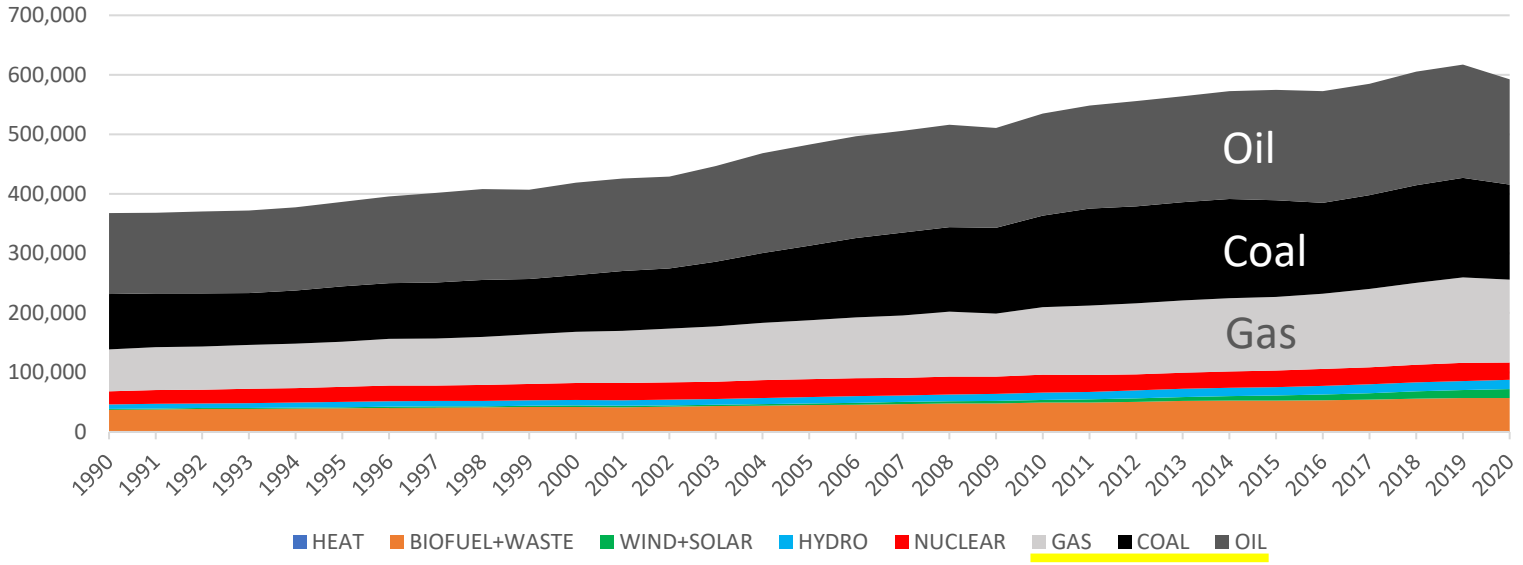
COMMUNICATING METHANE MITIGATION AS AN OPPORTUNITY

- CAN NON TECHNICAL GUIDES BE A KEY TO CLIMATE ACTION?

Richard Mattus, *RM Business Consulting AB*

Global Energy Production

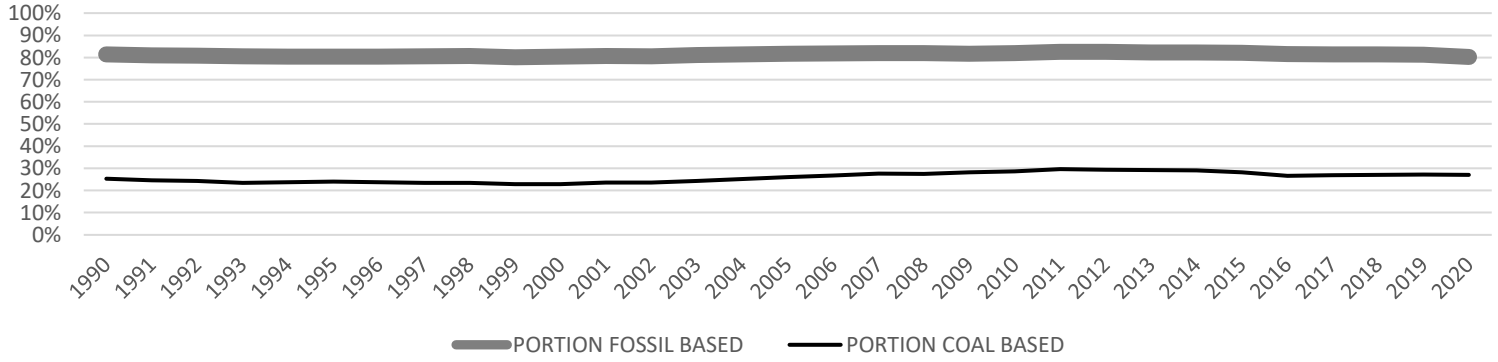
Number of 1000 TJ By Type of Energy 1990 - 2020
Data from IEA Statistics



~80% Fossil Based

Portions Fossil Based and Coal Based Energy

In % of Total Global Energy Production 1990 to 2020
Data from IEA Statistics



~80% Fossil Based

~30% Coal Based

It will take decades to phase out Fossil Based Energy.

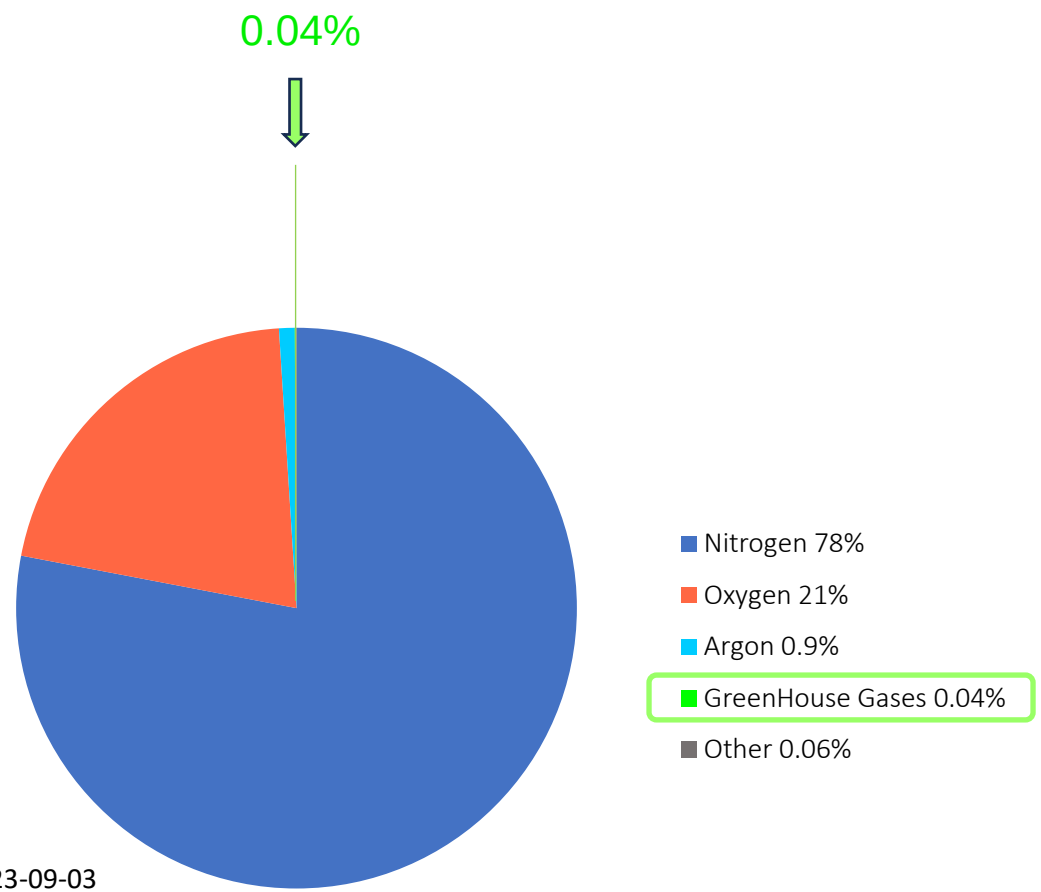
Source of Data: IEA Statistics

A. Communicating the **Opportunity** of Methane.

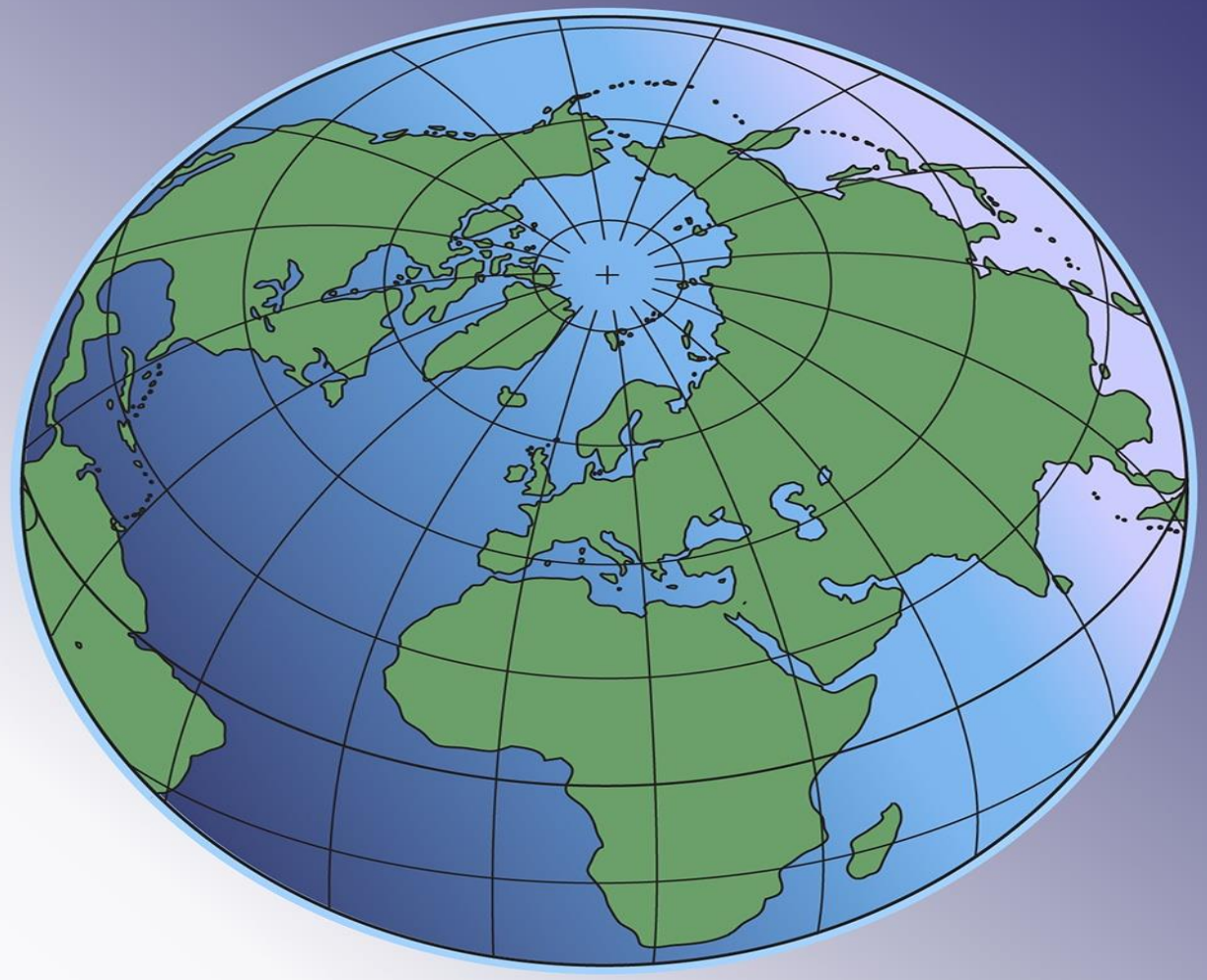
B. Can **Non-technical** Guides be a Key to Climate Action?

