

UPDATING A VAM PROCESSING GUIDE

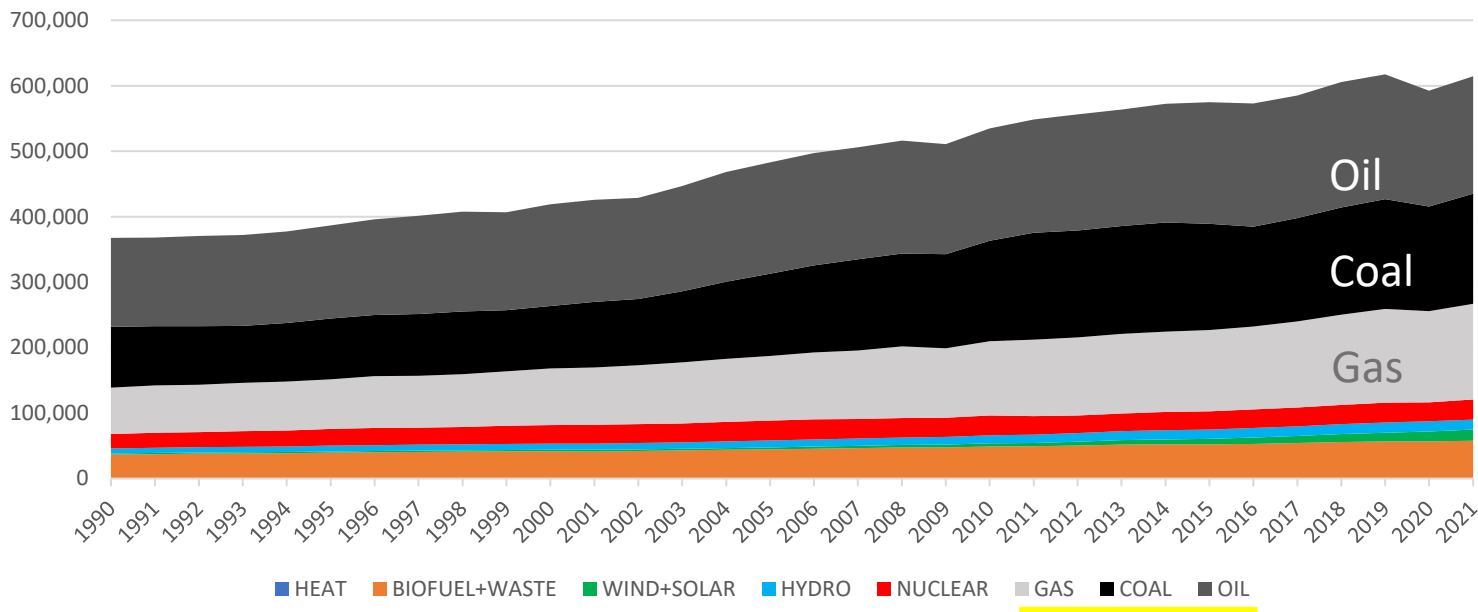
- Can a non-technical guide help bridge the time gap of reducing CO₂ emissions?

