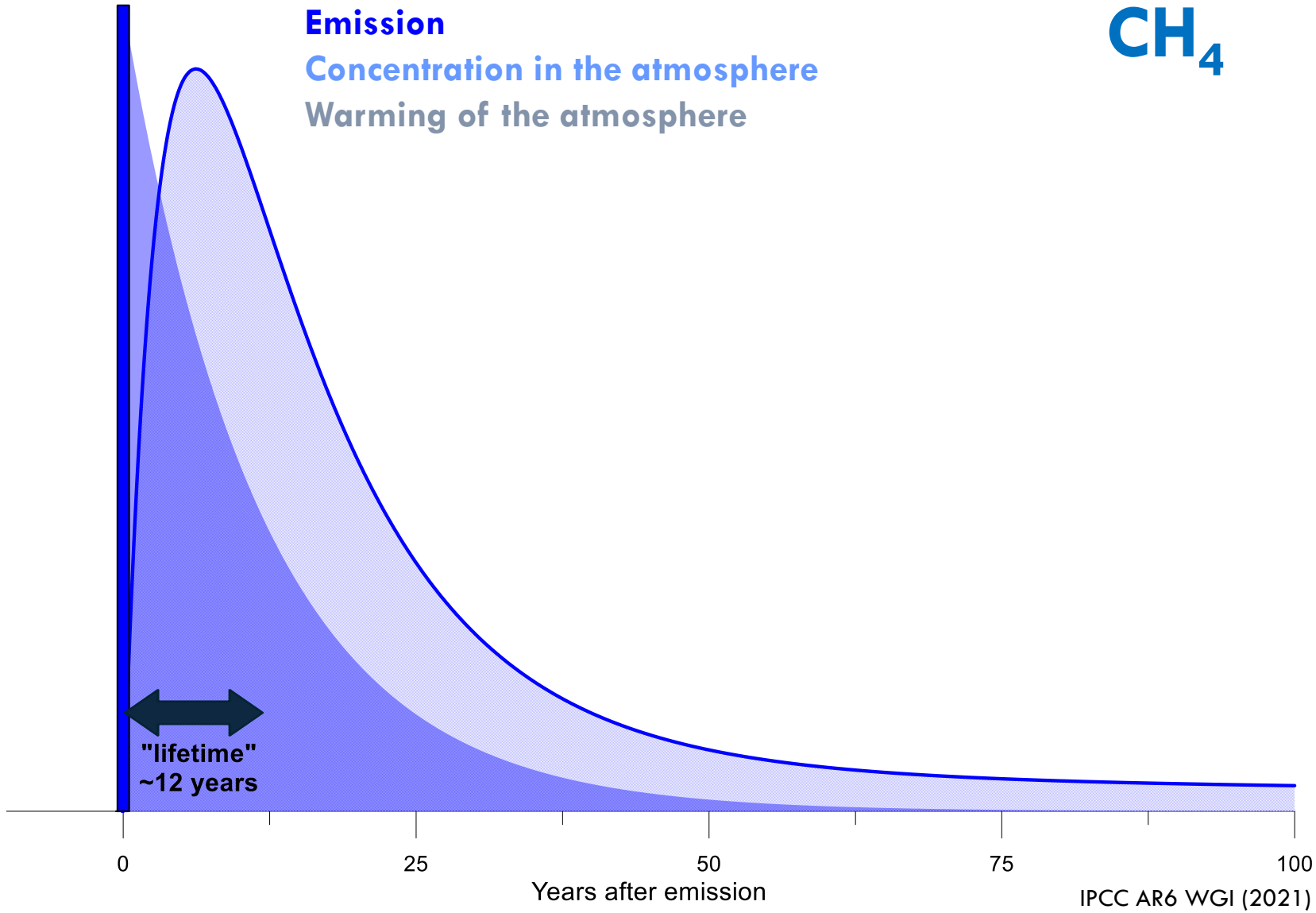


IPCC AR6 WGI Summary for Policymakers, Figures SPM.1 and SPM.2

Understanding methane

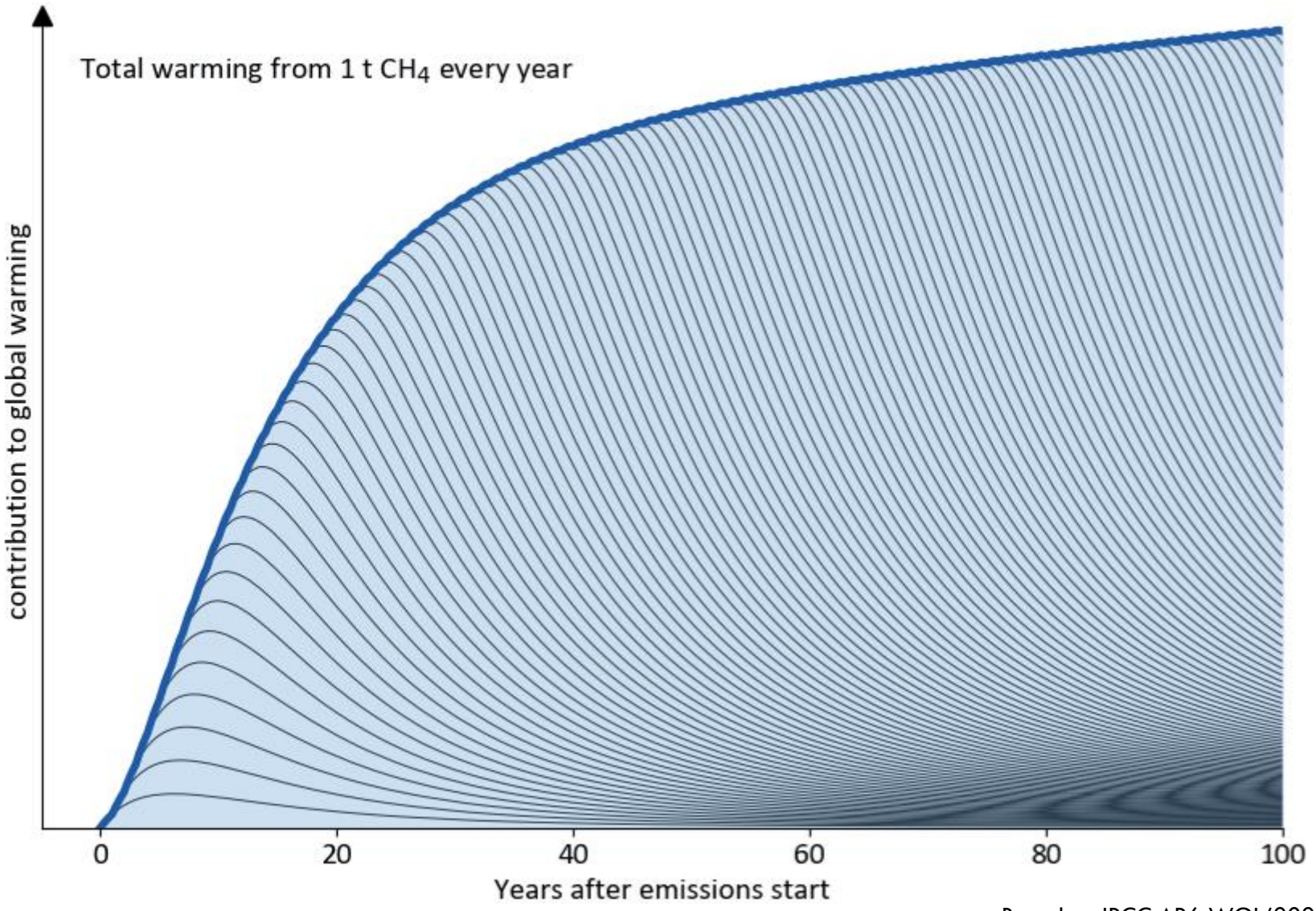
Similarities and differences from CO_2

From emission to warming | $CO_2 \neq CH_4$



IPCC AR6 WGI (2021) Chapter 7