A. Communicating the **Opportunity** of Methane.

Composition of the atmosphere



A thin bubble of atmosphere

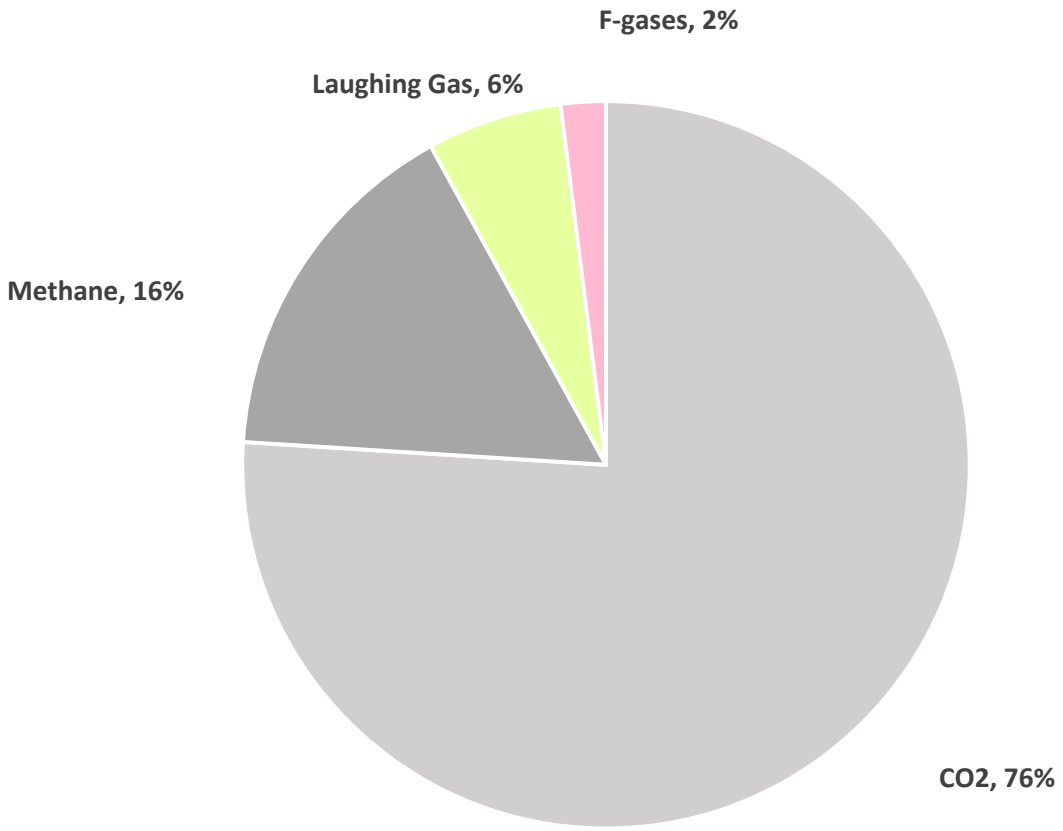


Thanks to the greenhouse gases,
the average temperature is +15^{oC}

Instead of -15^{oC}

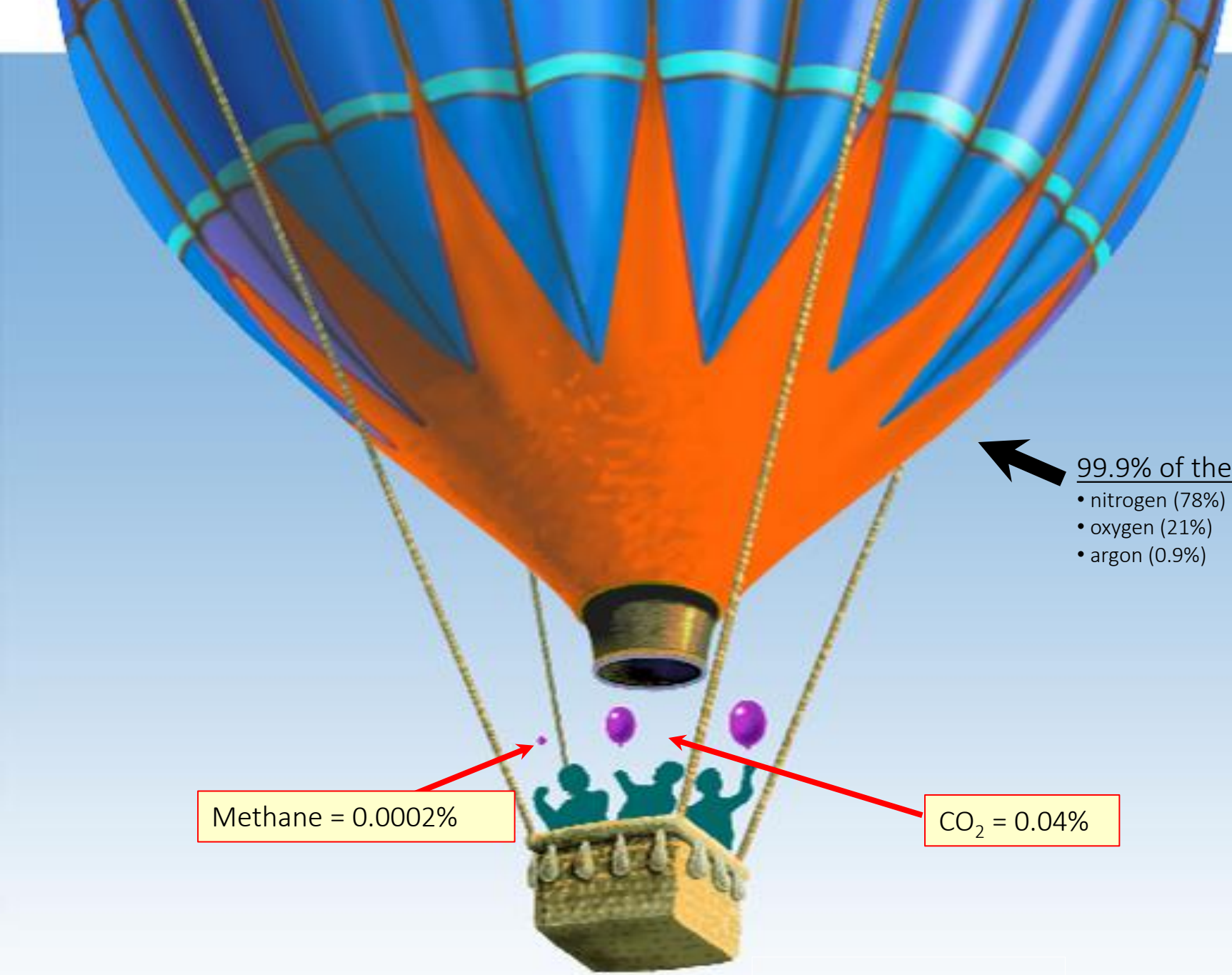
Atmospheric GHG-increases causing Global Warming

- by indicative order of importance*



* *NRDC (Natural Resources Defence Council)*

Composition of the atmosphere



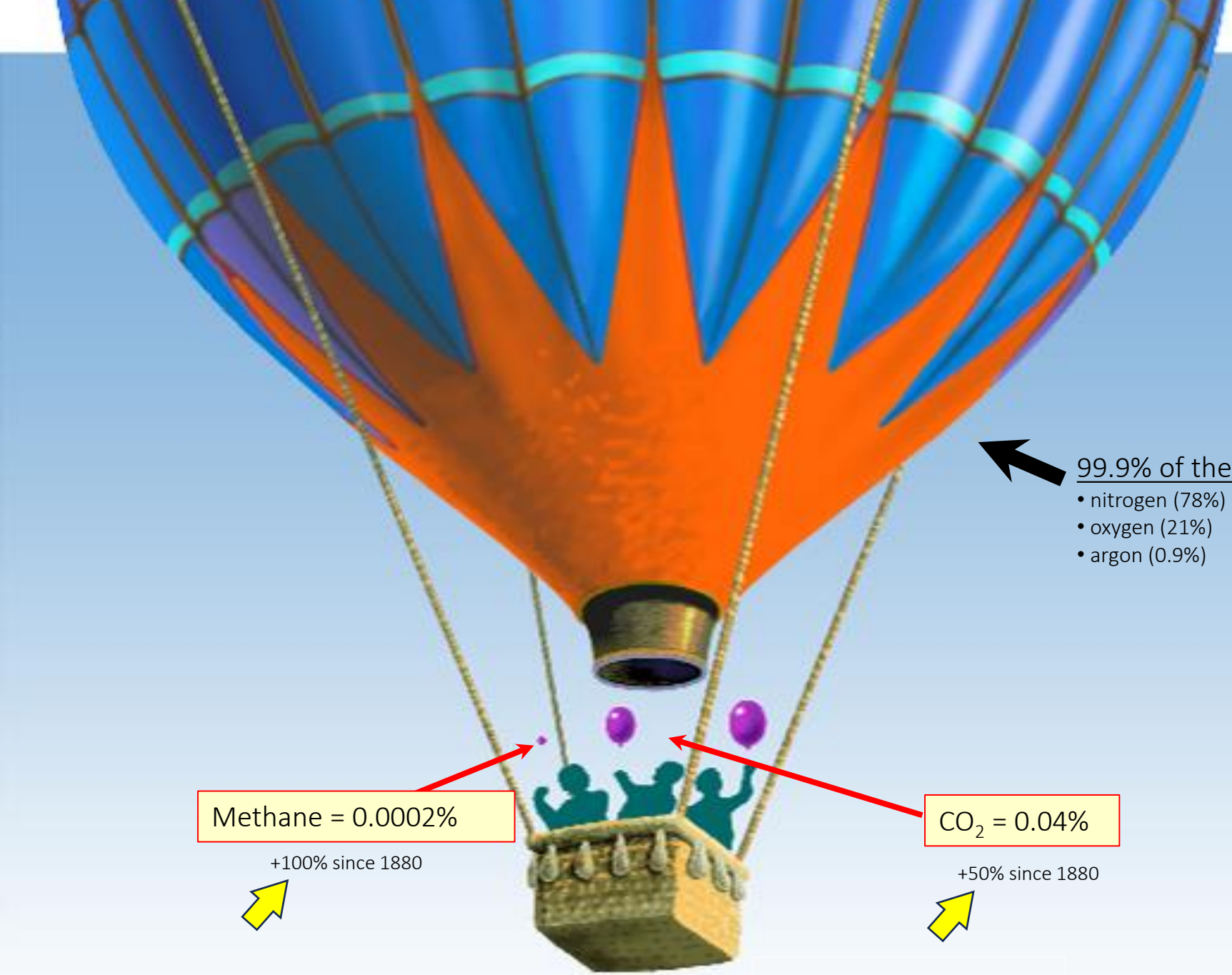
99.9% of the atmosphere:

- nitrogen (78%)
- oxygen (21%)
- argon (0.9%)

Methane = 0.0002%

CO_2 = 0.04%

Composition of the atmosphere



99.9% of the atmosphere:

- nitrogen (78%)
- oxygen (21%)
- argon (0.9%)