Richard Mattus
*UNECE Group of Experts on
Coal Mine Methane and Just Transition*

Global Energy Production

Number of 1000 TJ By Type of Energy 1990 - 2020

Data from IEA World Energy Balances

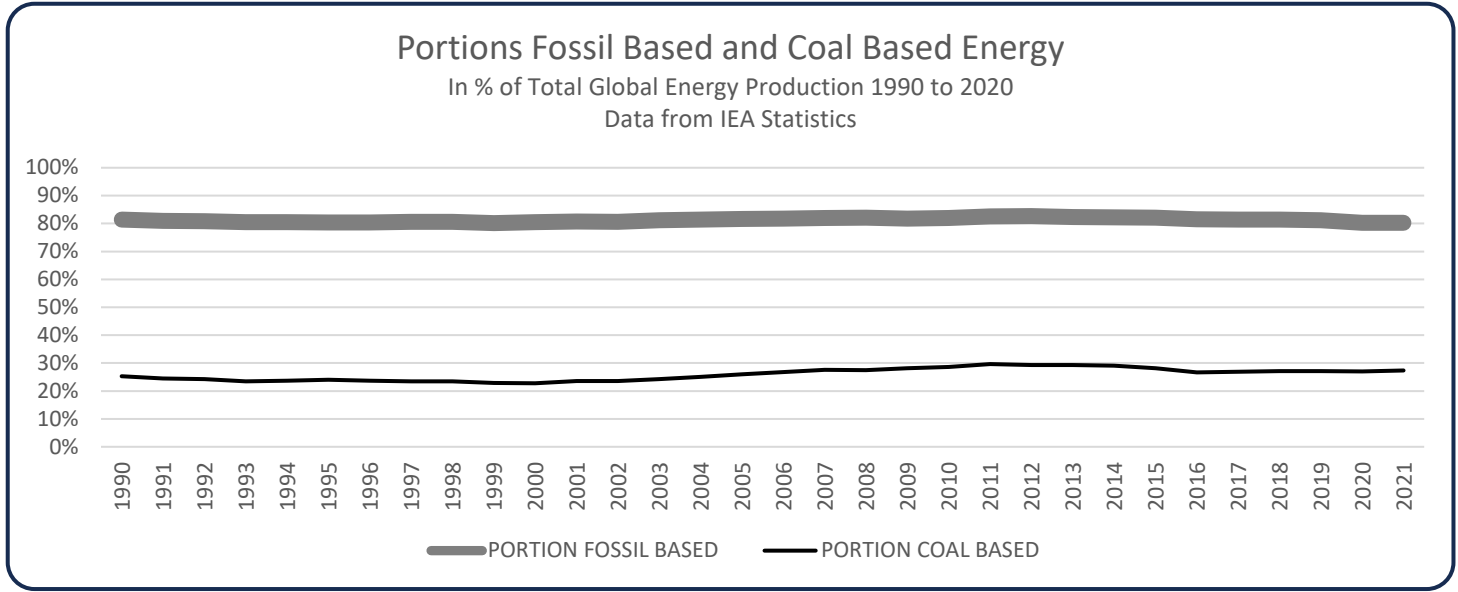


~80% Fossil Based

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

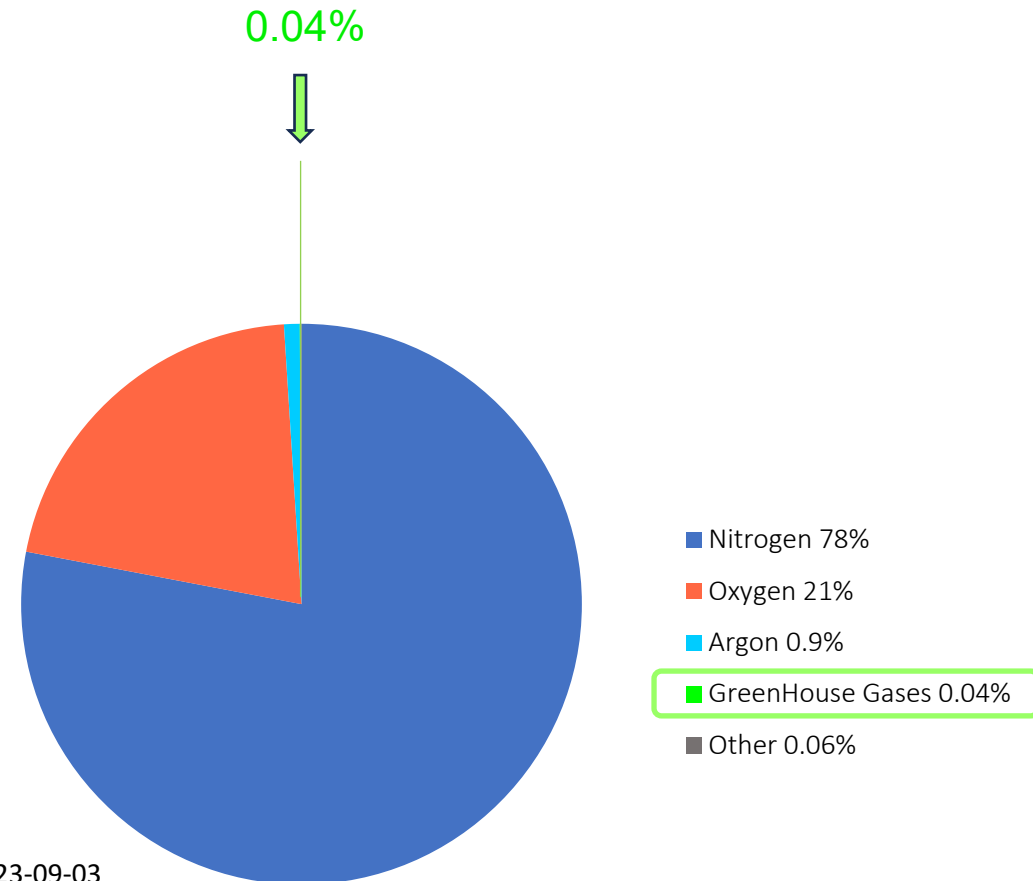
It will take decades to phase out Fossil Based Energy.

Source of Data:
IEA World Energy Balances

- A. Communicating the **Opportunity** of Methane.
- B. Can **Non-technical** Guides be a Key?

