CO_2 vs. CH_4

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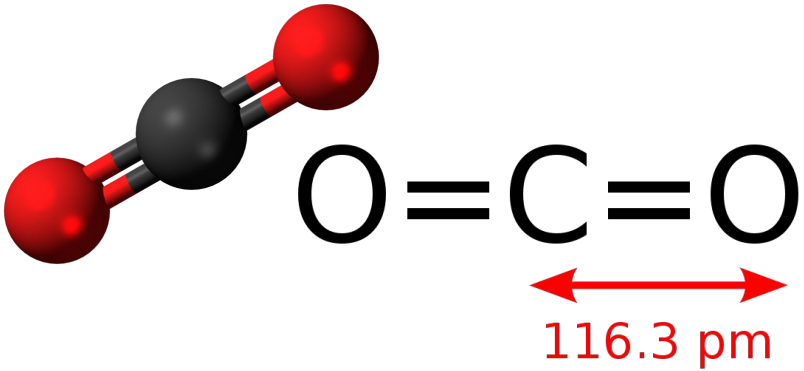
A few words about CO_2 and CH_4

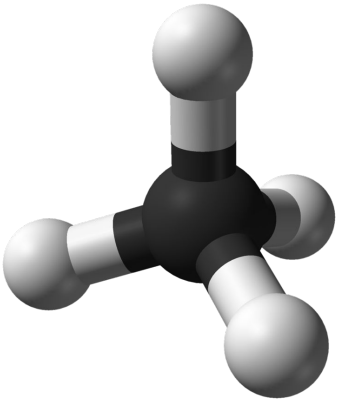
1. **Carbonic dioxide (CO2)**

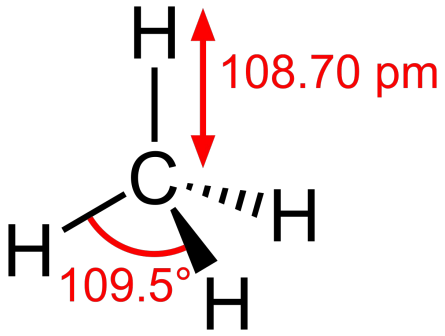
- Molar mass: 44.01 g*mol^-1
- Appearance: Colorless gas
- Boiling point: T ~ 164.79 K
- Density: ρ ~ 1.720 kg/m^{-3}



2. **Methane (CH4)**

- Molar mass: 16.04 g*mol^-1
- Appearance: Colorless gas
- Boiling point: T ~ 111.6 K
- Density: ρ ~ 0.657 kg·m^{-3}





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Influence of CO_2 and CH_4 on human's organism

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How CH4 and CO2 are formed?

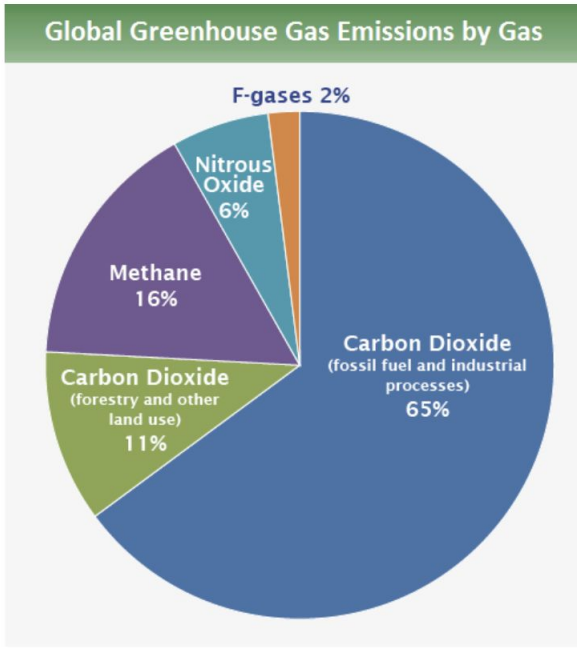
90-95% of the methane is of biological origin - Herbivorous ungulates, rice cultivation, wetlands

$CO_2 + 4H_2 \rightarrow CH_4 + 2H_2O$

CO_2 is formed when hydrocarbons are burned

$CH_4 + 2O_2 = CO_2 + 2H_2O + Q$

CO2 has the largest emissions among greenhouse gases, but…



Source: IPCC (2014) Exit based on global emissions from 2010. Details about the sources included in these estimates ca be found in the *Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Exit

Each gas has different influence on climate so it's useless to compare just by mass emission

We need **GWP-**
Multiple that equalize gases

Def. Energy absorbed by gas

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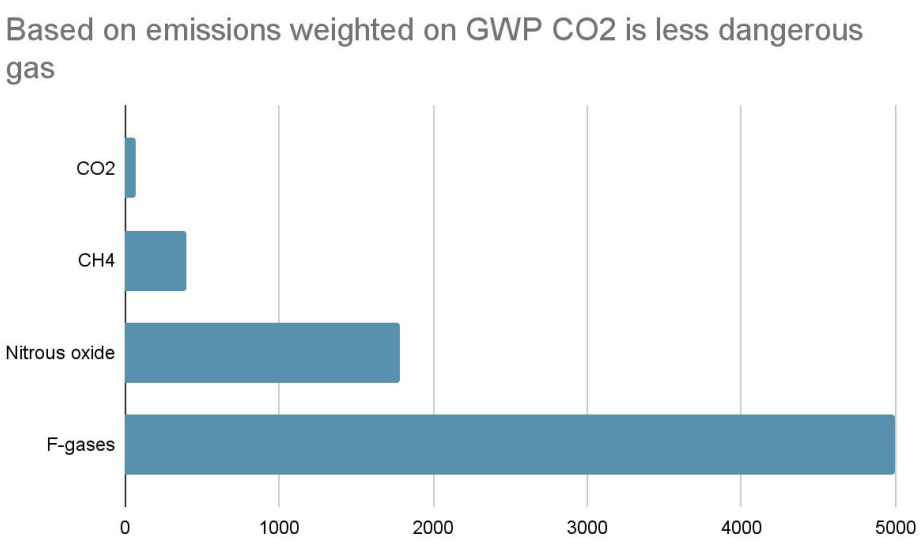
…CO2 is less dangerous for global warming