Methane = 0.0002%

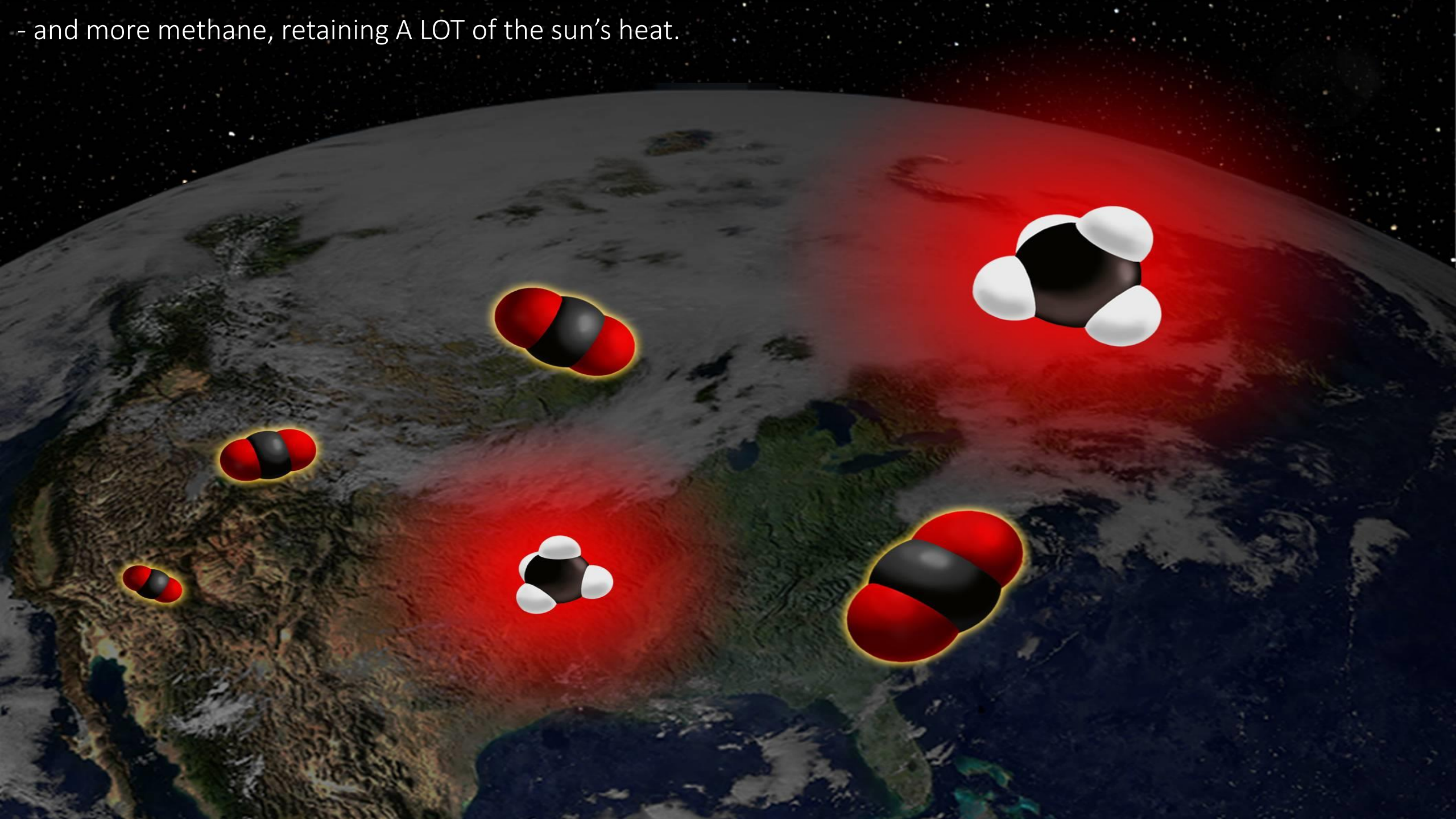
+100% since 1880

CO_2 = 0.04%

+50% since 1880

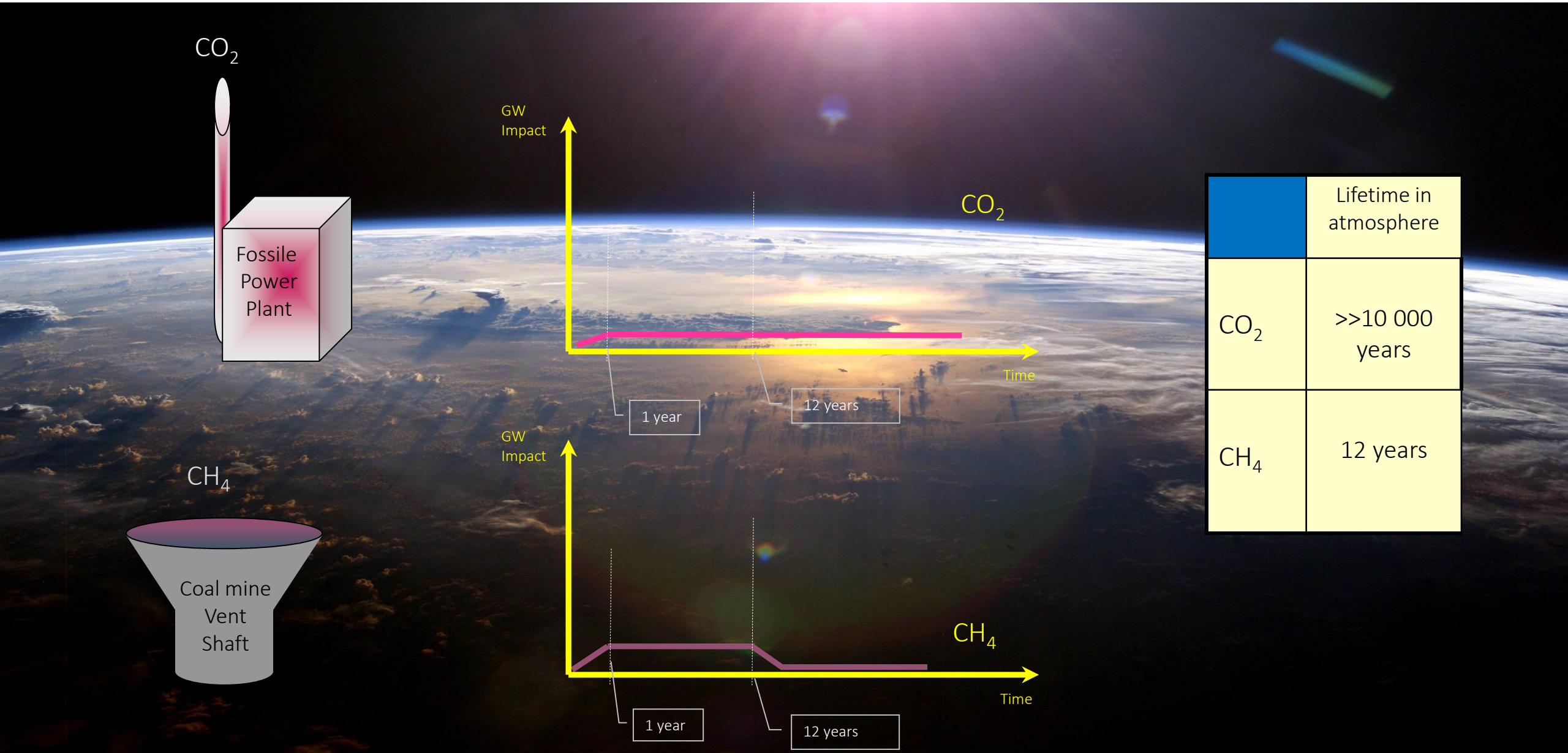
Increasing volume of CO_2, retaining some of the sun's heating energy (infrared radiation) in the atmosphere.

- and more methane, retaining A LOT of the sun’s heat.



Green House Gases CO_2 vs methane (CH_4)

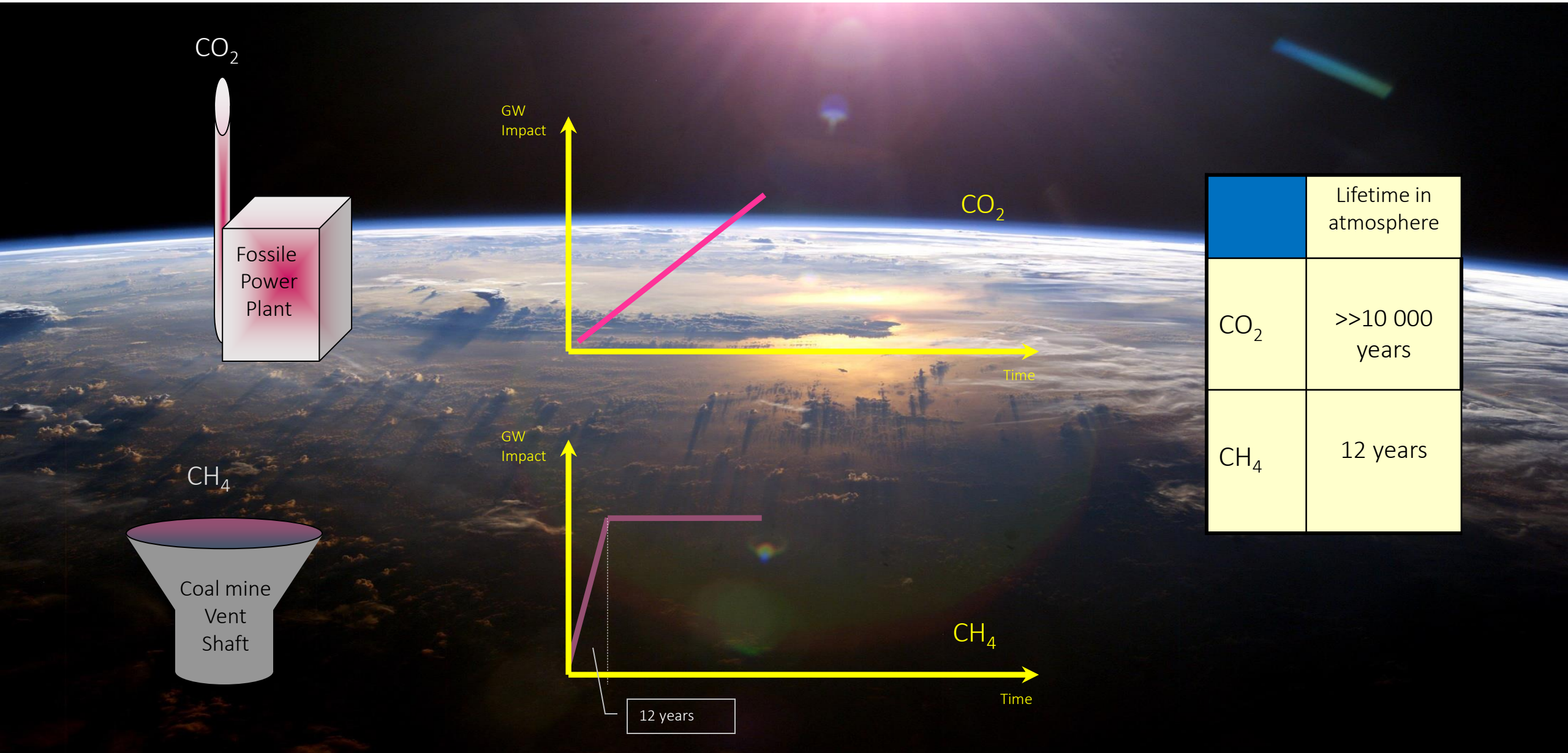
Effect of **one year** of emissions



	Lifetime in atmosphere
CO_2	>>10 000 years
CH_4	12 years

Green House Gases CO_2 vs methane (CH_4)

Effect of **long-time** emissions



	Lifetime in atmosphere
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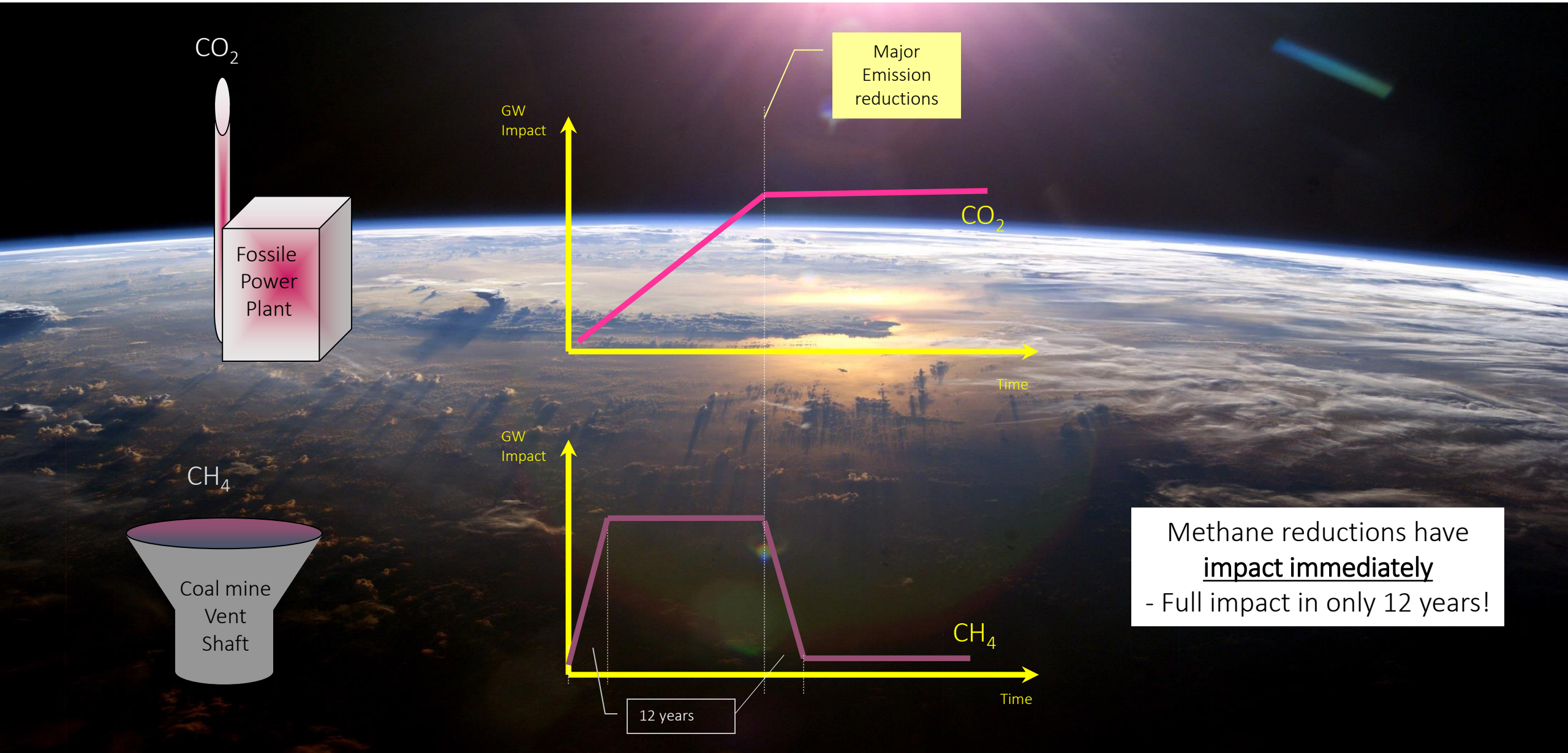
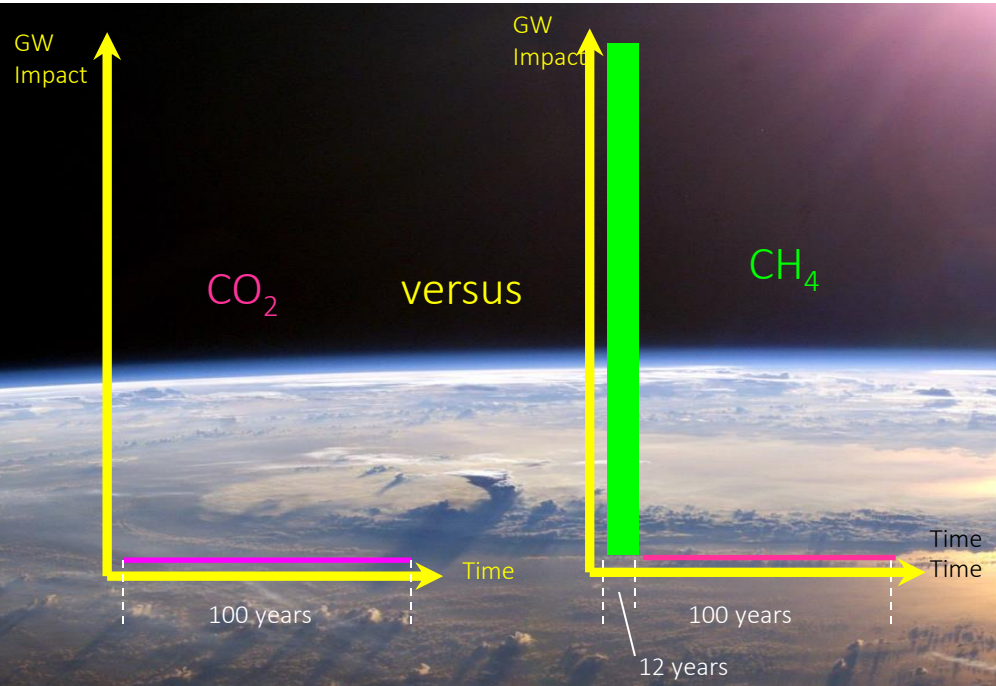
Green House Gases CO_2 vs methane (CH_4)

Effect of **<u>emission reductions</u>**



Methane reductions have
<u>impact immediately</u>
- Full impact in only 12 years!