A. Communicating the Opportunity of Methane.

Composition of the atmosphere



A thin bubble of atmosphere



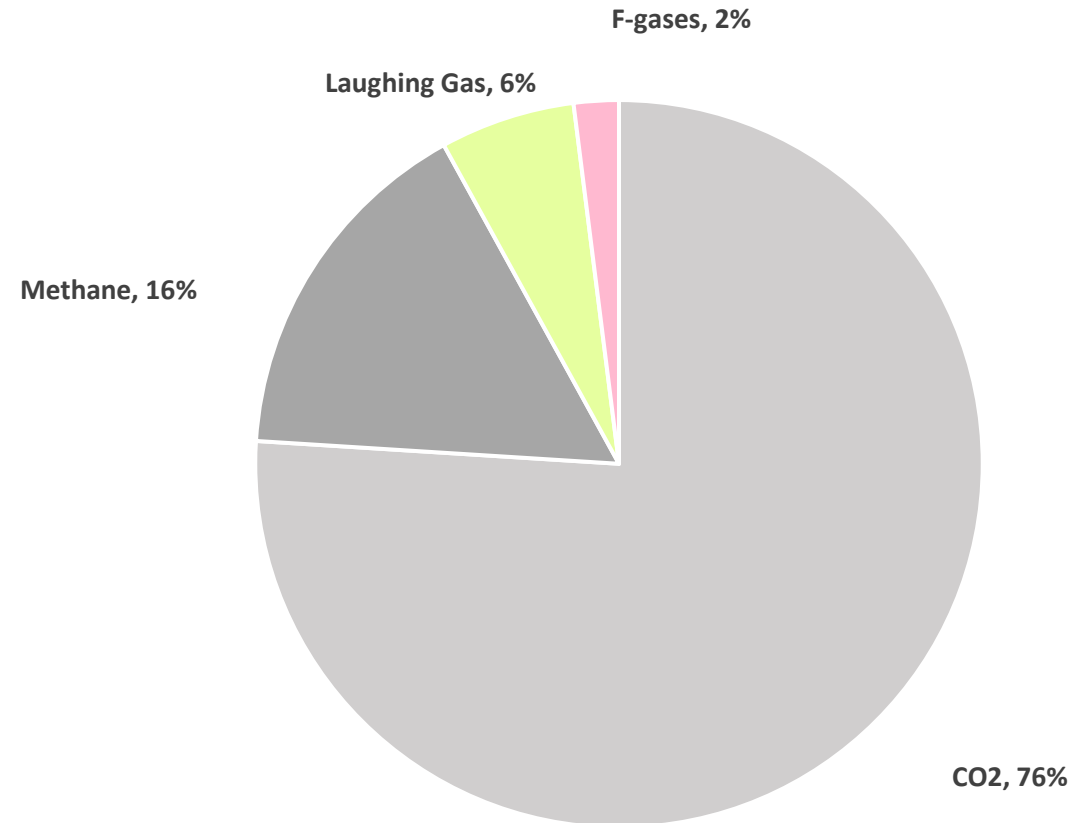
Thanks to the greenhouse gases,
the average temperature is $+15^{\circ}\text{C}$



Instead of -15°C

Atmospheric GHG-increases causing Global Warming

- by indicative order of importance*



Composition of the atmosphere

99.9% of the atmosphere:

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

Methane = 0.0002%

CO₂ = 0.04%

Composition of the atmosphere

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Methane = 0.0002%

+100% since 1880



CO₂ = 0.04%

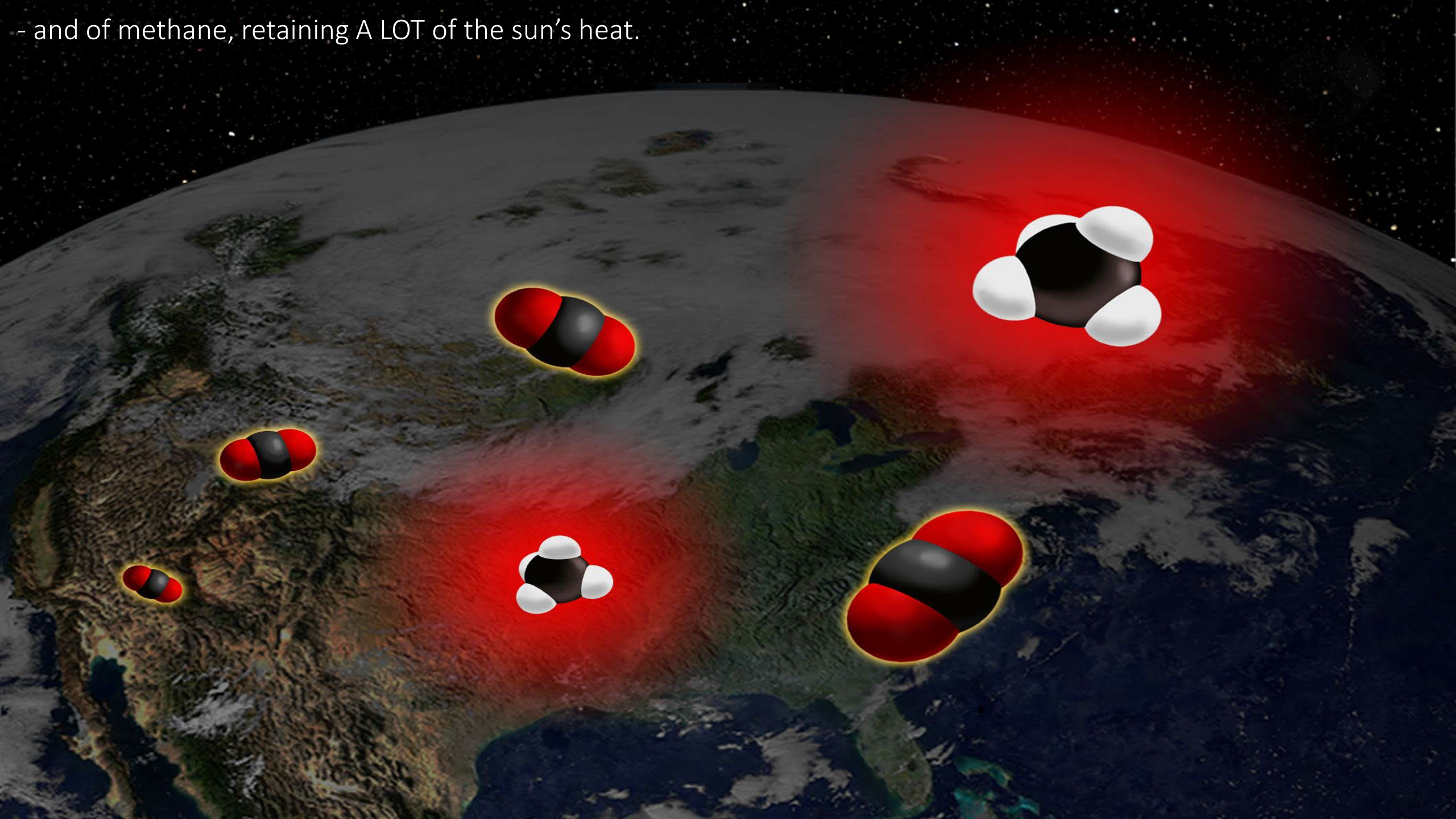
+50% since 1880



Increasing volume of atmospheric CO₂ molecules, retaining some of the sun's heating energy (infrared radiation).



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



Green House Gases CO₂ vs methane (CH₄)

Effect of one year of emissions

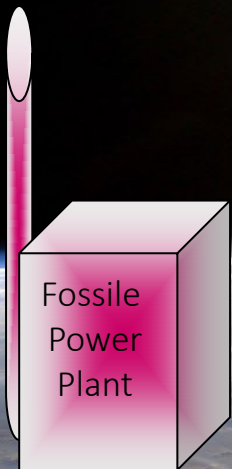


	Lifetime in atmosphere
CO ₂	>>10 000 years
CH ₄	12 years

Green House Gases CO₂ vs methane (CH₄)