Gas	GWP 100 years	Emissions share
CO_2	1	76%
CH_4	25	16%
Nitrous oxide	298	6%
F-gases	2500	2%



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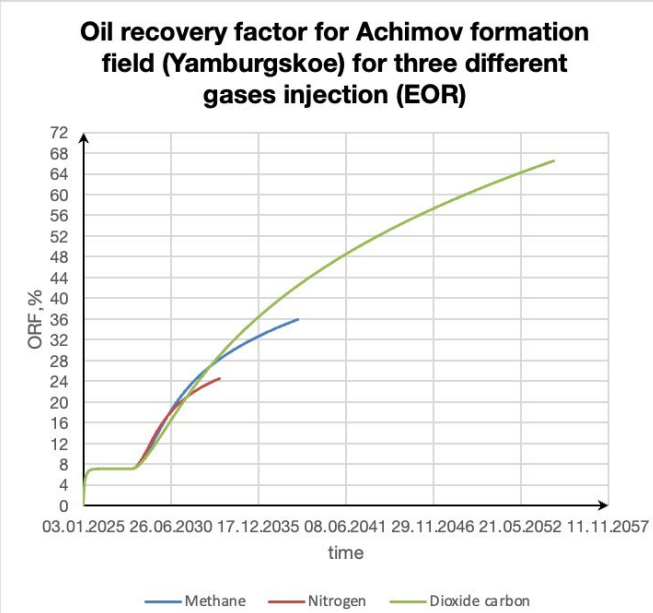
What can we do with gases emission | CCUS

4 technology of capture gases

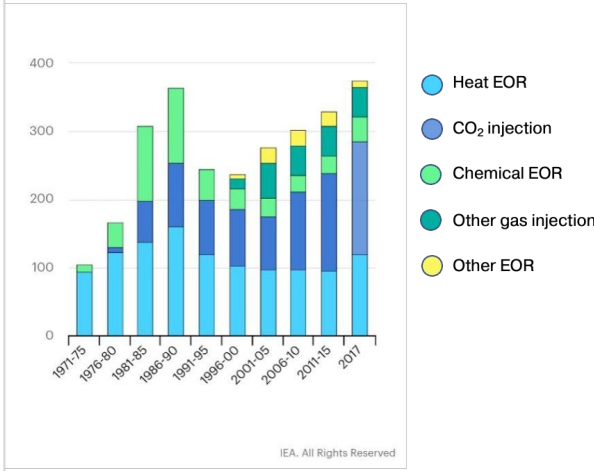
- **absorption**
- **adsorption**
- **chemical looping combustion**
- **membrane gas separation**

Enhanced oil-recovery method

Mechanisms to increase oil recovery:
•mass exchange between oil and gas
•reducing oil viscosity
•oil swelling
•decrease in oil-rock IFT



Graph of the use of different EOR according to IEA data



ORF: CO_2 – 66,5%, **N_2**– 24,4 %, **CH_4** – 35,8%

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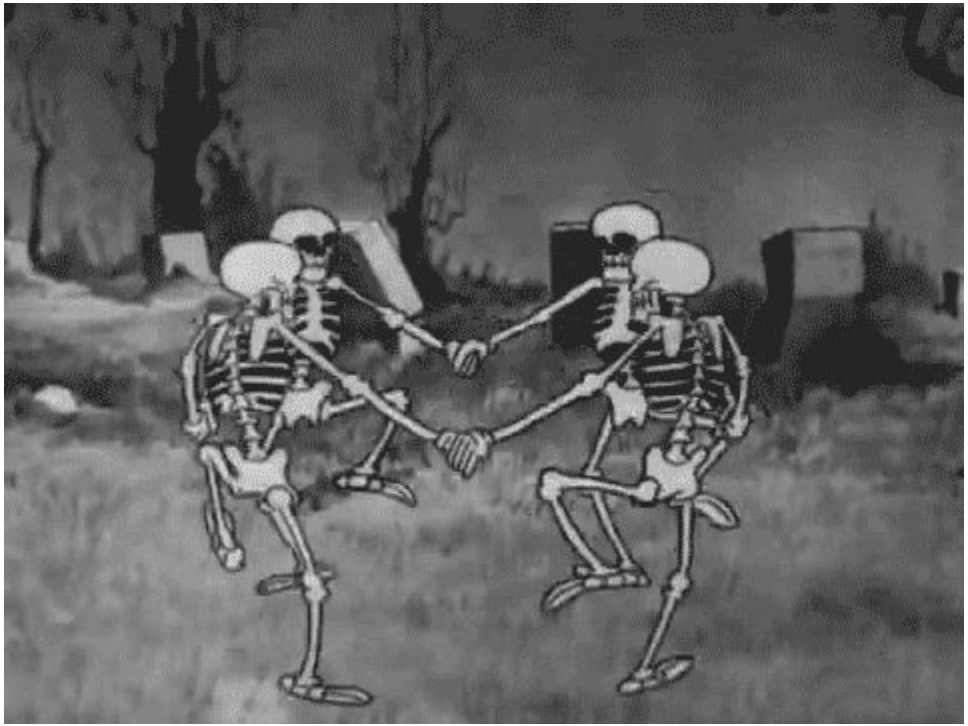
*-graphs by authors

Thanks for watching



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