Green House Gases CO_2 vs methane (CH_4)

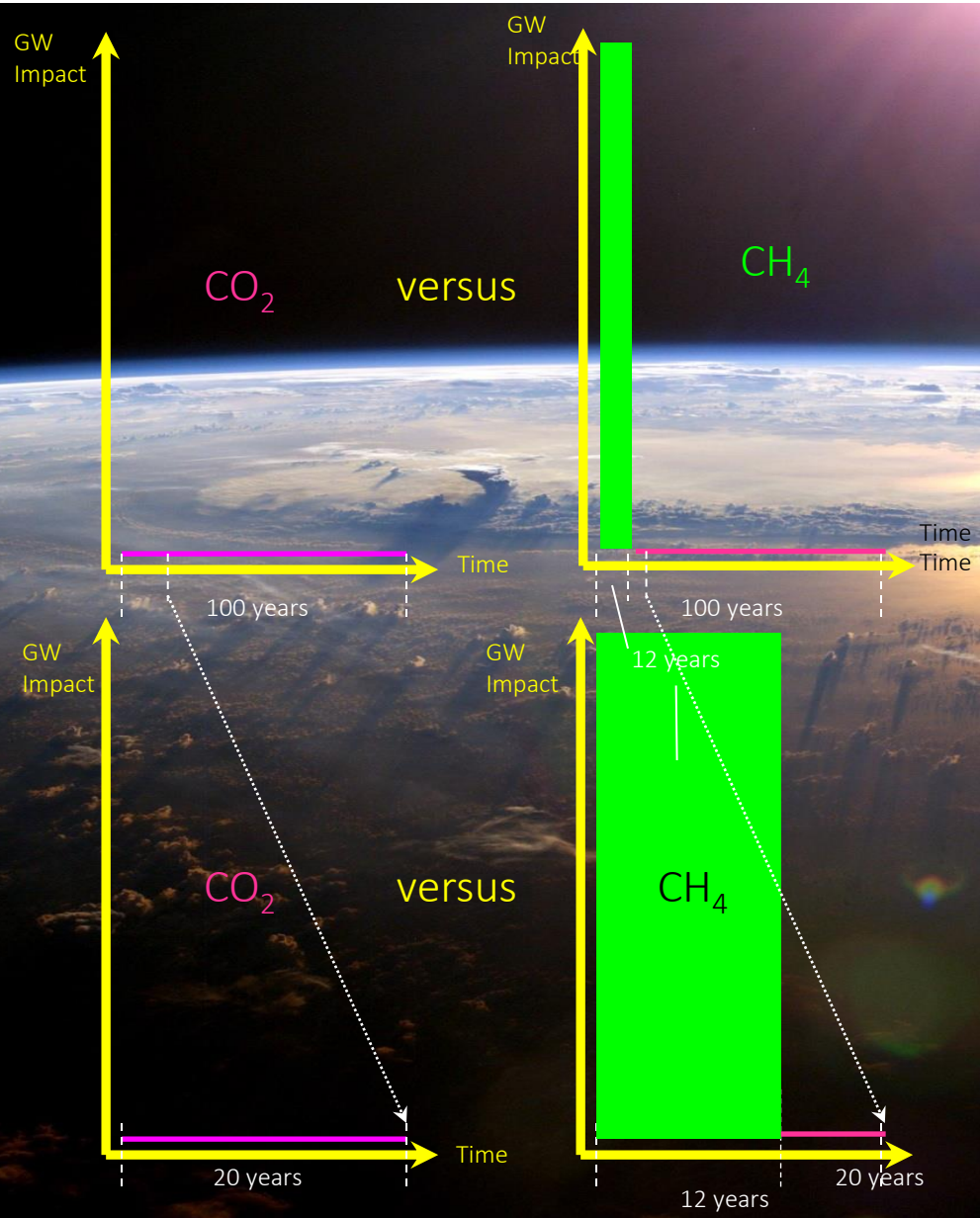


On 100 year basis, methane has vs CO_2: 30 times the impact on global warming.

IPCC AR# = Assessment Report # (Year)	GWP 100 years
AR2 (1995)	21
AR3 (2001)	23
AR4 (2007)	25
AR5 (2014)	34*
AR6 (2021)	30*

* Feedback effects included

Green House Gases CO_2 vs methane (CH_4)



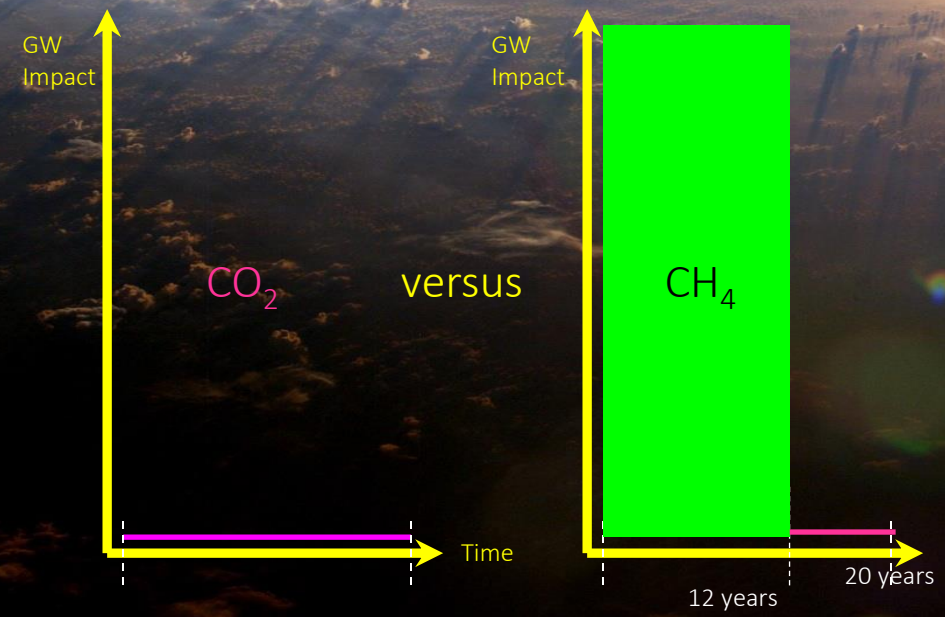
On 20 year basis, methane has vs CO_2: 82 times the impact on global warming!

IPCC AR# = Assessment Report # (Year)	GWP 100 years	GWP 20 years
AR2 (1995)	21	56
AR3 (2001)	23	62
AR4 (2007)	25	72
AR5 (2014)	34*	86*
AR6 (2021)	30*	82*

* Feedback effects included

Green House Gases CO_2 vs methane (CH_4)

CONCLUSION:
On a short-term basis methane has an immediate and massive impact on global warming.



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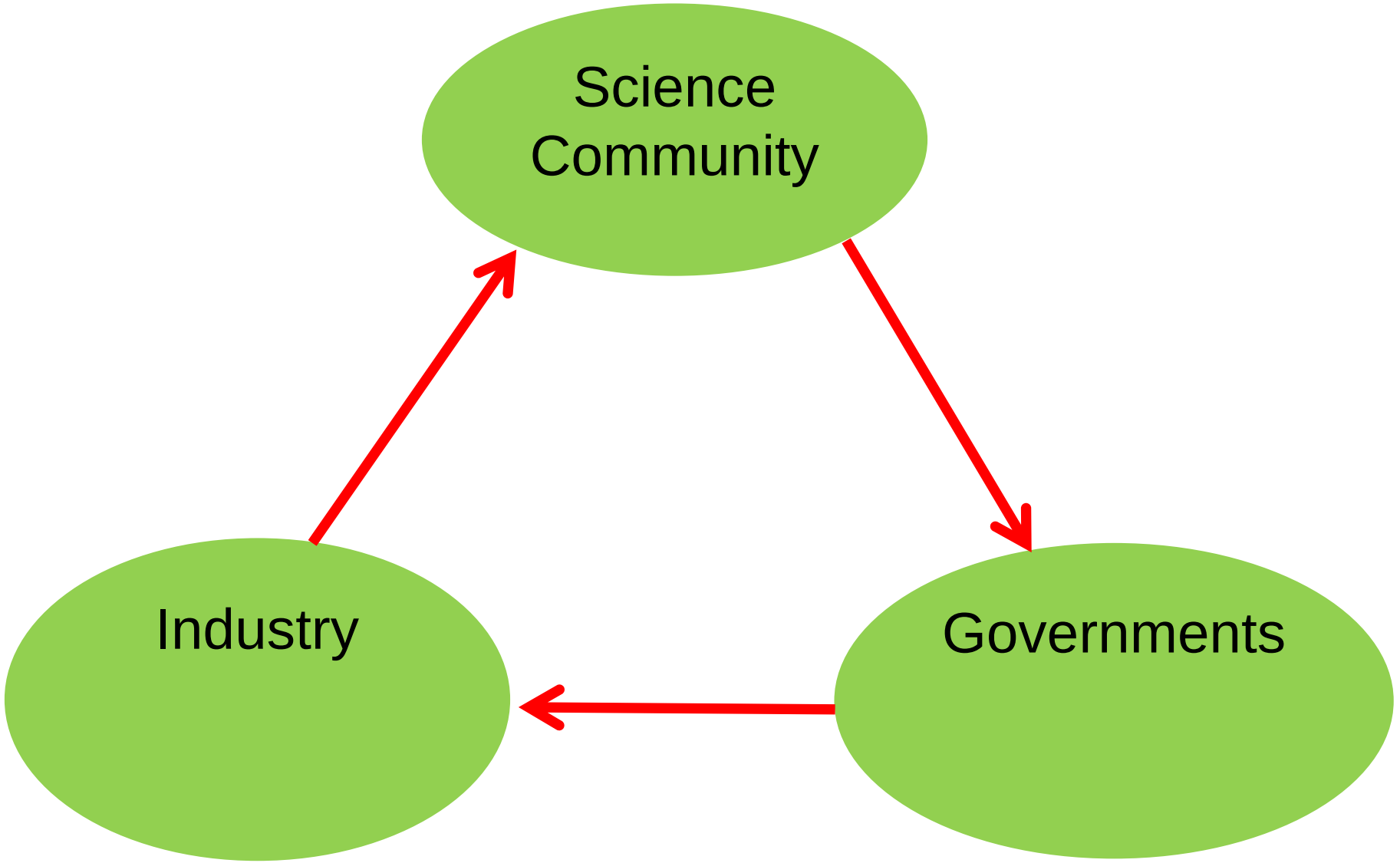
A. Communicating the **Opportunity** of Methane.