From emission to warming | $CO_2 \neq CH_4$



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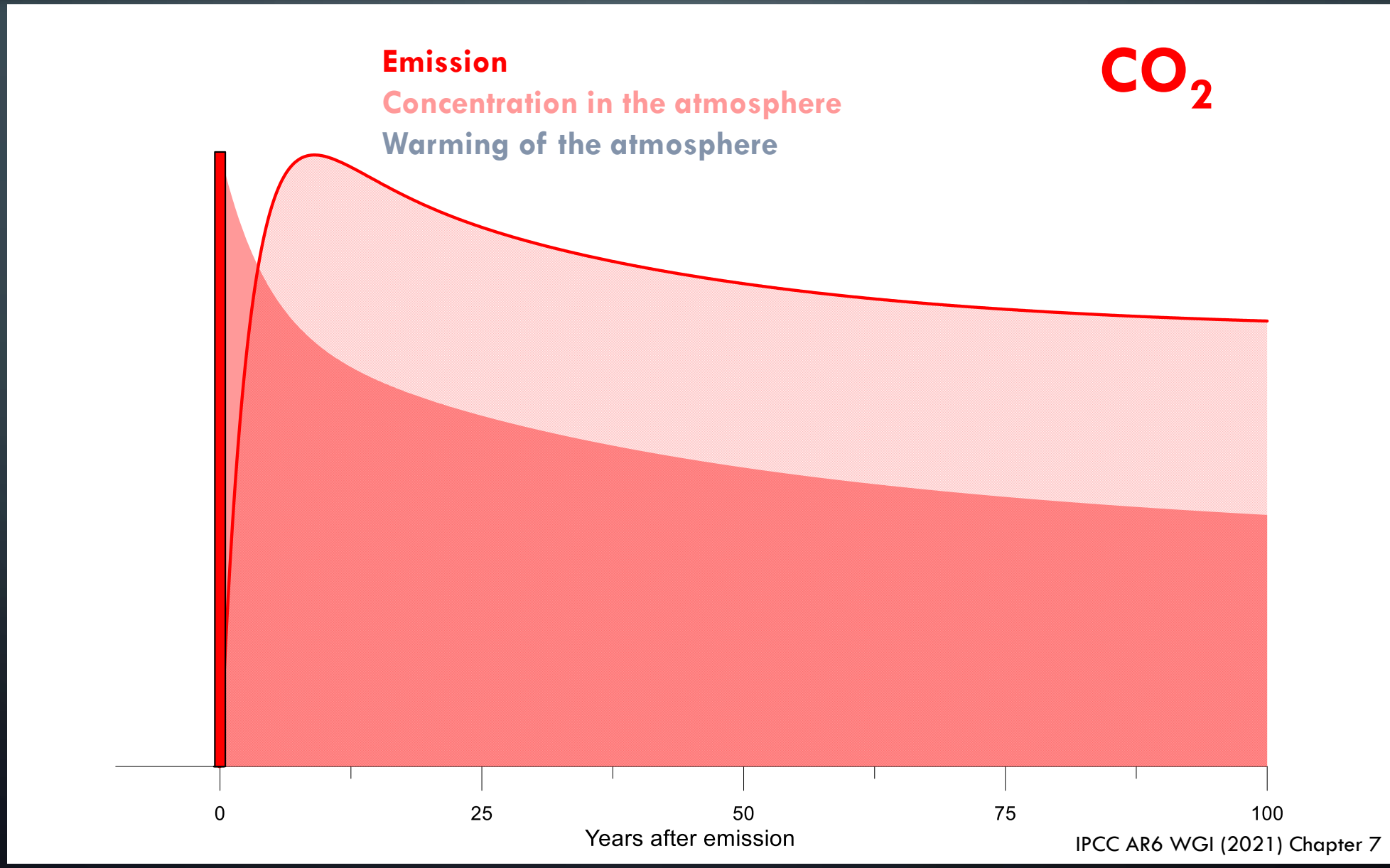

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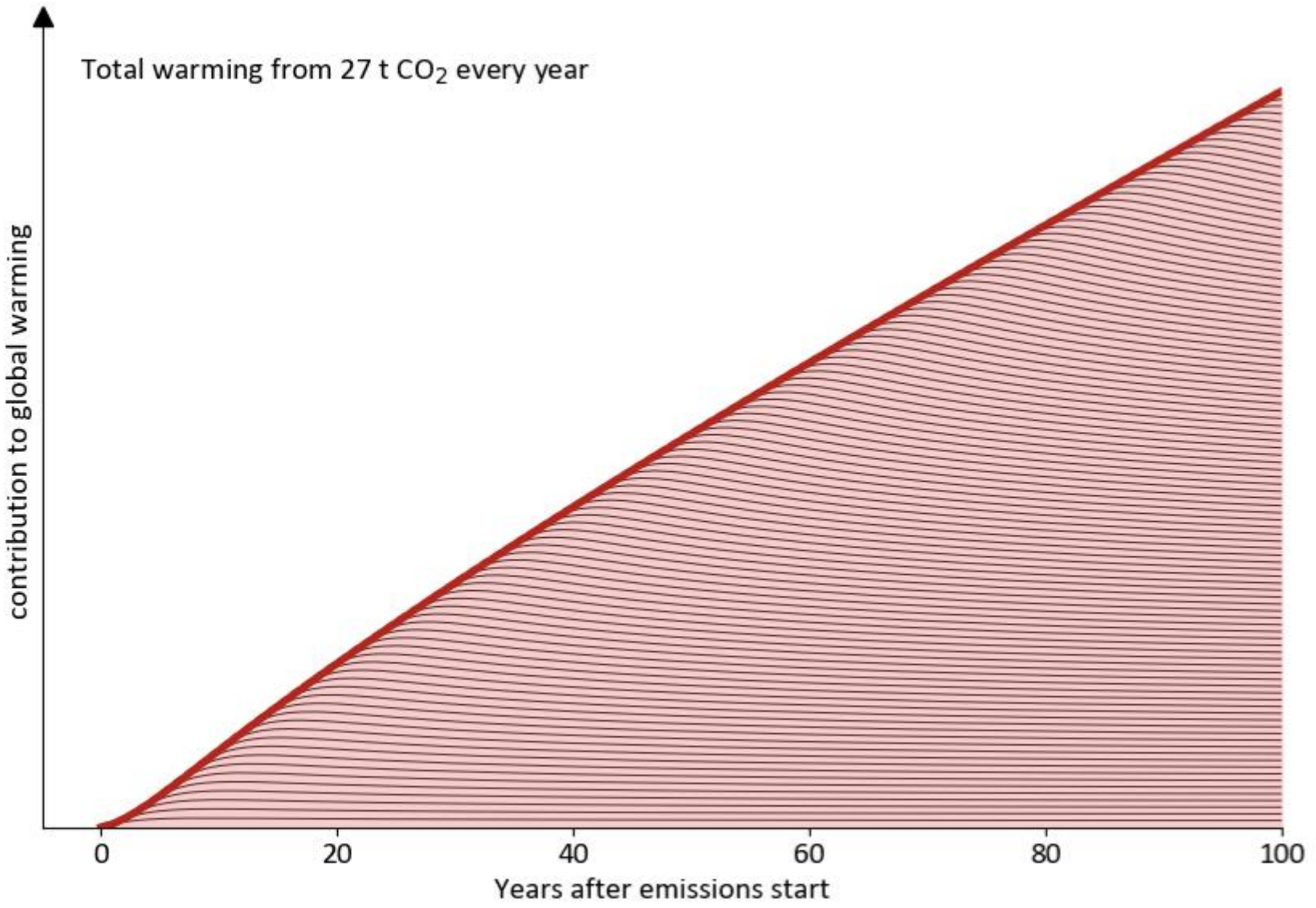
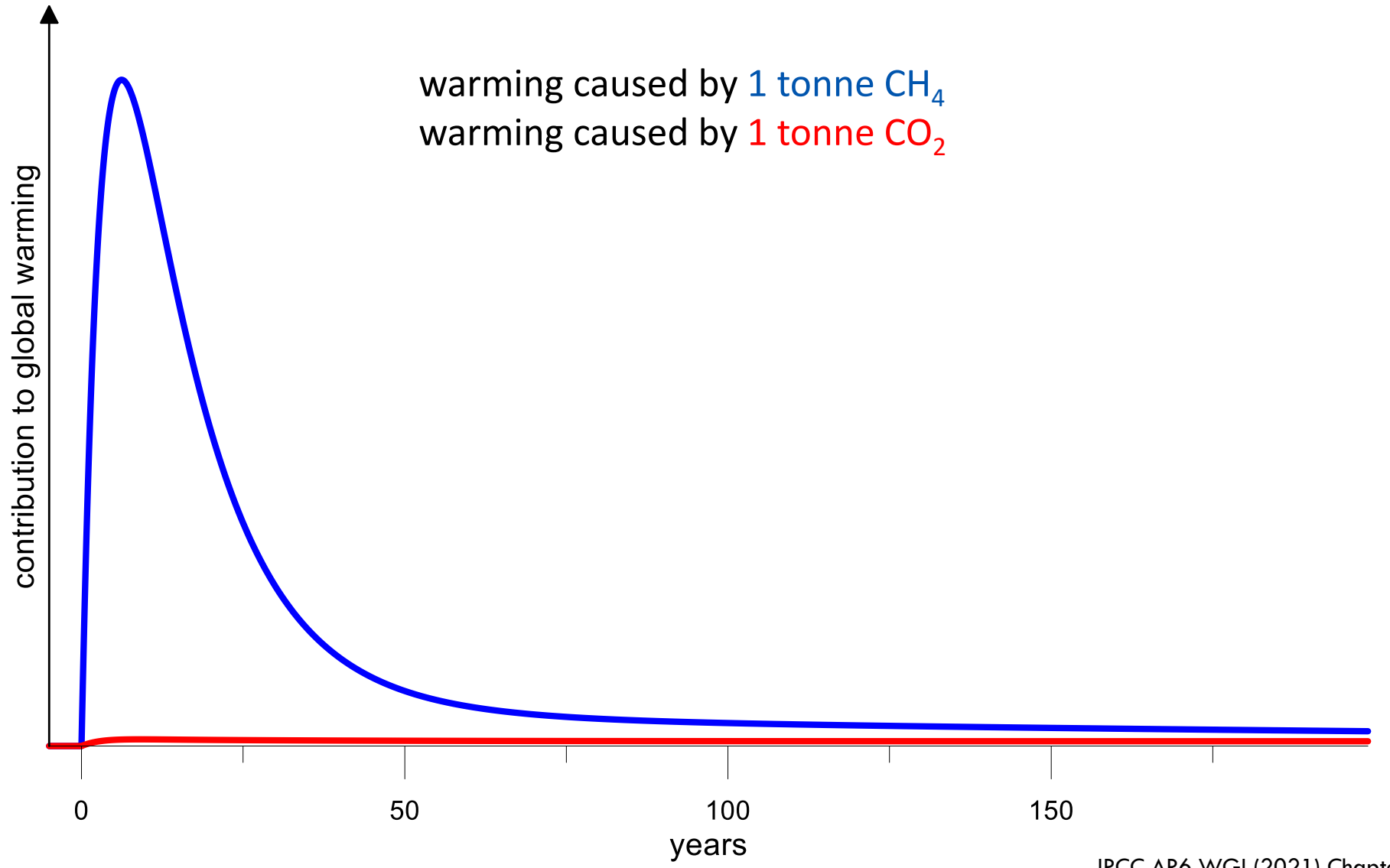