Effect of long-time emissions

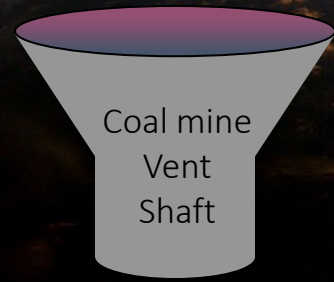
CO₂



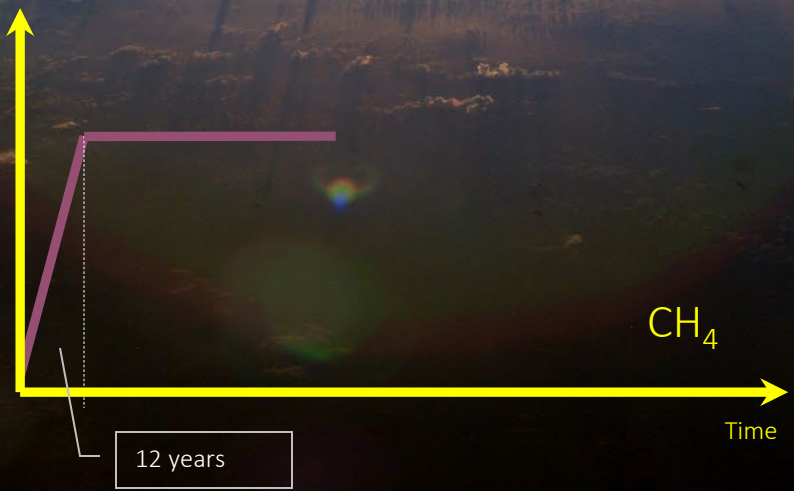
GW Impact



CH₄



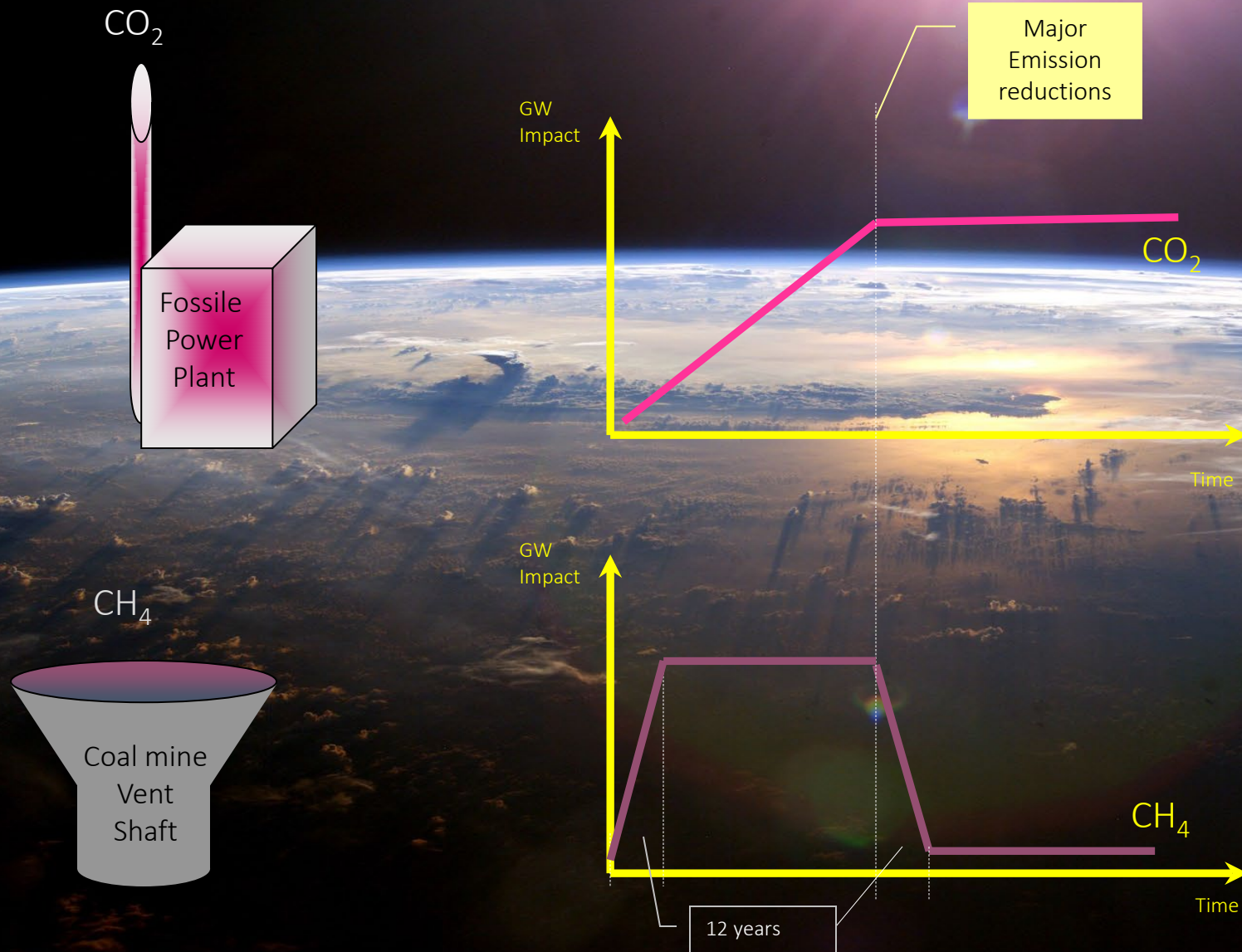
GW Impact



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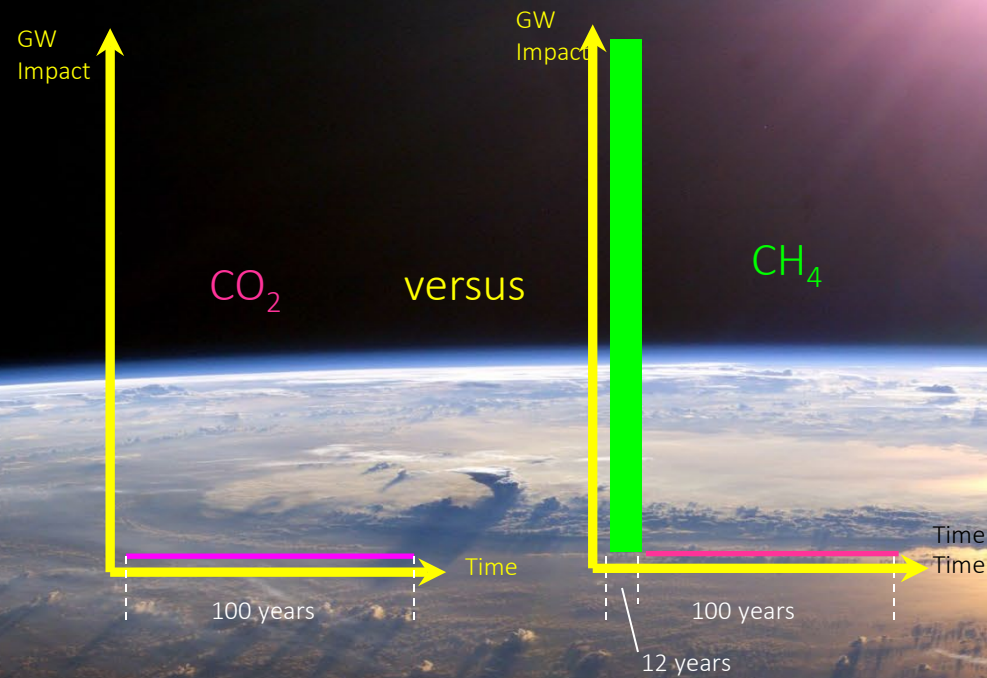
Green House Gases CO₂ vs methane (CH₄)