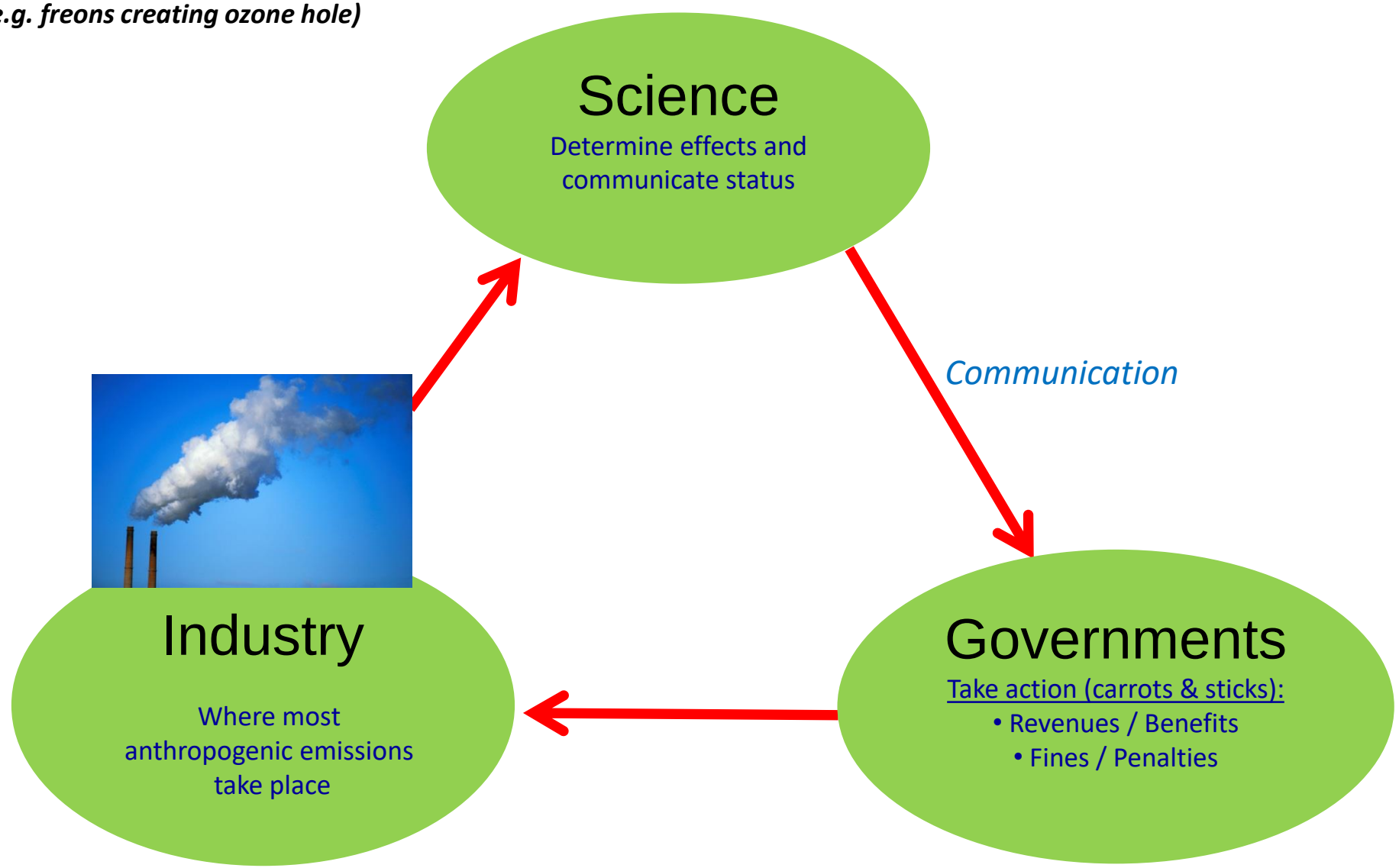
B. Can **Non-technical** Guides be a Key to Climate Action?

Model on interaction Industry-Science-Government



Dealing with ***emission issues*** in general

(e.g. freons creating ozone hole)



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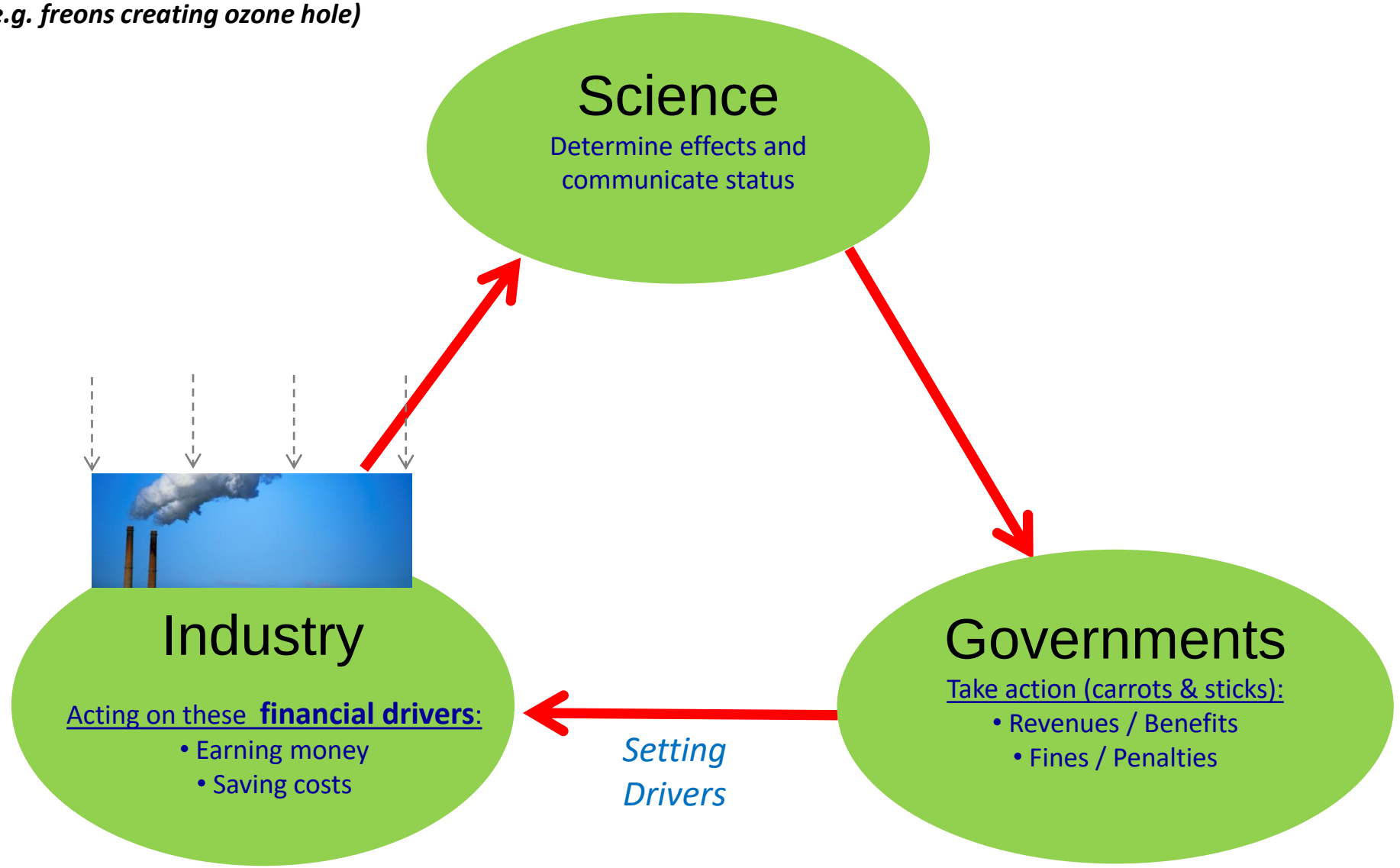

Dealing with the ***climate change*** issue (CO_2 and methane)

Science

Determine effects and communicate status

How it should be

Industry

Where most anthropogenic GHG emissions take place

Governments

Dealing with the ***climate change*** issue (CO_2 and methane)

Science

Determine effects and communicate status

Communication

How it should be

Industry

Acting on these **financial drivers**:

- Earning money
- Saving costs

Setting Drivers

Governments

Take action (carrots & sticks):

- Carbon Credits
- Carbon Taxes

Dealing with the ***climate change*** issue (CO_2 and methane)

Science

Determine effects and communicate status

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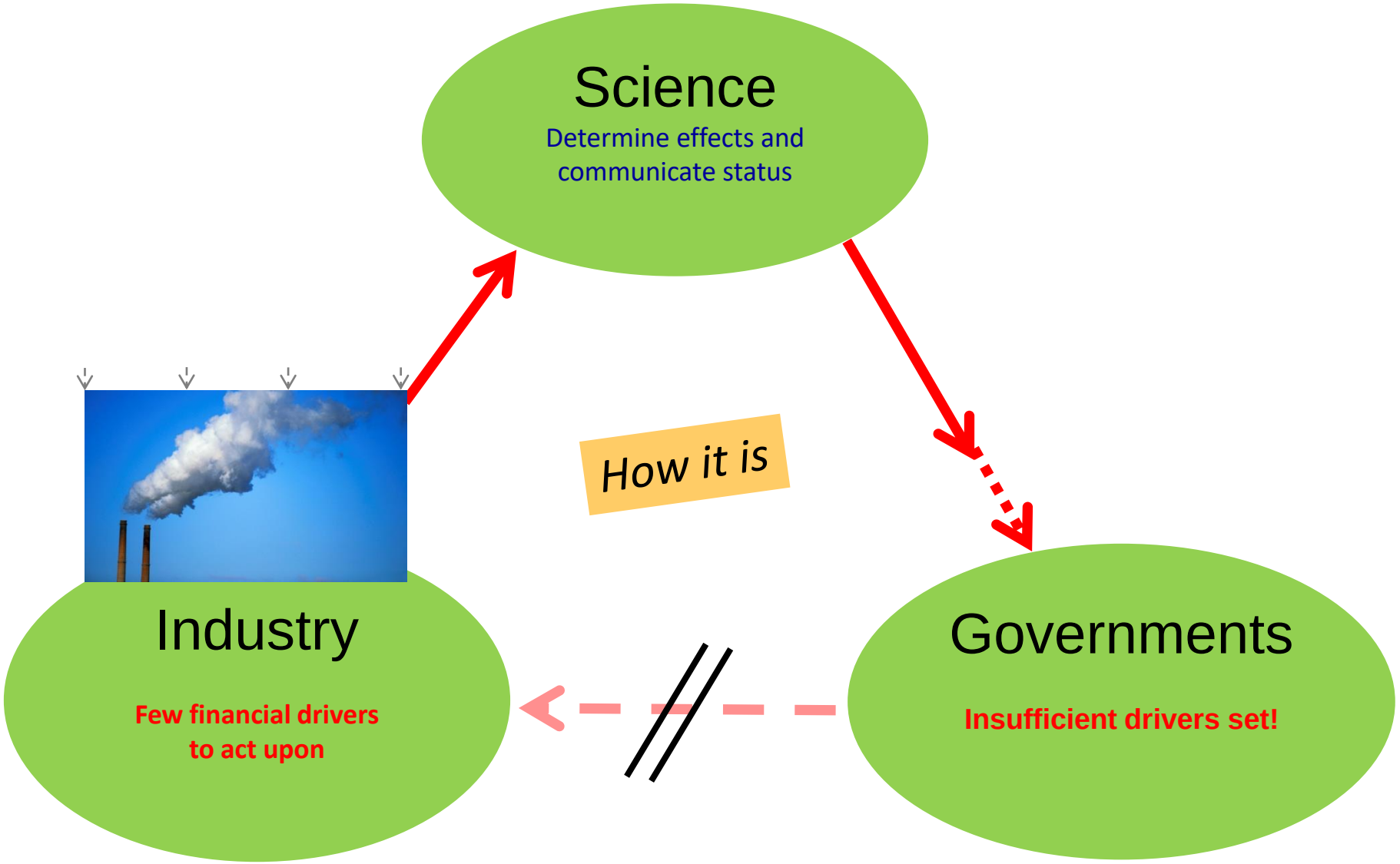