Based on IPCC AR6 WGI (2021) Chapter 7

A tonne-for-tonne comparison | $CO_2 \neq CH_4$



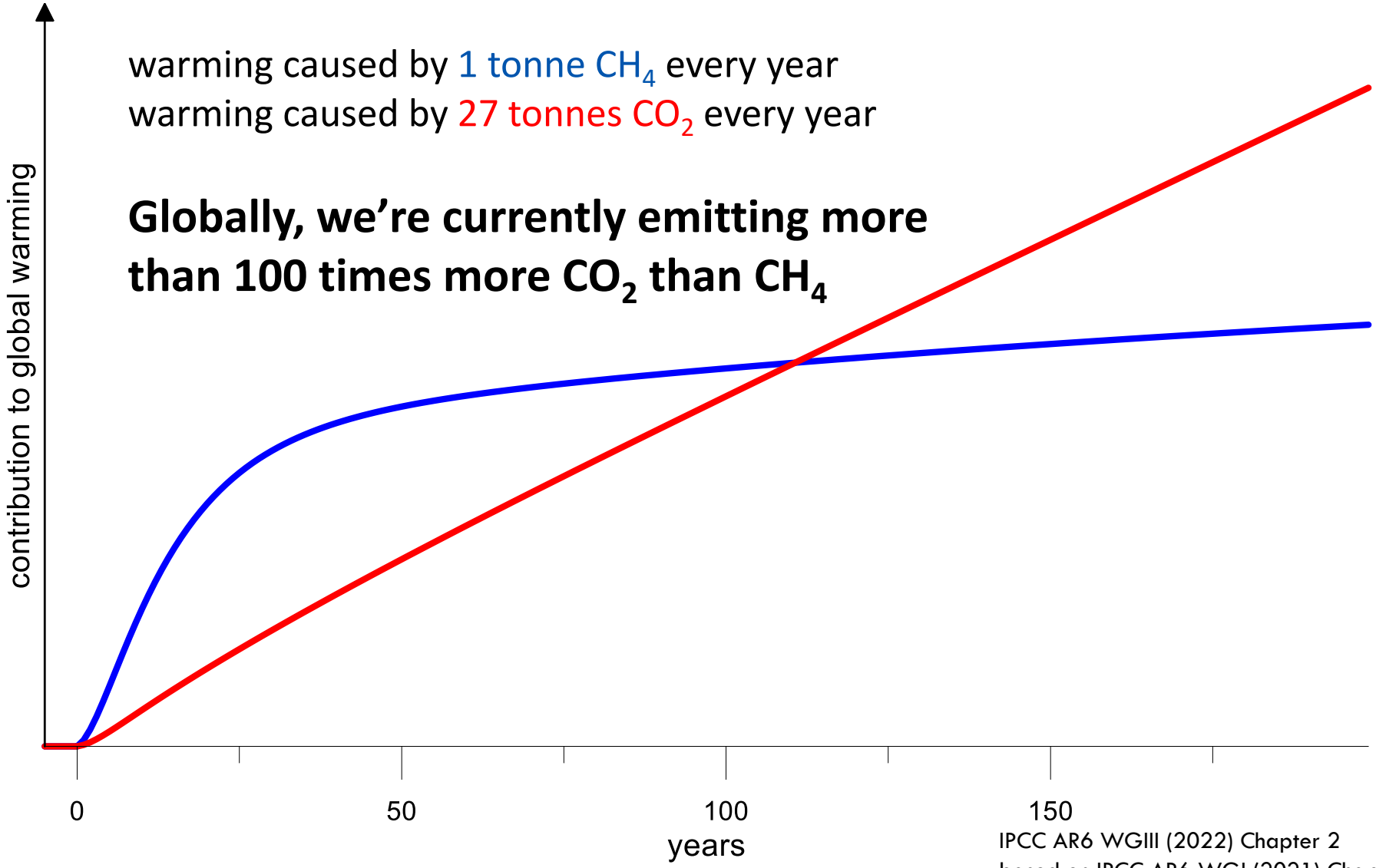
IPCC AR6 WGI (2021) Chapter 7

A tonne-for-tonne comparison | $CO_2 \neq CH_4$

warming caused by 1 tonne CH_4 every year

warming caused by 27 tonnes CO_2 every year

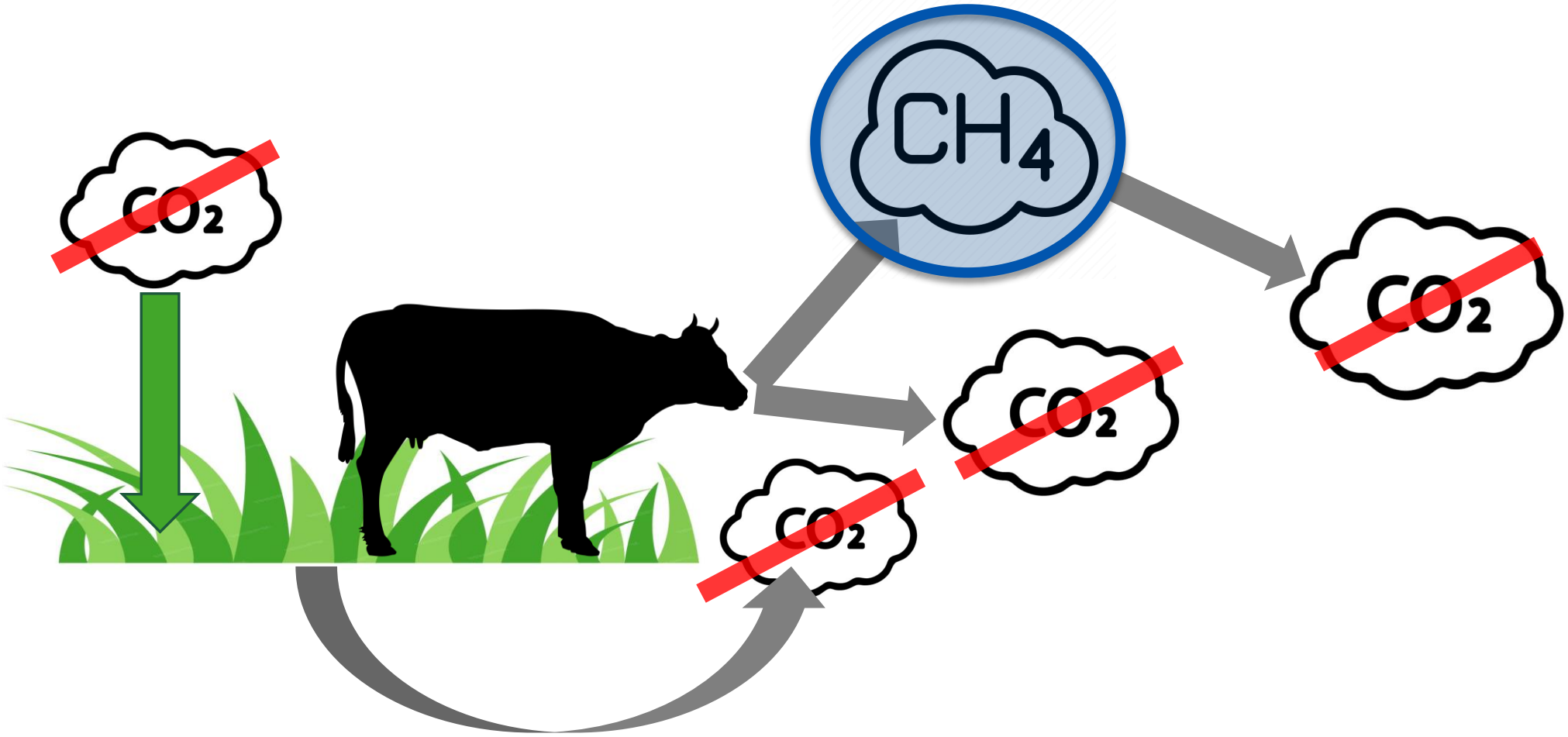
Globally, we're currently emitting more than 100 times more CO_2 than CH_4



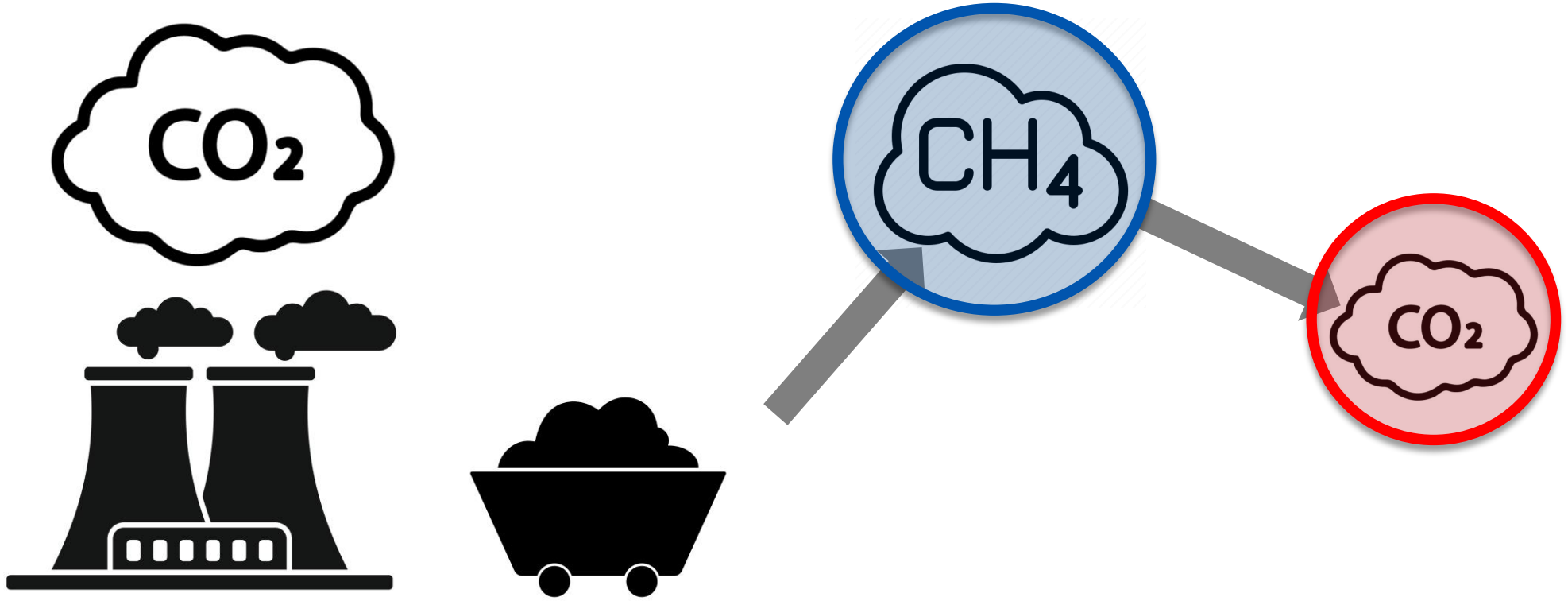
IPCC AR6 WGIII (2022) Chapter 2
based on IPCC AR6 WGI (2021) Chapter 7