Effect of emission reductions



Methane reductions have impact immediately
- Full impact in only 12 years!

Green House Gases CO₂ vs methane (CH₄)

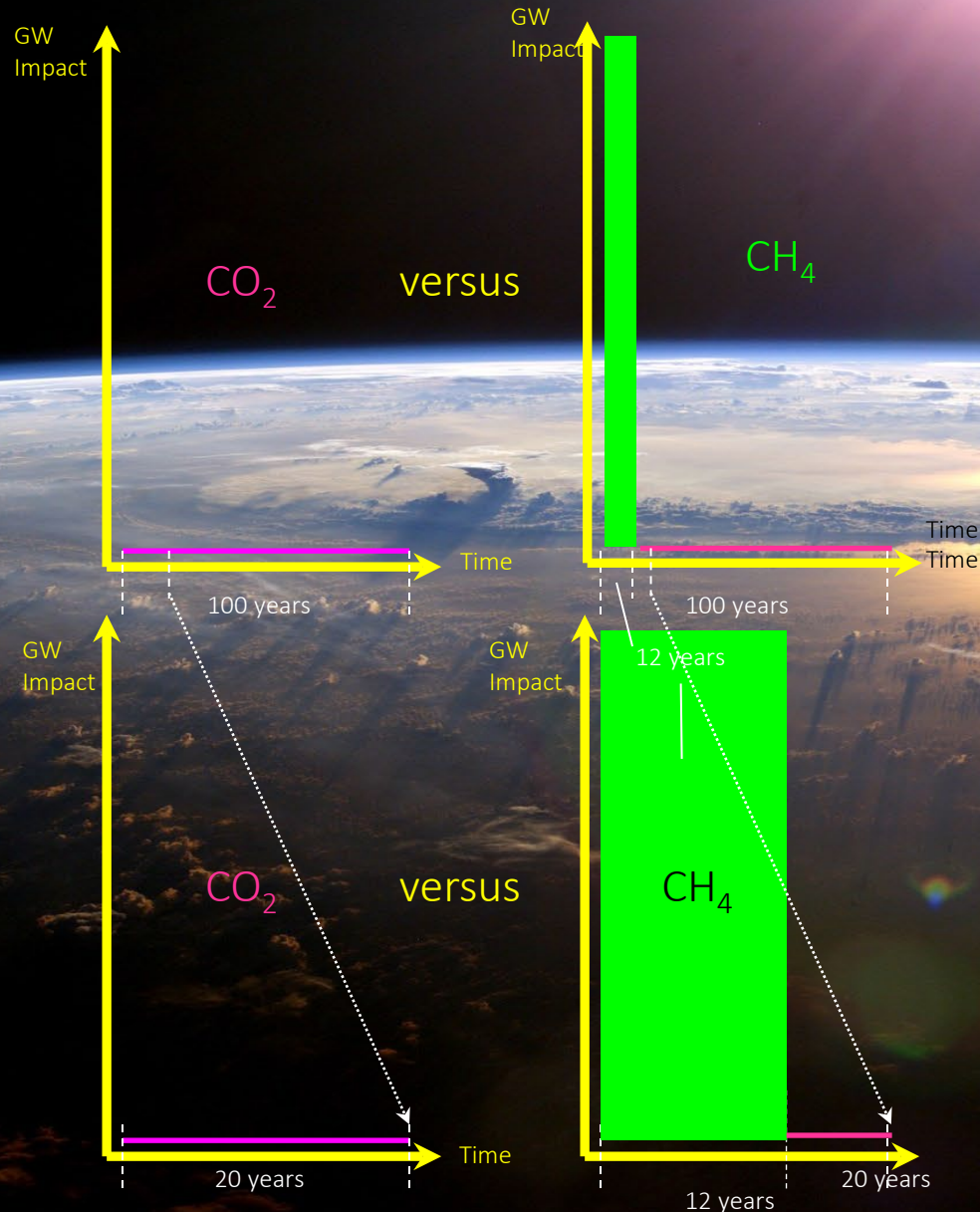


On **100 year** basis, methane has vs CO₂: 30 times the impact on global warming.