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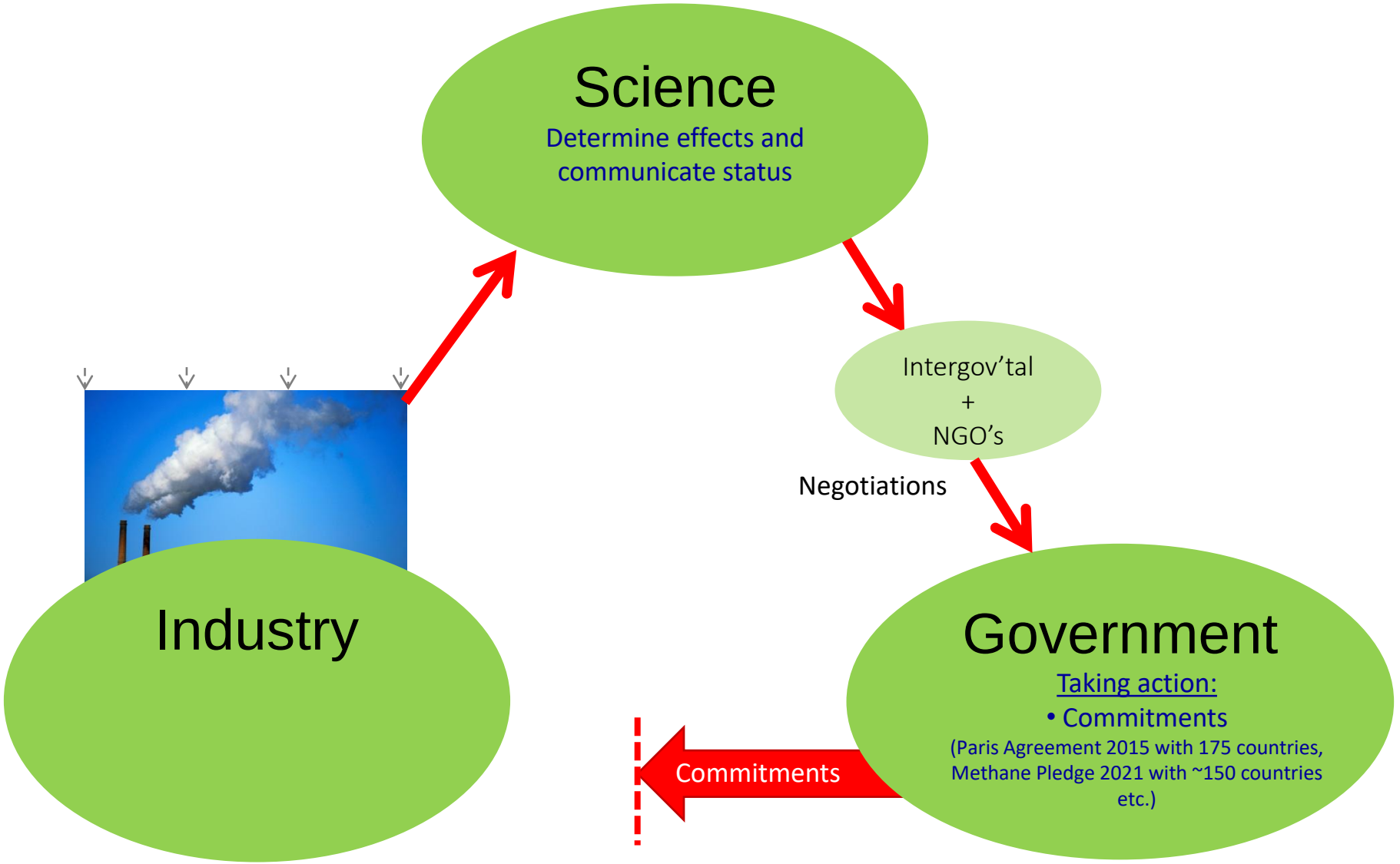


Dealing with the ***climate change*** issue (CO_2 and methane)

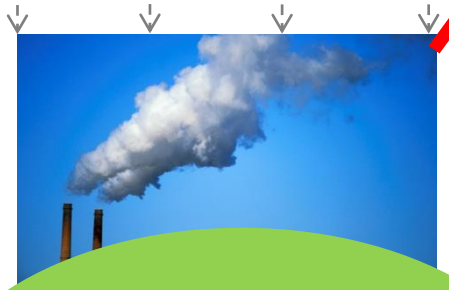
Science

Determine effects and communicate status

Intergov'tal + NGO's

Negotiations

Billions of USD in Investment Capital; *"Hard to find projects"*



Industry

<u>Acting on these **financial drivers**:</u>

- Earning money
- Saving costs

Commitments

Government

<u>Taking action:</u>

- Commitments
- Carbon Credits (carrots)
- Carbon Taxes (sticks) ?

Dealing with the ***climate change*** issue (CO_2 and methane)

Science

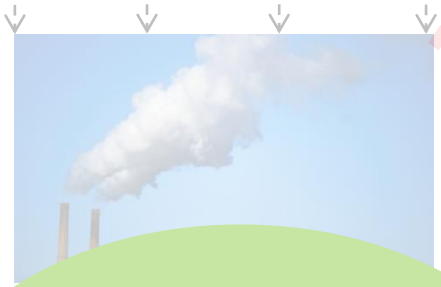
IS THIS A KEY TO TRIGGER MORE ACTION?

Intergov'tal + NGO's

Negotiations

Emissions info

Billions of USD in Investment Capital; *"Hard to find projects"*



Industry

Acting on **financial drivers**:
- Earning money
- Saving costs

Commitments

Government

Taking action:
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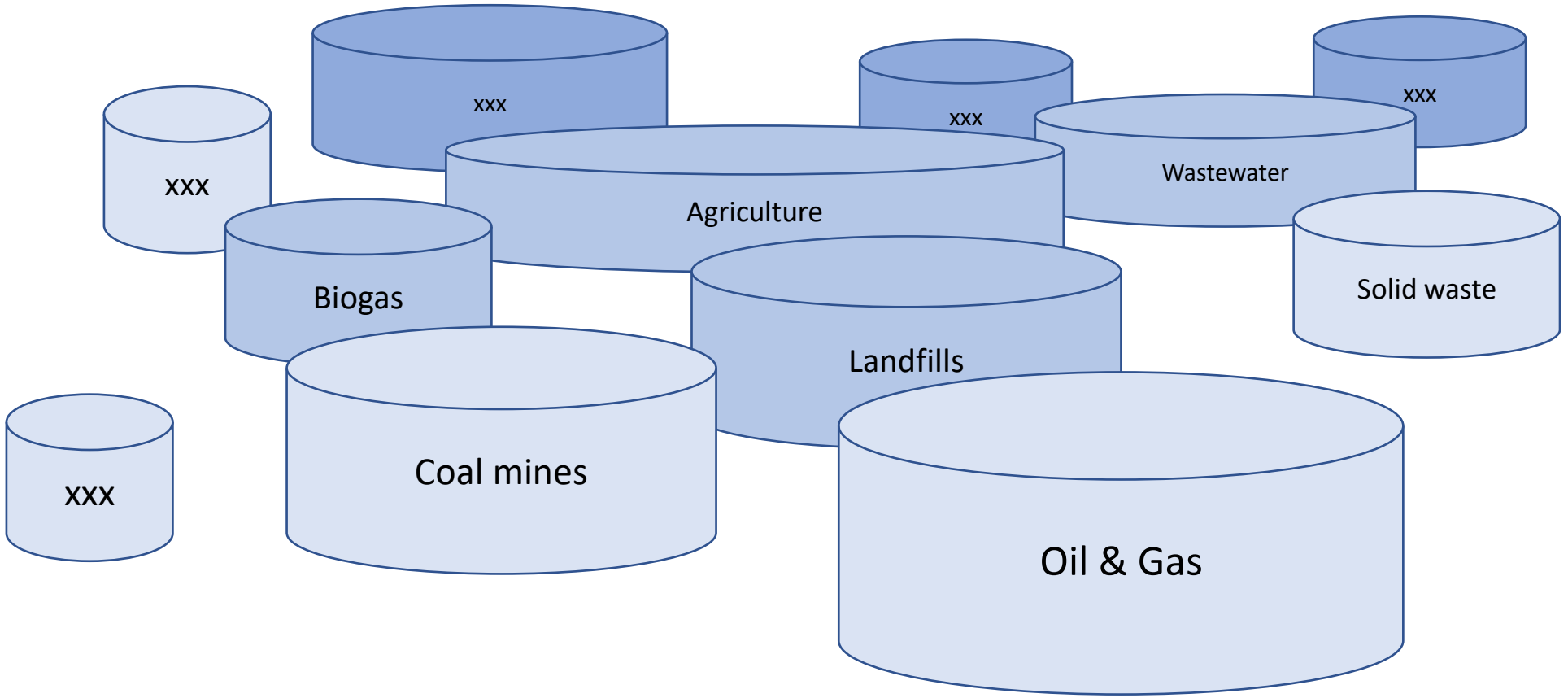
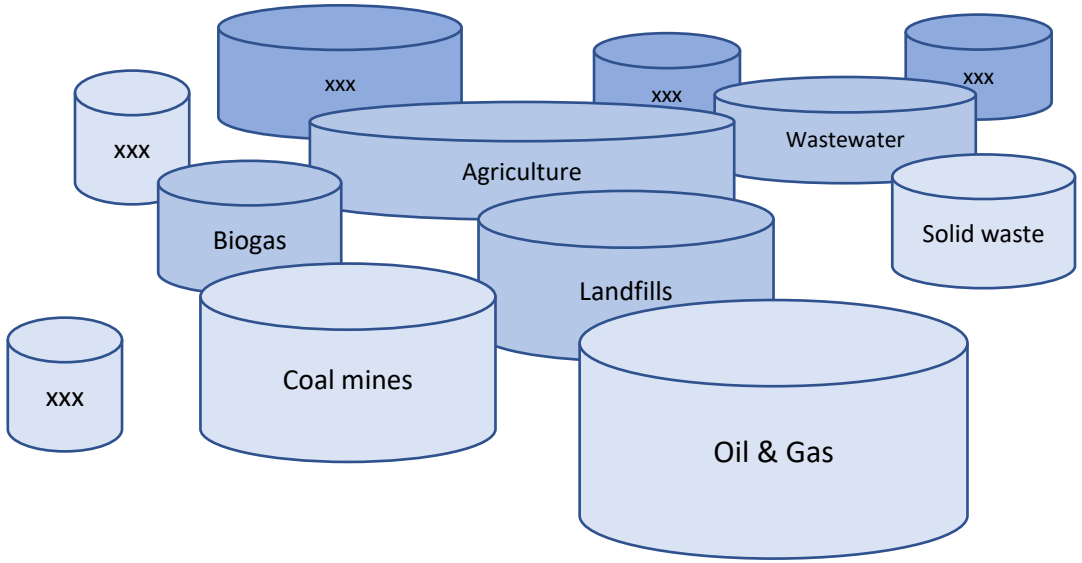
- Carbon Credits (carrots)
- Carbon Taxes (sticks) ?

Dealing with the ***climate change*** issue – focus on methane

Methane emissions from different sectors ..



Dealing with the ***climate change*** issue – <u>focus on methane</u>



<u>.. have for 2 decades been focused on by:</u>

- GMI, Global Methane Initiative
- Groups of Experts of Sustainable Energy Division, UNECE (UN in Geneva).

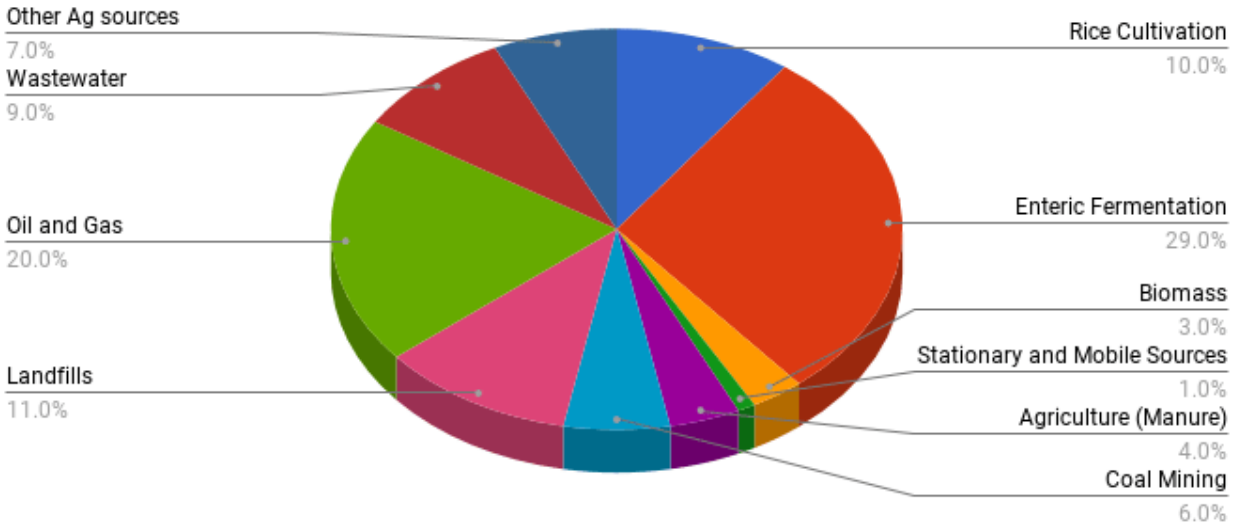
<u>.. creating a ”gold mine” of info on:</u>

- Inventories of emission sources.
- Technology demonstrations.