Is biogenic Methane fundamentally different from fossil methane?

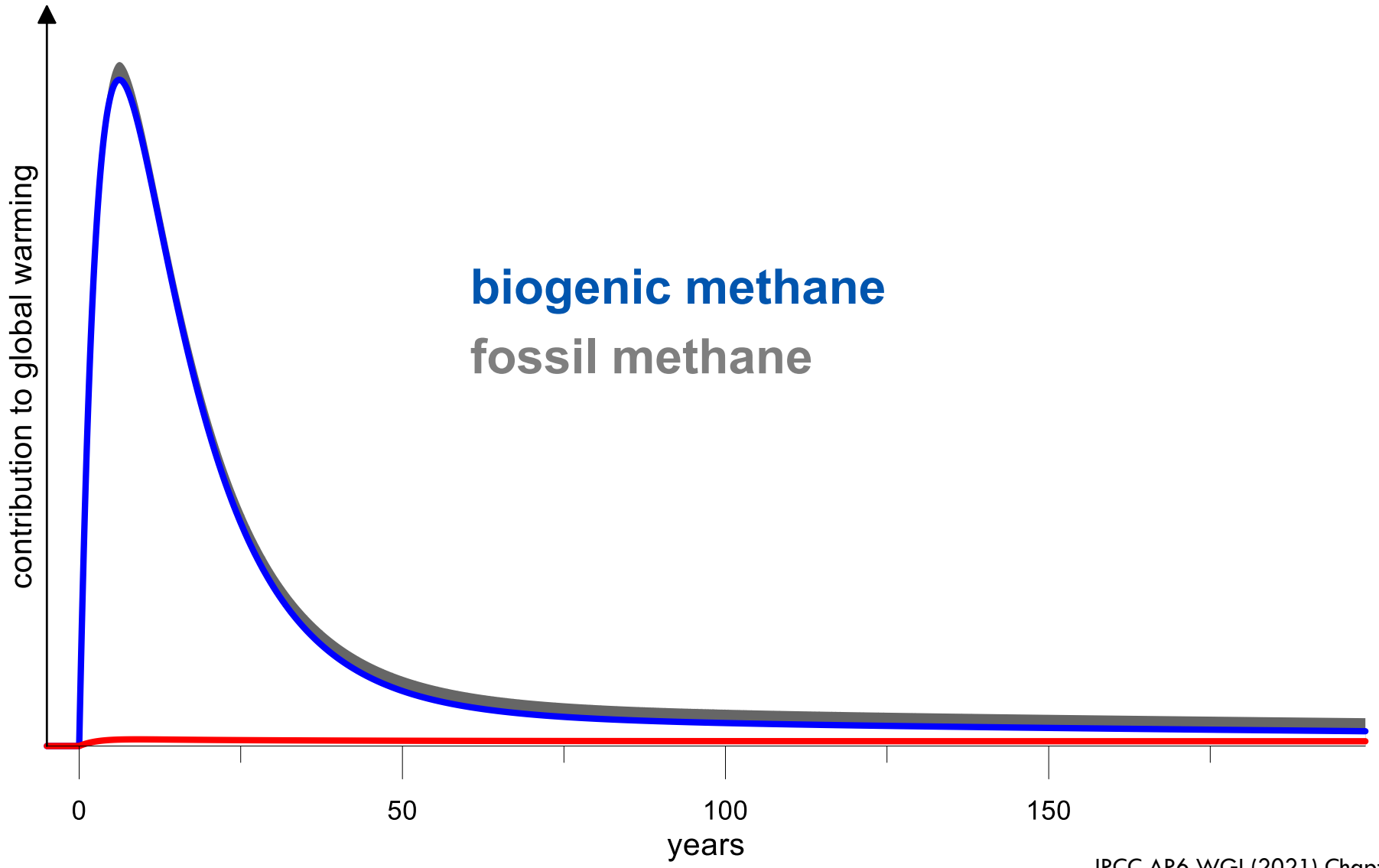
Biogenic methane
(produced from recently living biomass)



Fossil methane
(produced from fossil – long-dead biomass)



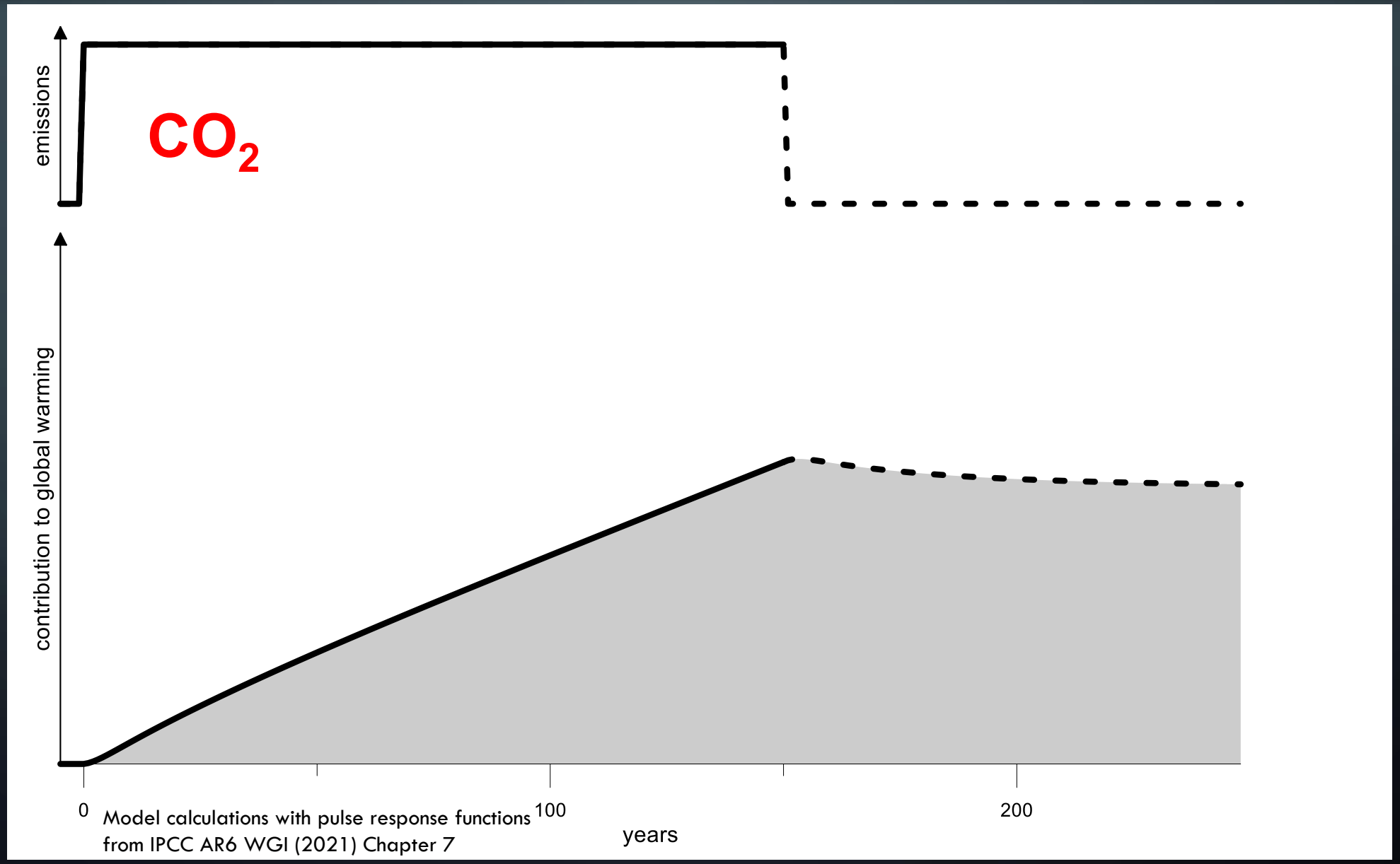
Is biogenic CH_4 different from fossil CH_4 ?



