

What's the cause of CO₂? - Kaya Identity

$$\text{CO}_2 \text{ Emissions} = \text{Population} \times (\text{GDP}/\text{Population}) \times (\text{CO}_2/\text{GDP})$$

Cannot reduce Population or GDP to zero so must reduce CO₂/GDP to zero

$$\text{But } (\text{CO}_2/\text{GDP}) = (\text{Fossil}/\text{Energy}) \times (\text{CO}_2/\text{Fossil}) \times (\text{Energy}/\text{GDP})$$

So two options for Net Zero, either has to happen very quickly:

A. Fossil/Energy to zero: completely stop fossil fuel use (and conventional cement, steel etc.) very rapidly

or

B. CO₂/Fossil to zero: deploy CCS on all the fossil fuels that are used – needs Direct Air Capture as well as 'conventional' CCS

- A & B are obviously mutually complementary, but compete for effort and investment; both also helped by reduced Energy/GDP
- **Neither are easy - to date A has received a lot more attention than B**

0.04% was the average population growth rate between 10,000 BCE and 1700



Data sources: Our World in Data based on HYDE, UN, and UN Population Division [2019 Revision] This is a visualization from OurWorldinData.org, where you find data and research on how the world is changing.

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