<u>Does it come across as a ”jungle” of info,</u> (difficult to access for policy makers, politicians, investors, project developers, media etc) **– <u>being too technical?</u>**

Global Anthropogenic Methane Emissions by source (2010)

- Importance of Size of Source



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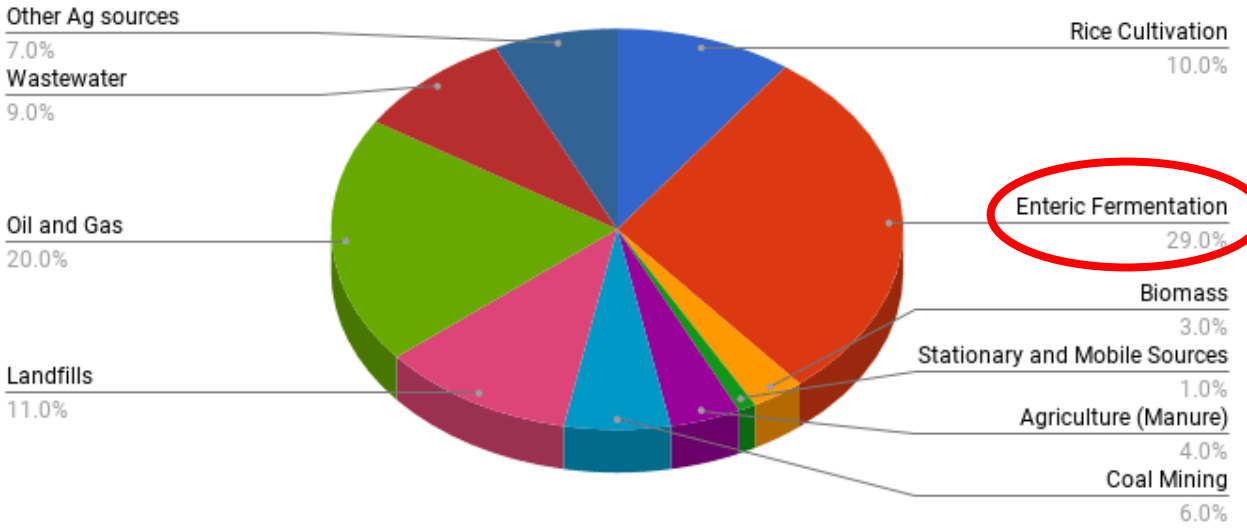
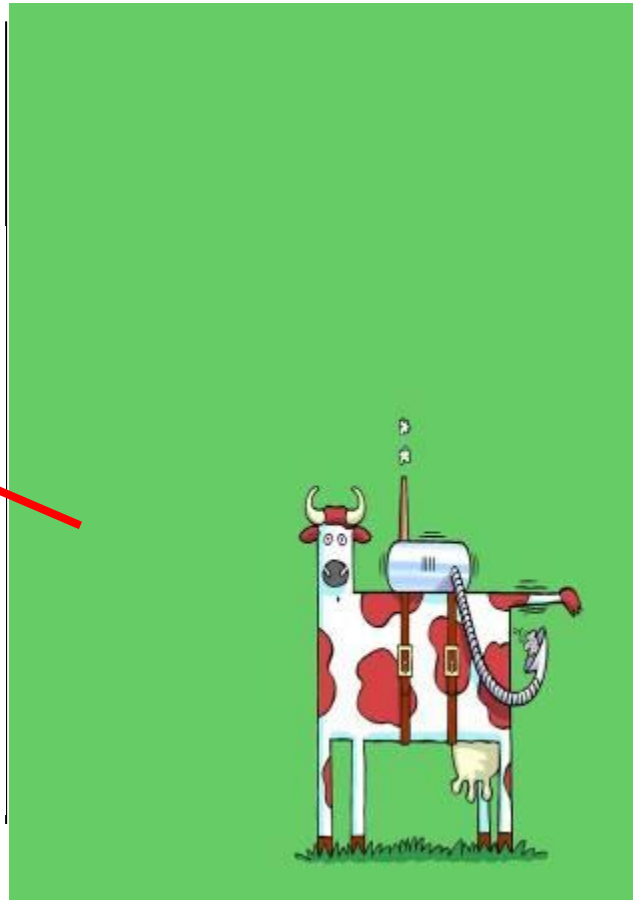
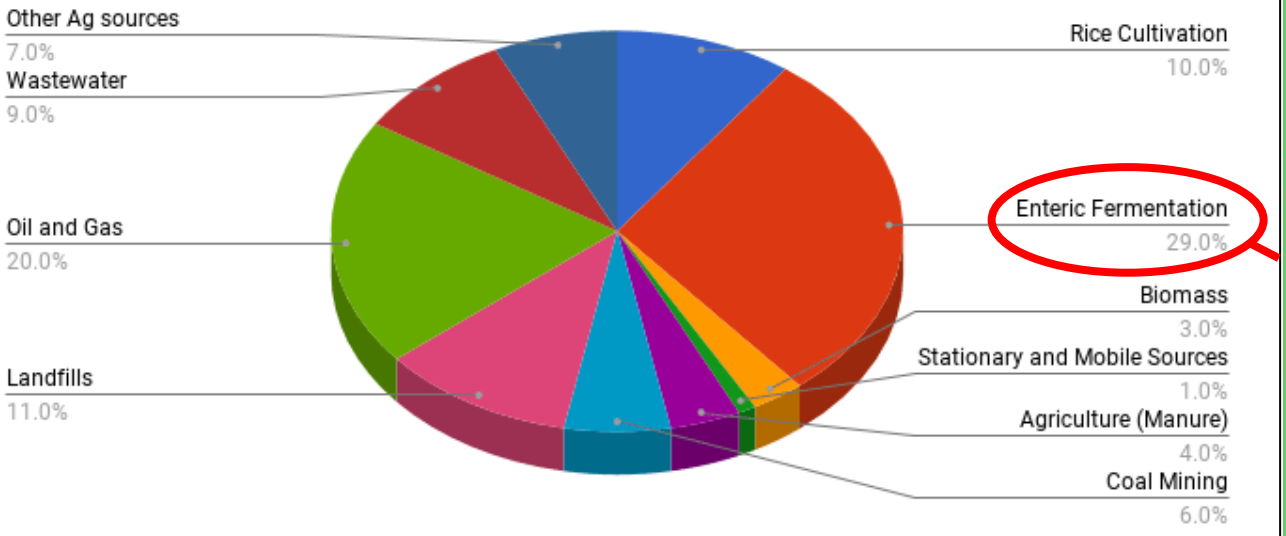


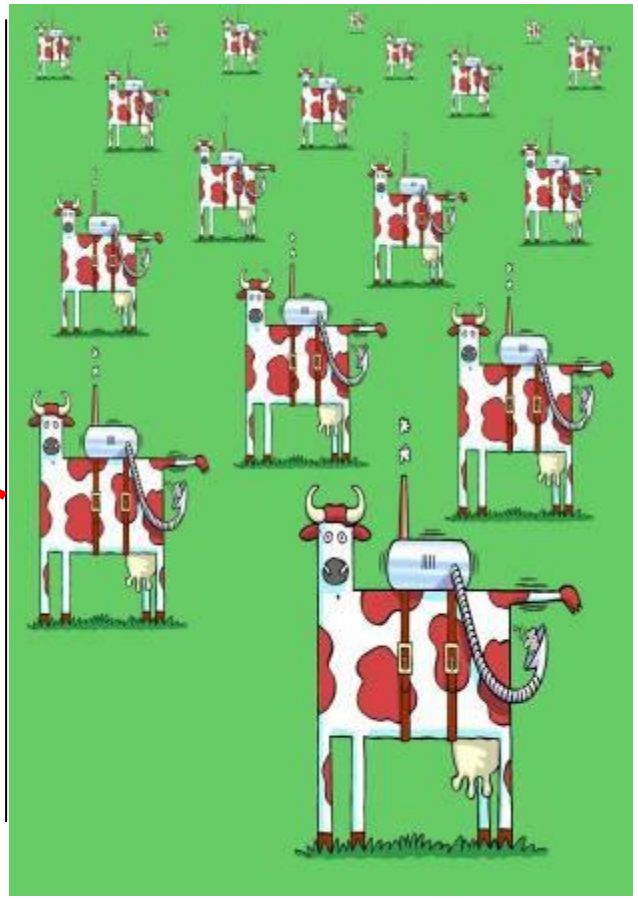


One single cow emits only 50 – 100 kgs of methane per year.

Global Anthropogenic Methane Emissions by source (2010)

- Importance of Size of Source





But they are many!

Global Anthropogenic Methane Emissions by source (2010)

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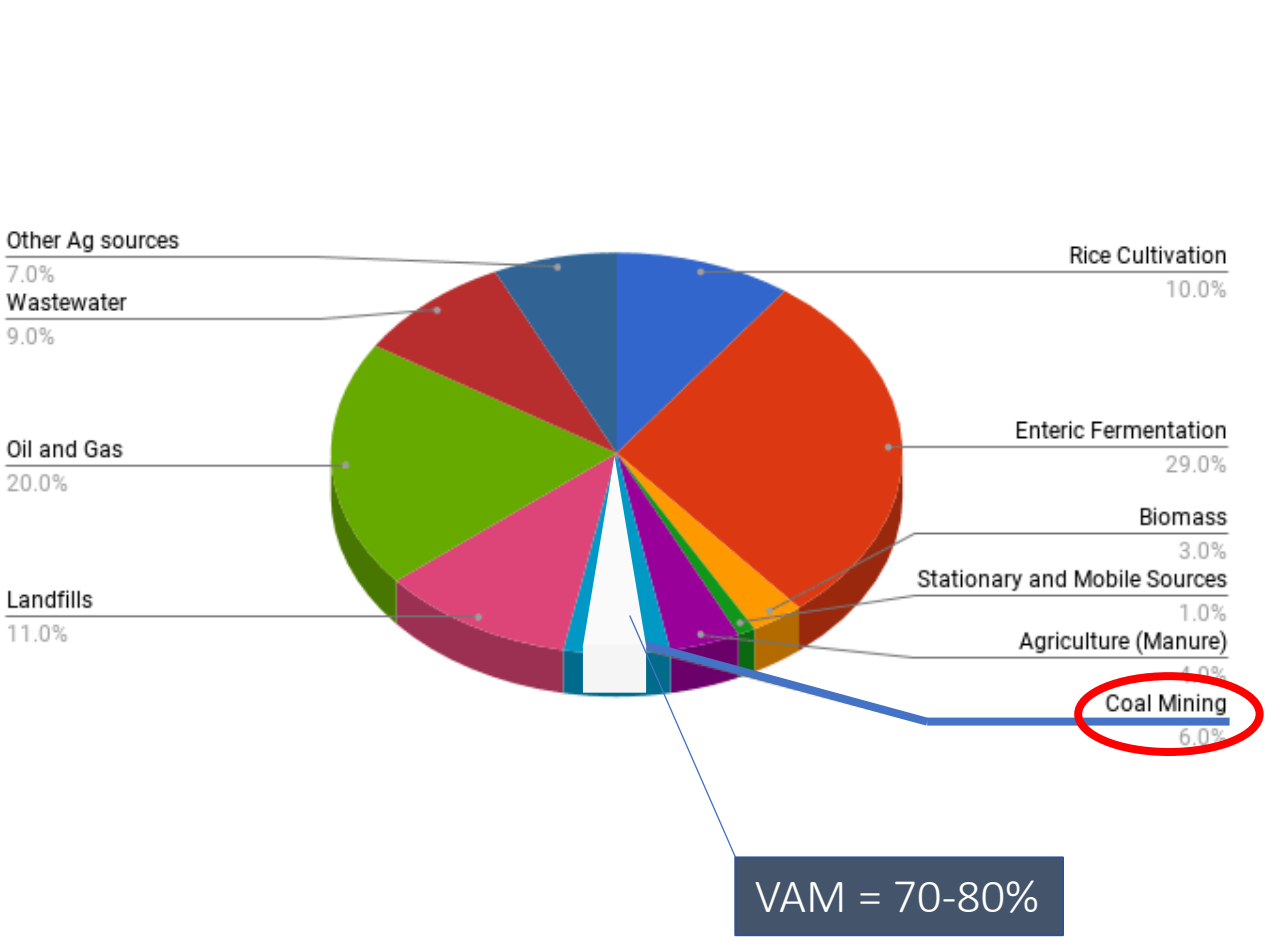
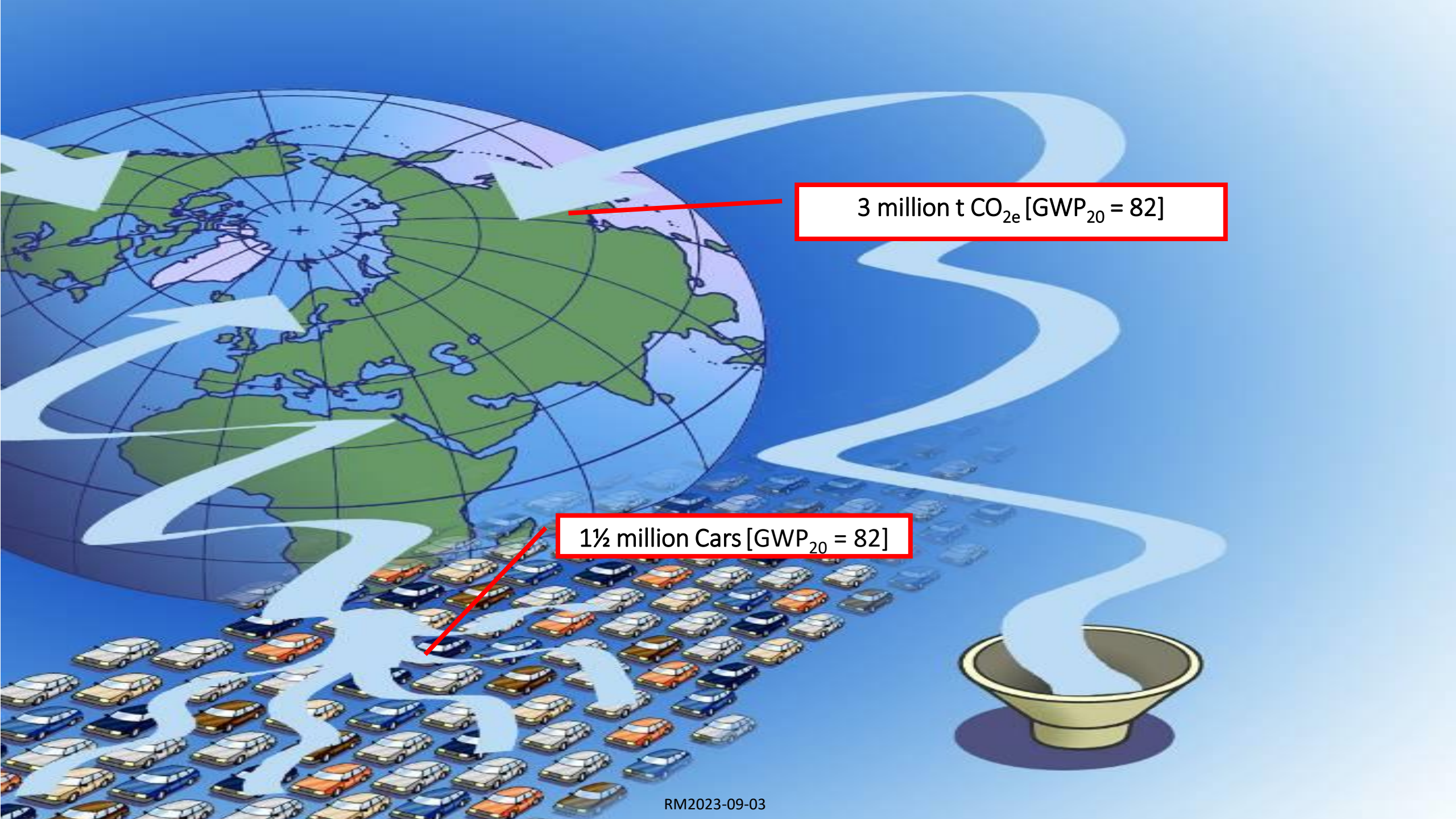