IPCC AR6 WGI (2021) Chapter 7

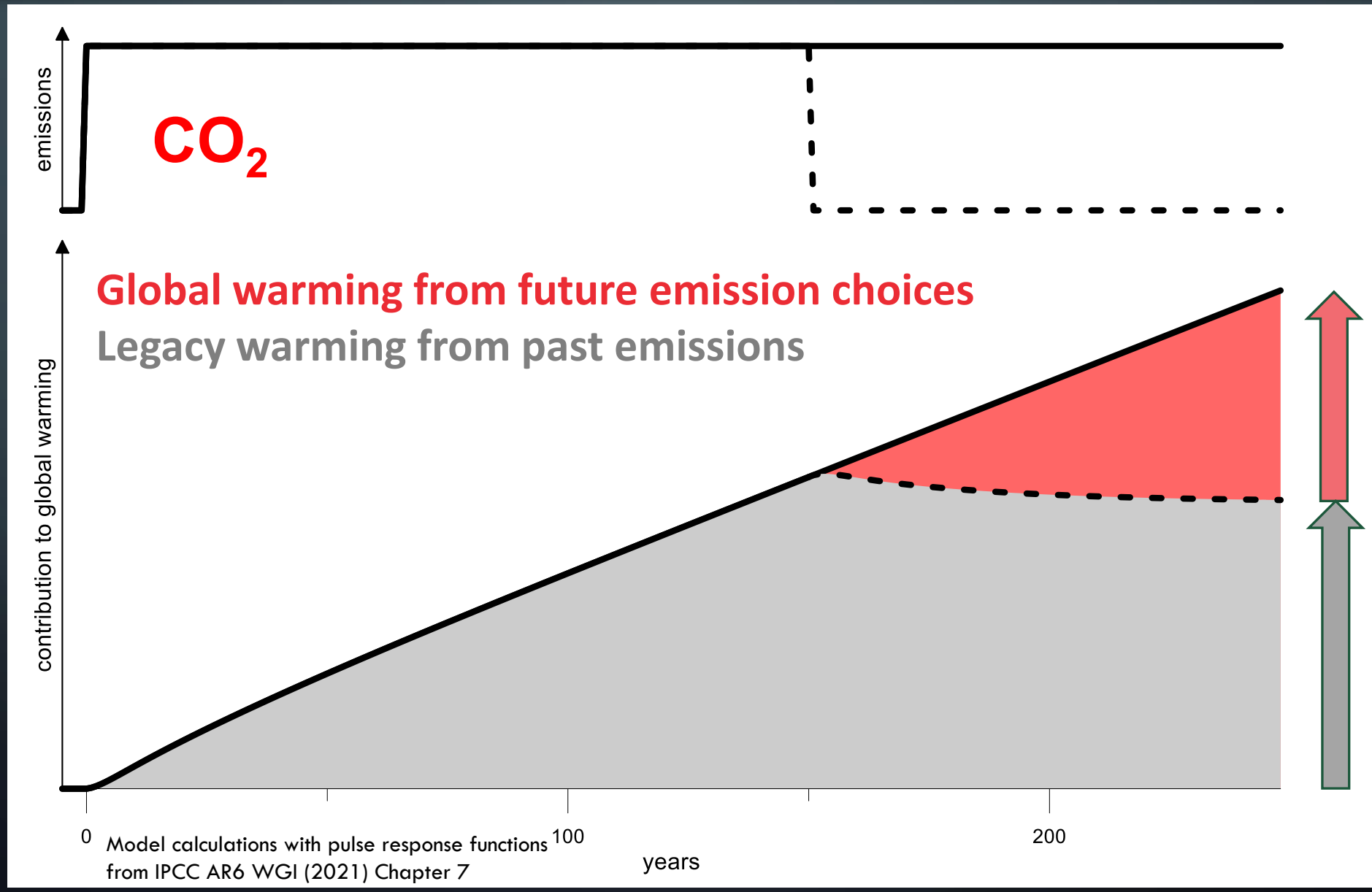
Past emissions and future choices

What would happen if we stopped emissions?



Model calculations with pulse response functions from IPCC AR6 WGI (2021) Chapter 7

What happens if we don't stop emissions?



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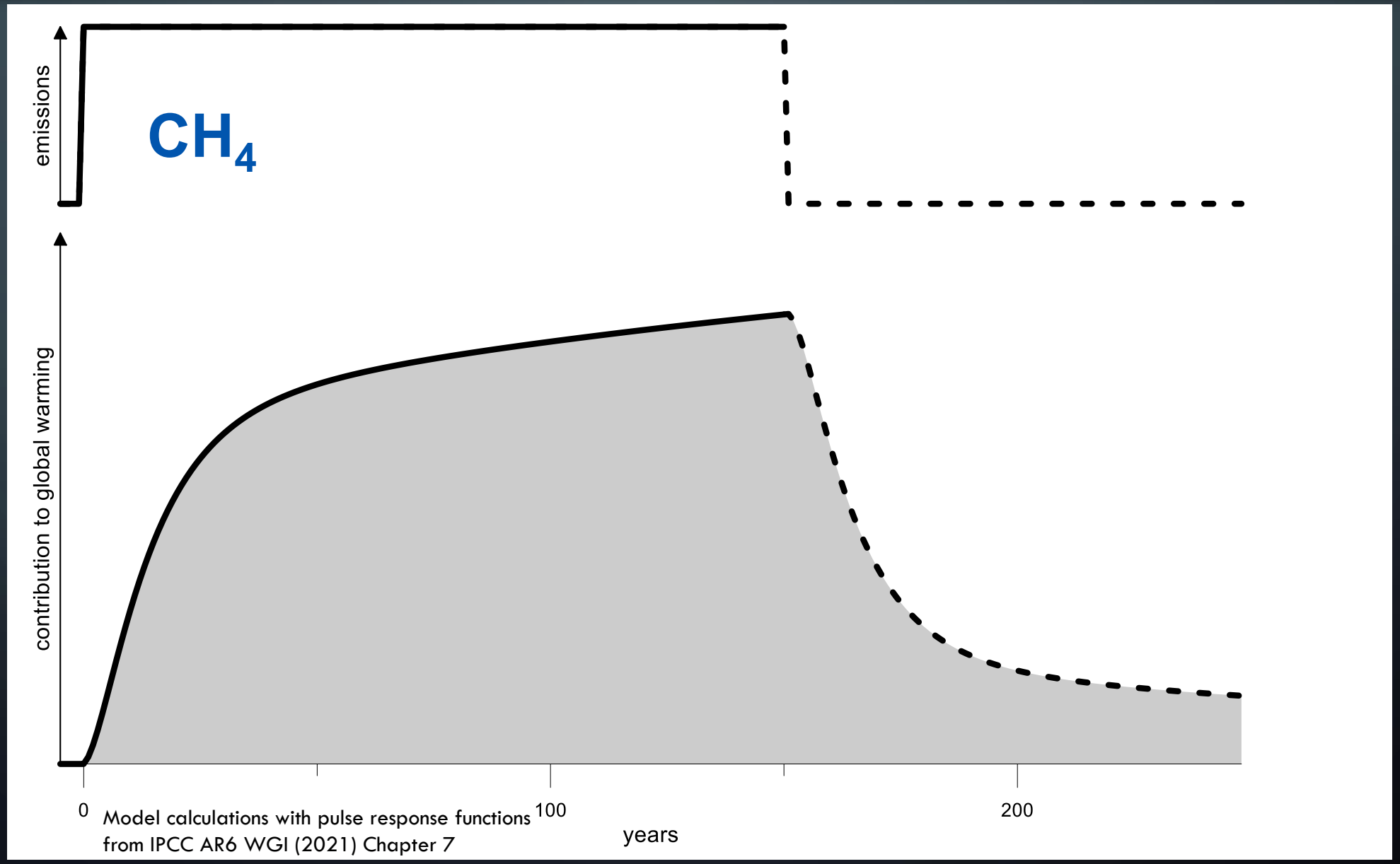

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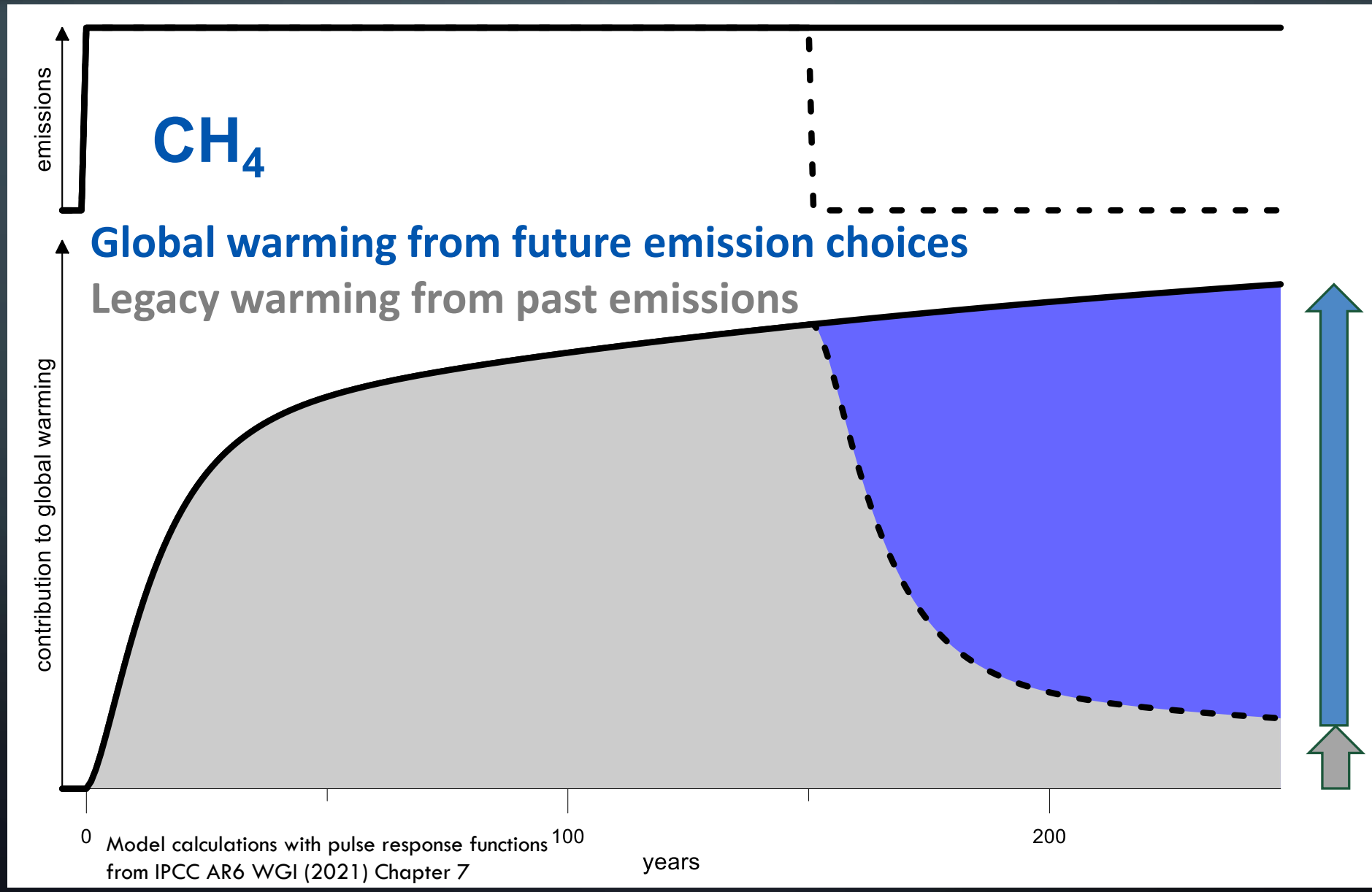