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 CO₂ vs methane (CH₄)



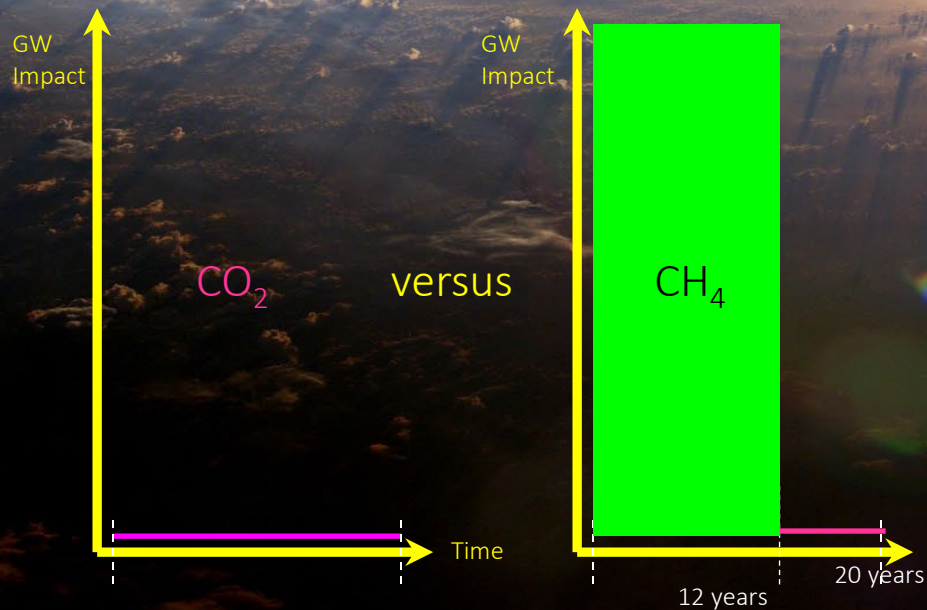
On **20 year** basis, methane has vs CO₂: 82 times the impact on global warming!

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 CO₂ vs methane (CH₄)