Coal Mine VAM = singular large source of methane emission

1 million t CO_{2e} [GWP_{100} = 25-30]

3 million t CO_{2e} [GWP_{20} = 82]

Coal mine VAM
1 million m3/h, 0.8%
= 50,000 tons
methane/year


3 million t CO_{2e} [GWP_{20} = 82]
1½ million Cars [GWP_{20} = 82]

COAL MINE METHANE

- It will take decades to phase out Coal Mining.
- Metallurgical Coal will remain even longer.

- Most (70 – 80%) coal mine methane ends up as VAM, Ventilation Air Methane.

- Character: Enormous volume of extremely dilute emission.
- Issue: To mitigate it, the full volume must be processed.

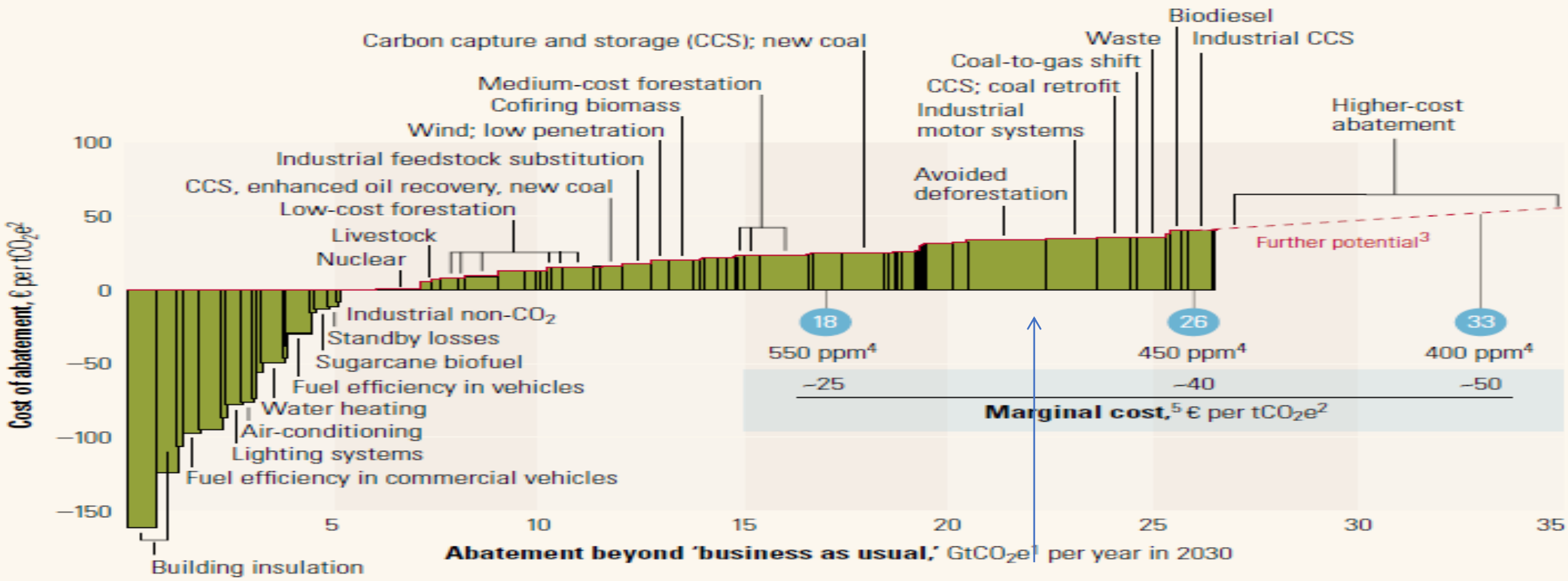
- There is proven technology.
  - Major global interest until COP15 in Copenhagen in 2009 failed to extend the Kyoto Protocol.
  - Now we see renewed interest.

- High investment but comparatively low cost ..

McKinsey study of GHG abatement costs

2007

Estimated costs per ton CO2e (over 25 years) to achieve increasing reductions (GtCO2e) and resulting levels of atmospheric CO2.



• Example; To achieve atmospheric CO_2 level of 450 ppm, a total of 26 $GtCO_{2e}$ needs to be abated, including all of the actions noted in the graph – i.e. up to and including Industrial CCS.

• The items with negative costs are profitable in their own merits (energy efficiency over 25 years).

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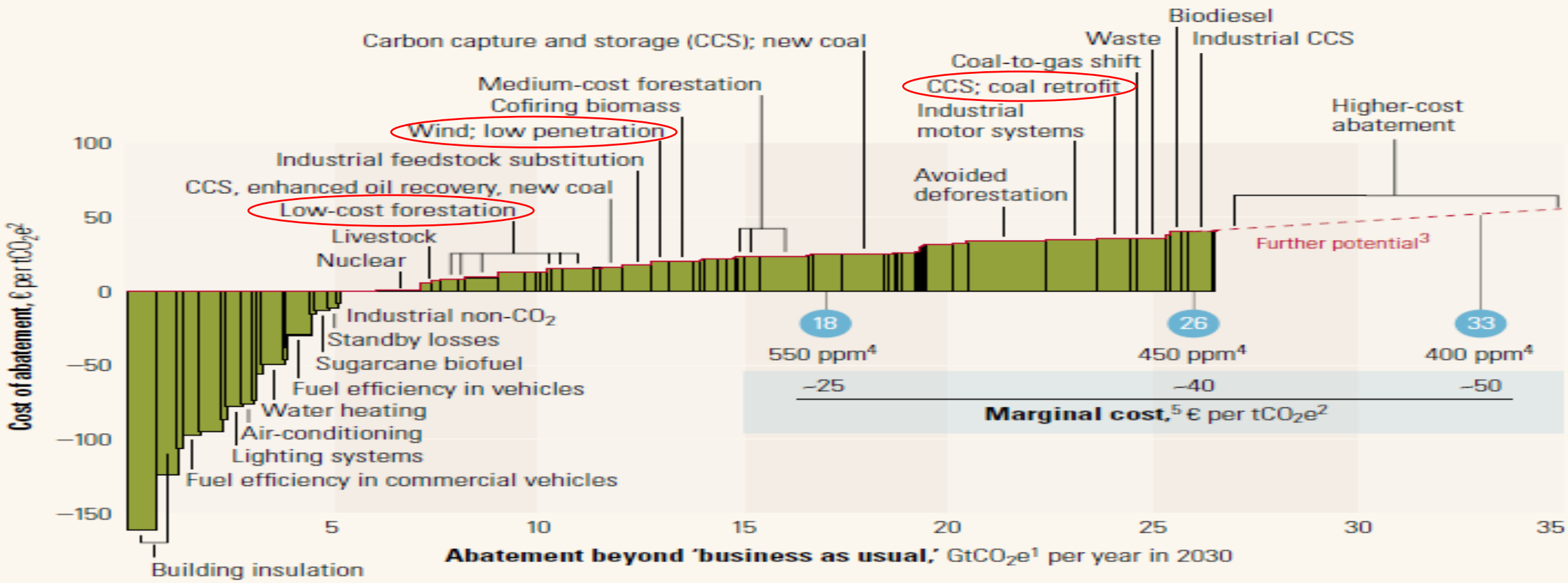

EXAMPLES:

- Low cost forestation: EUR 10 – 15 /t CO_{2e}
- Low penetration Wind Power: EUR ~20 /t CO_{2e}
- CCS (Carbon Capture & Storage) applied as retrofit on existing coal fired power plants: EUR ~35 /t CO_{2e}

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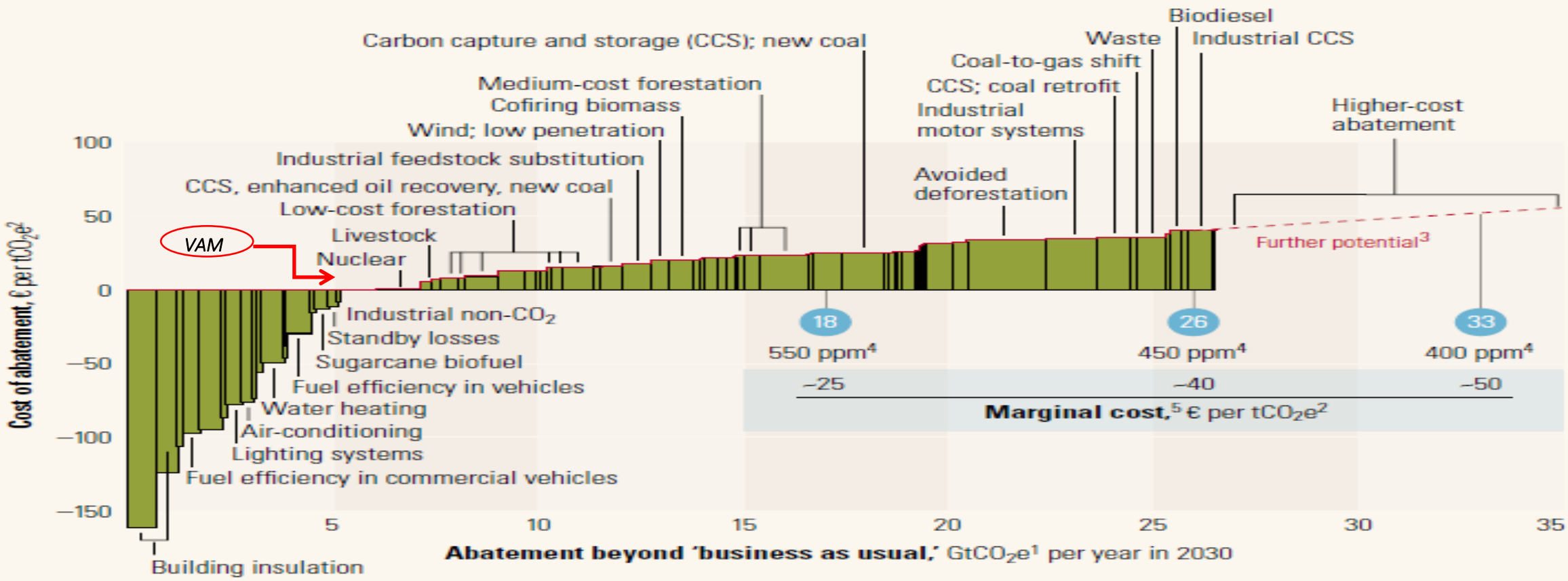

In this comparison, VAM processing would come out with an abatement cost around EUR 4-8 /t CO_{2e}.

CONCLUSION:
VAM processing is a highly cost-efficient way to reduce large volumes of GHG emissions.

UPDATING VAM PROCESSING GUIDE

Non technical document as support for e.g.
Policy Makers, Politicians, Media, Managements, Boards.

CONTENT:

- Processing Technologies: Successful, Failing Issues, Under Development.
- Guide Lines and Tools: Processing Capacity, Footprint, Optimization etc.
- Indications of Economics: CAPEX, Payback relating to penalities/Carbon Credits etc.
- Safety aspects.
- Barriers/difficulties of technology options and potential ways to overcome them.
- Case Studies.
- ..

1st draft due by end of year 2023 with document completed in 1Q 2024.