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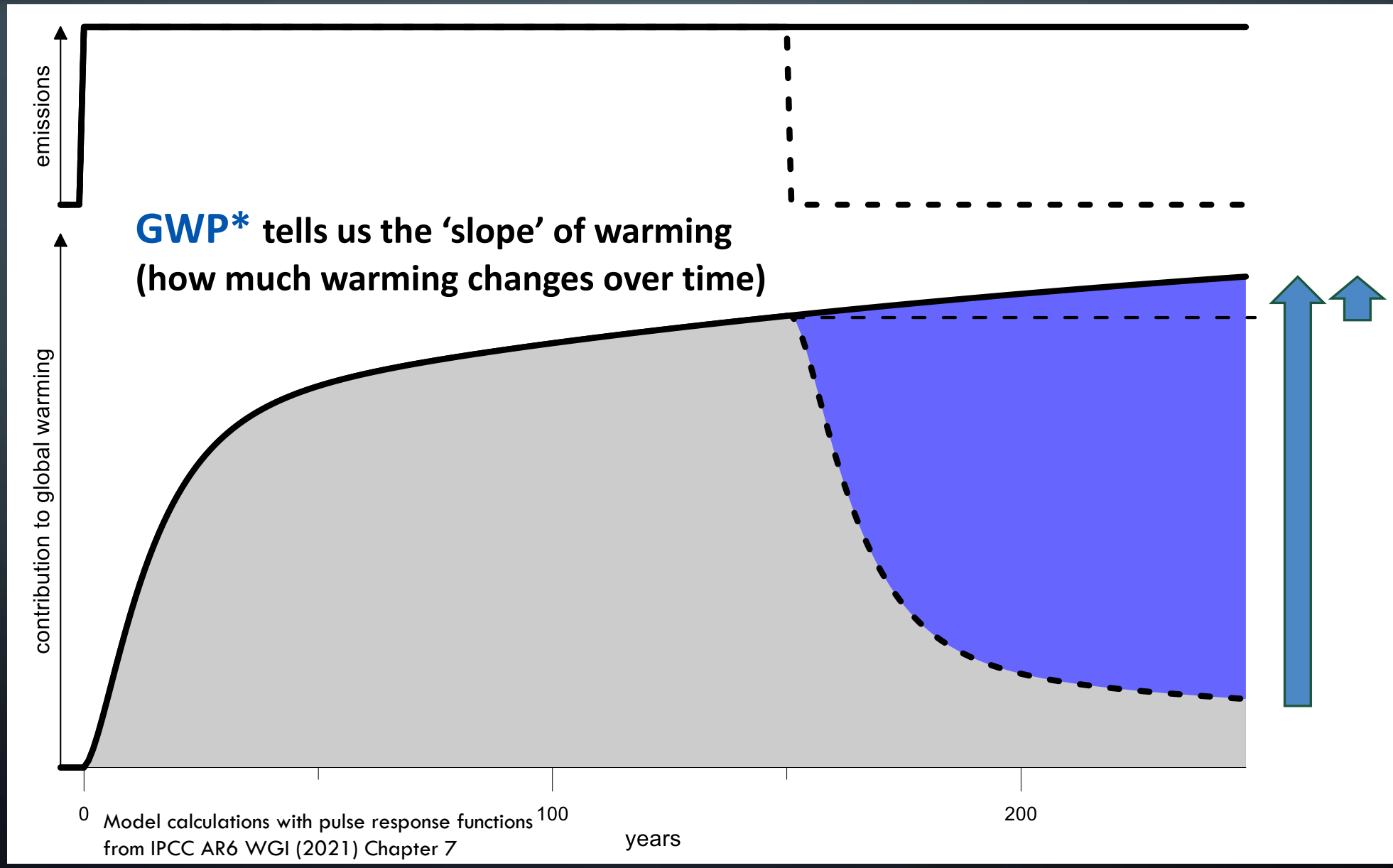
What do GHG emission metrics tell us?



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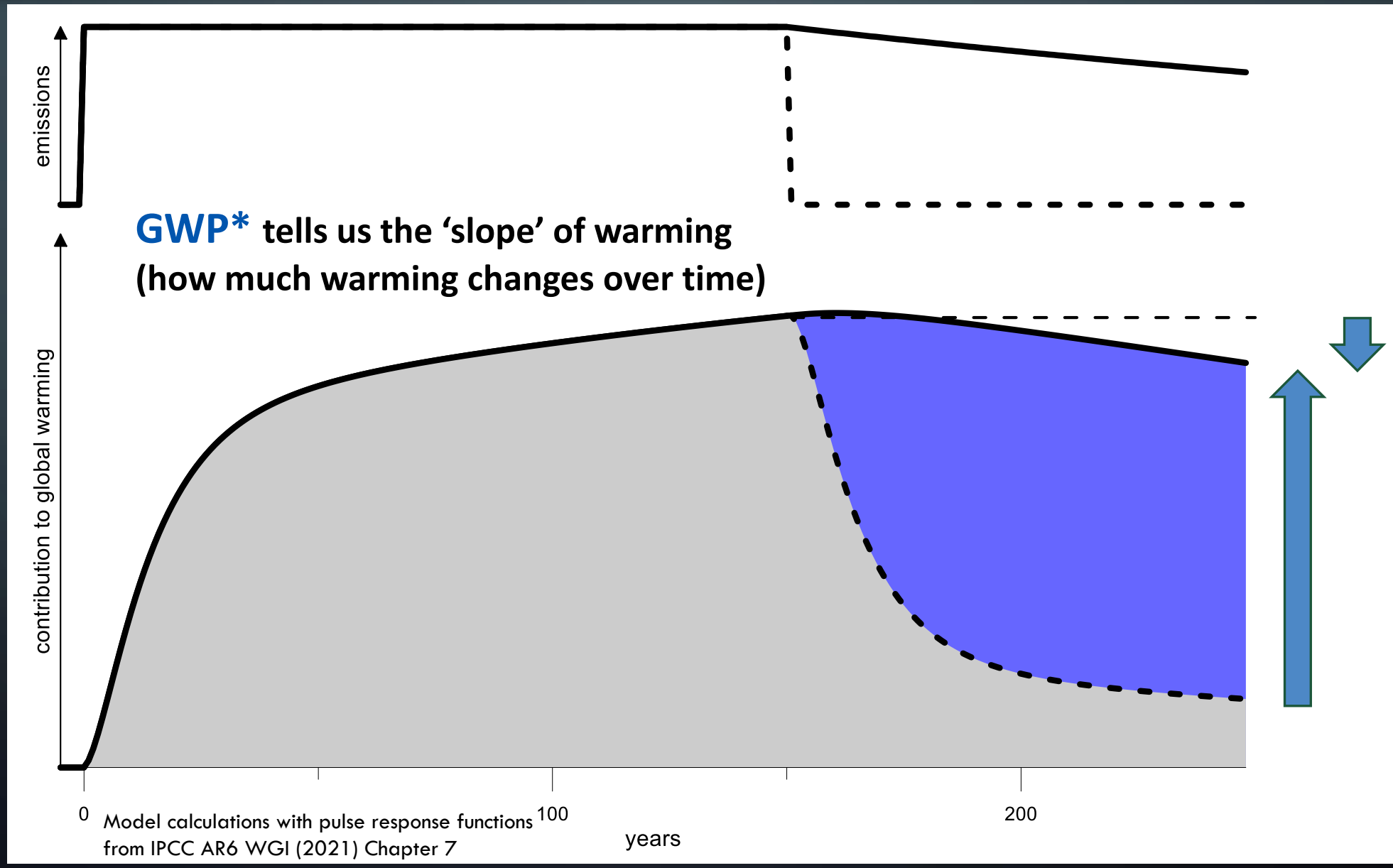
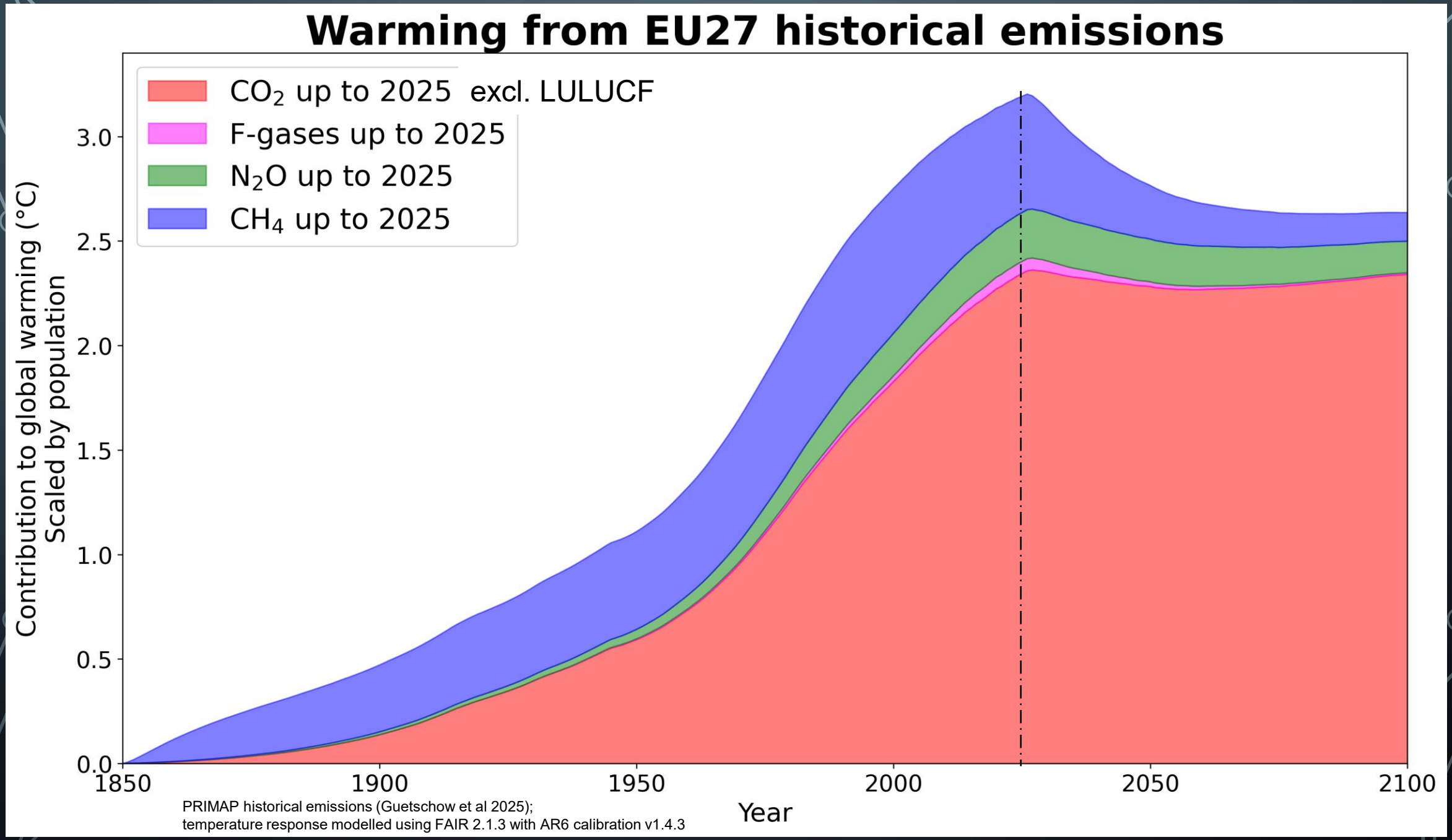


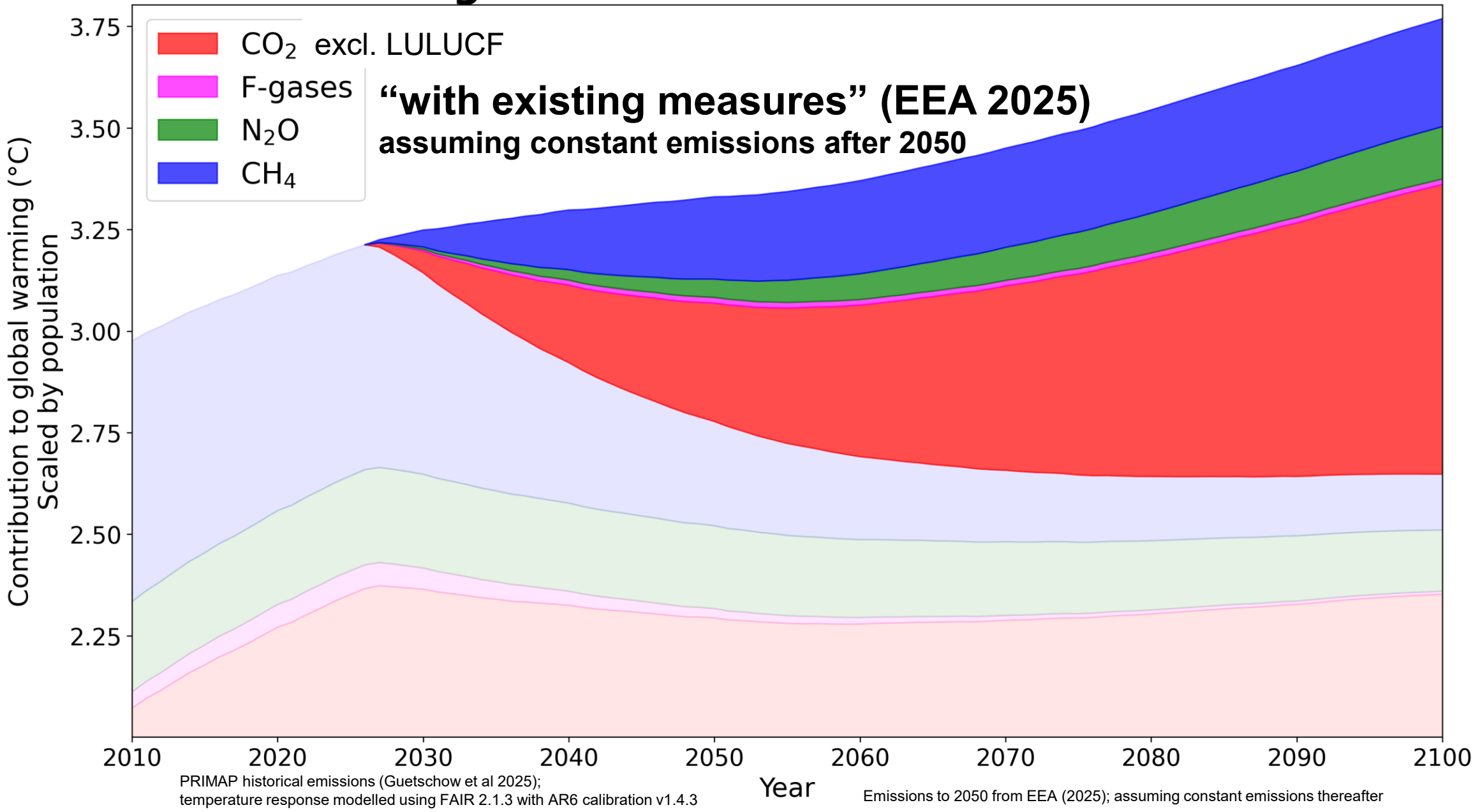
Past and future warming from EU-27

Warming from EU27 historical emissions



PRIMAP historical emissions (Guetschow et al 2025);
temperature response modelled using FAIR 2.1.3 with AR6 calibration v1.4.3

Warming from EU27 future emissions - WEM



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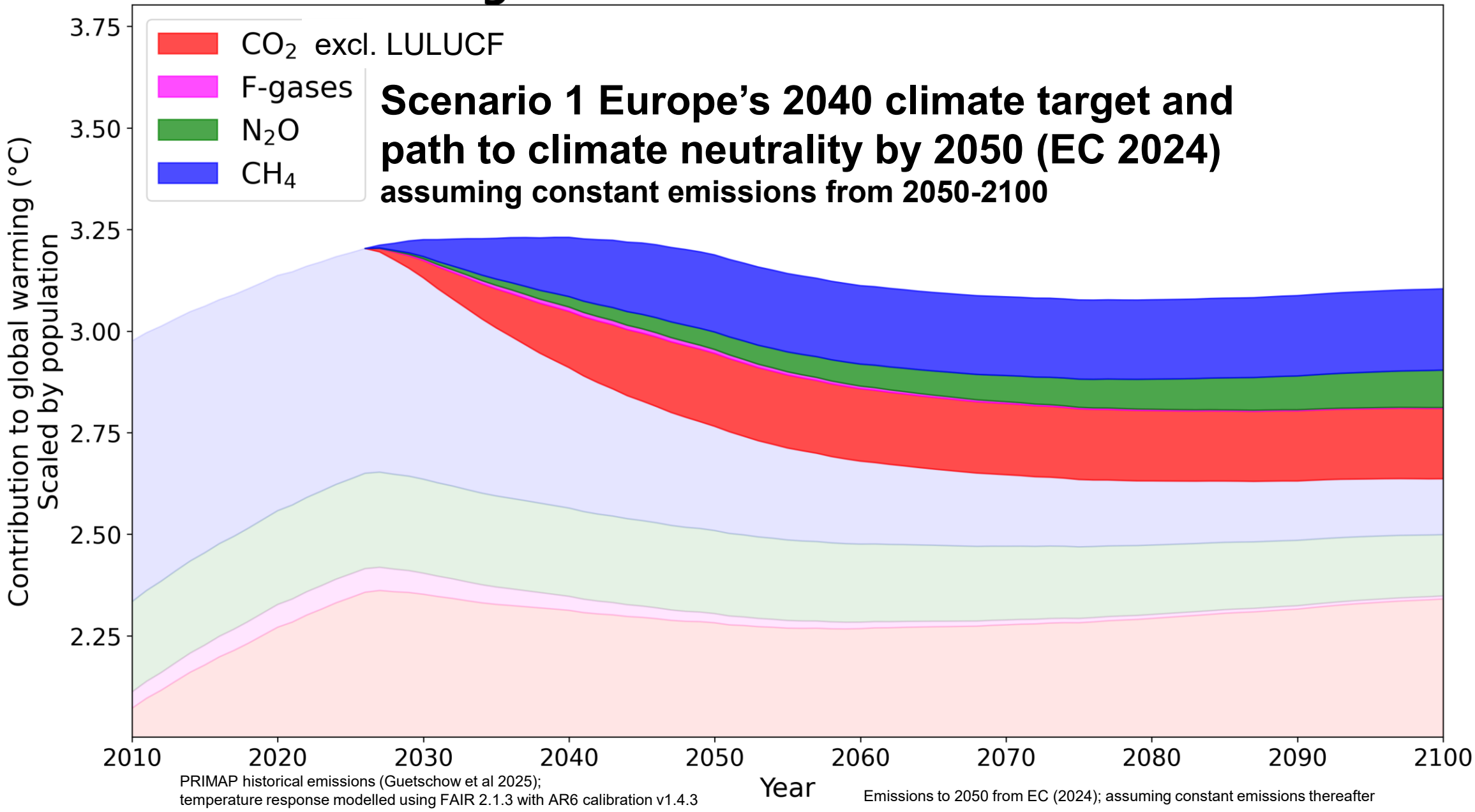
Emissions to 2050 from EEA (2025); assuming constant emissions thereafter

Warming from EU27 future emissions - S1



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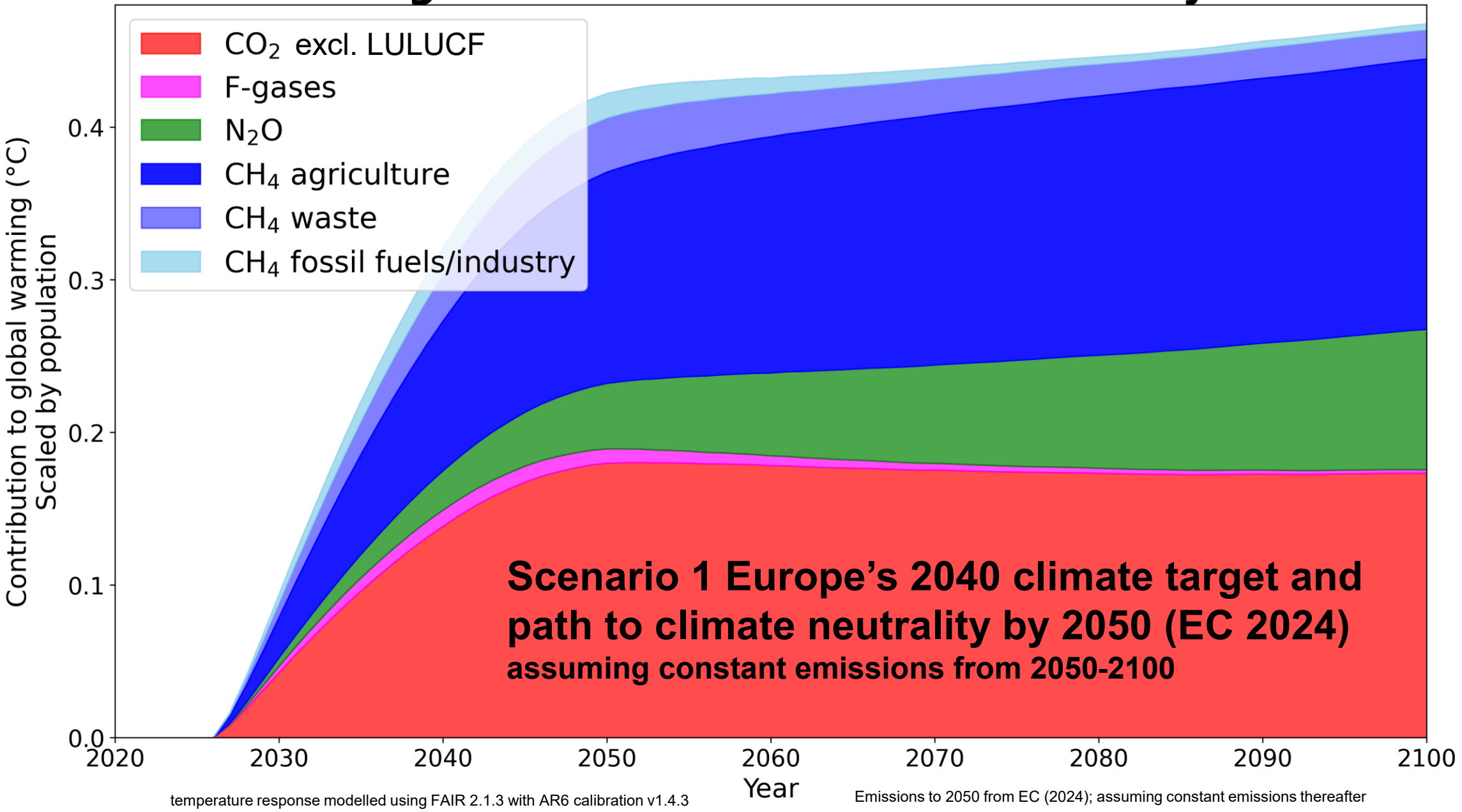
Emissions to 2050 from EC (2024); assuming constant emissions thereafter

Warming from EU27 future emissions only - S1



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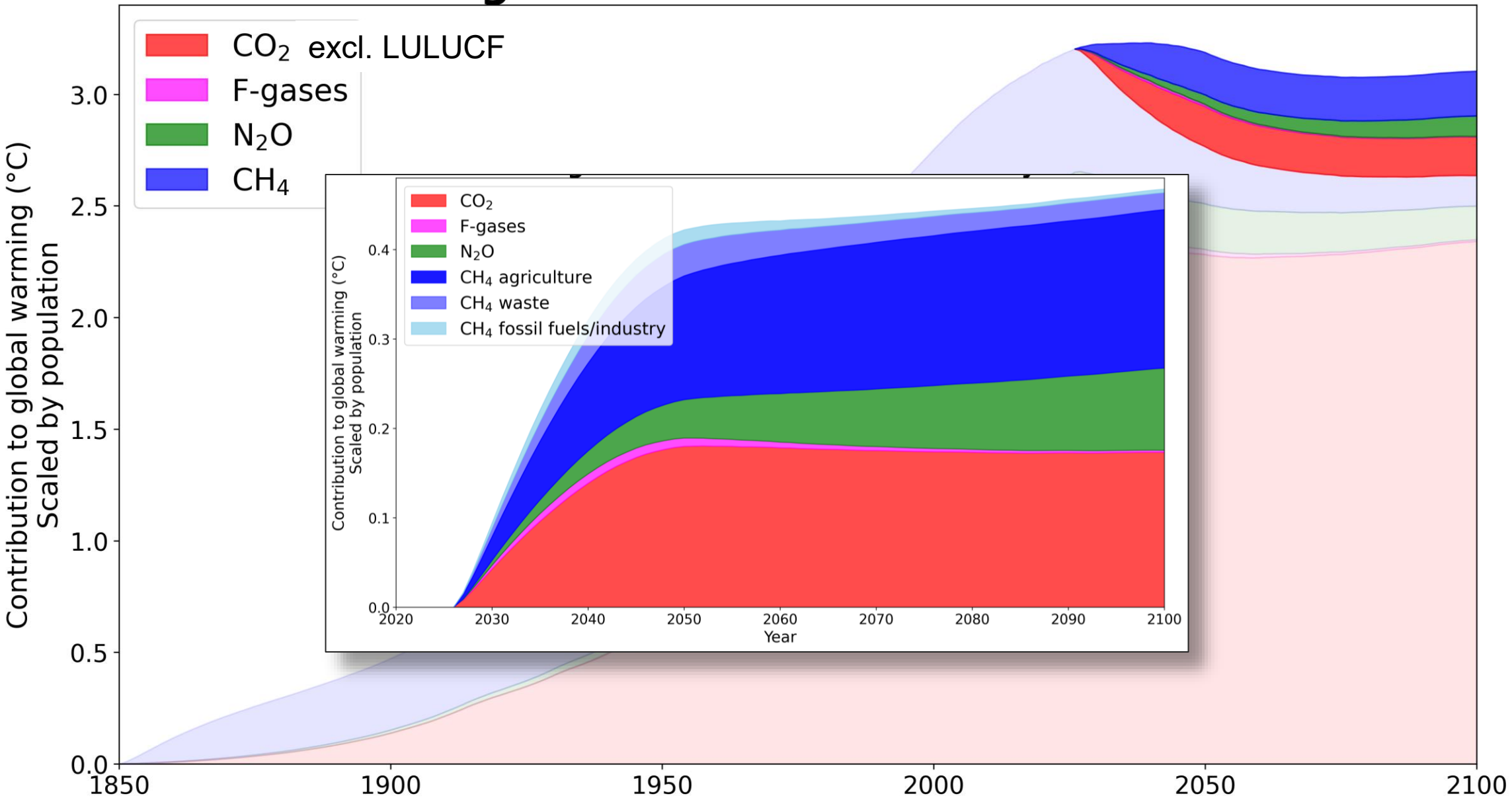
Warming from EU27 future emissions - S1



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Emissions to 2050 from EC (2024); assuming constant emissions thereafter

Every year matters
Every tonne of every gas matters
Every fraction of a degree matters

Thank you

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