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



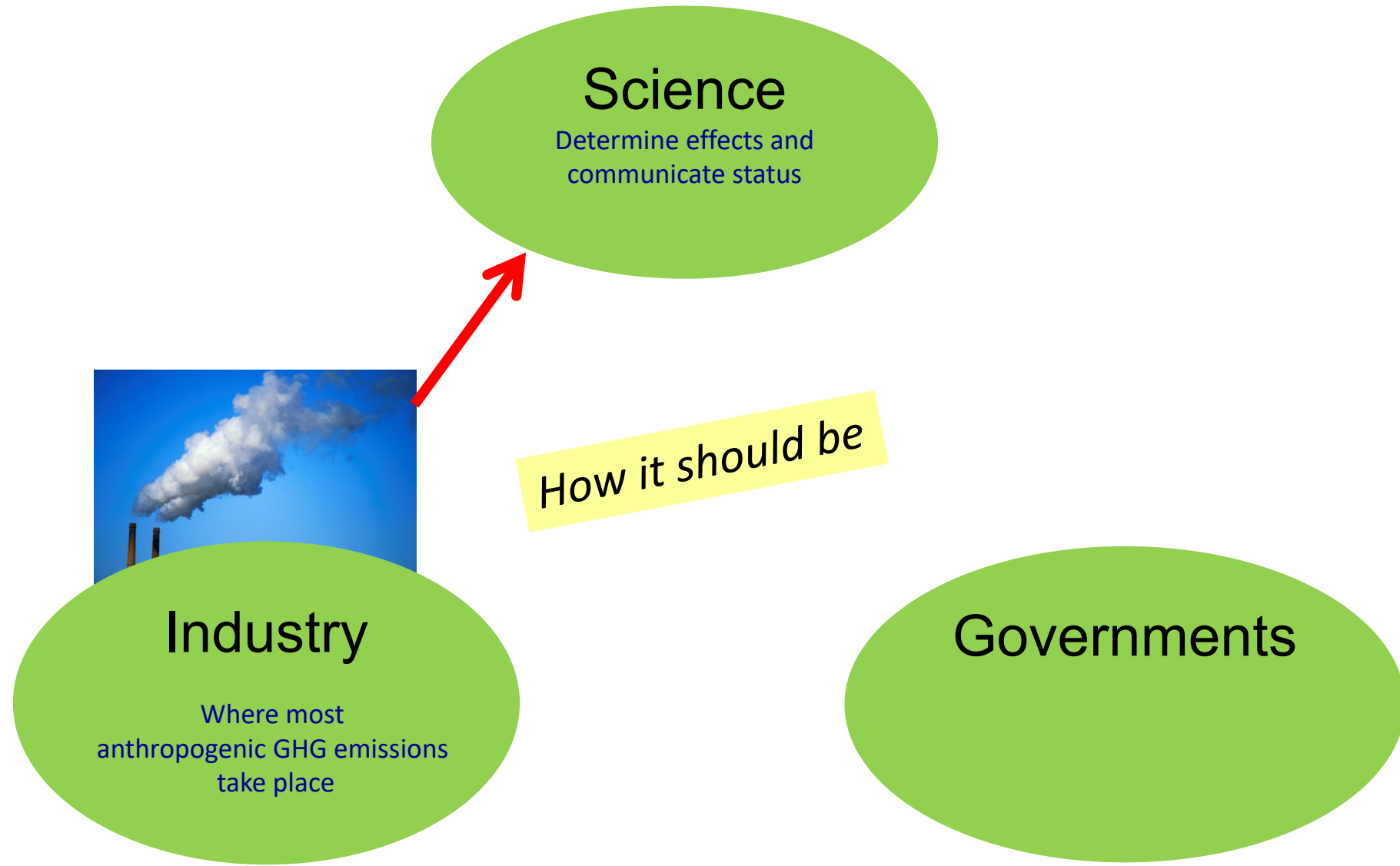
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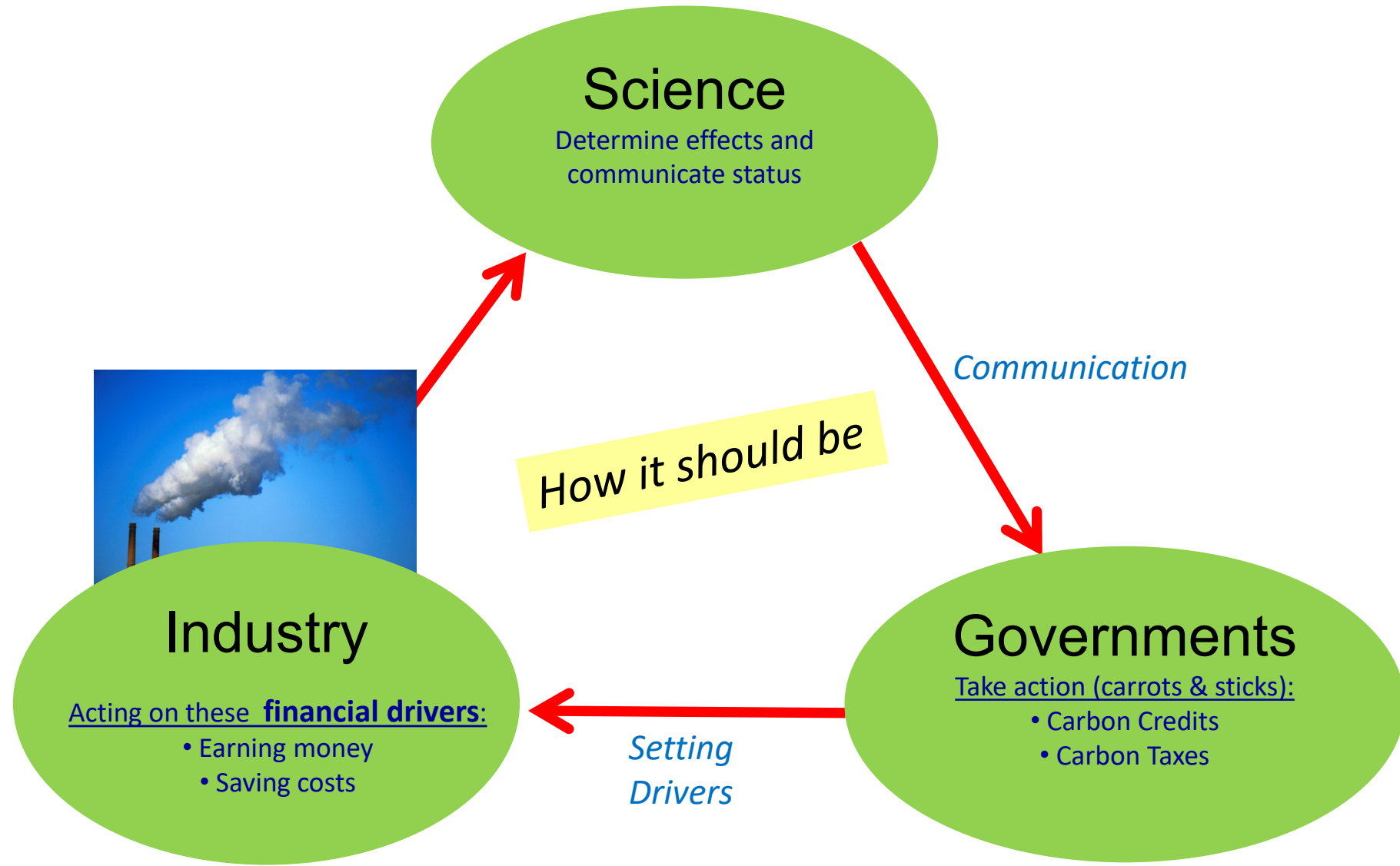
A. Communicating the Opportunity of Methane.

B. Can Non-technical Guides be a Key?

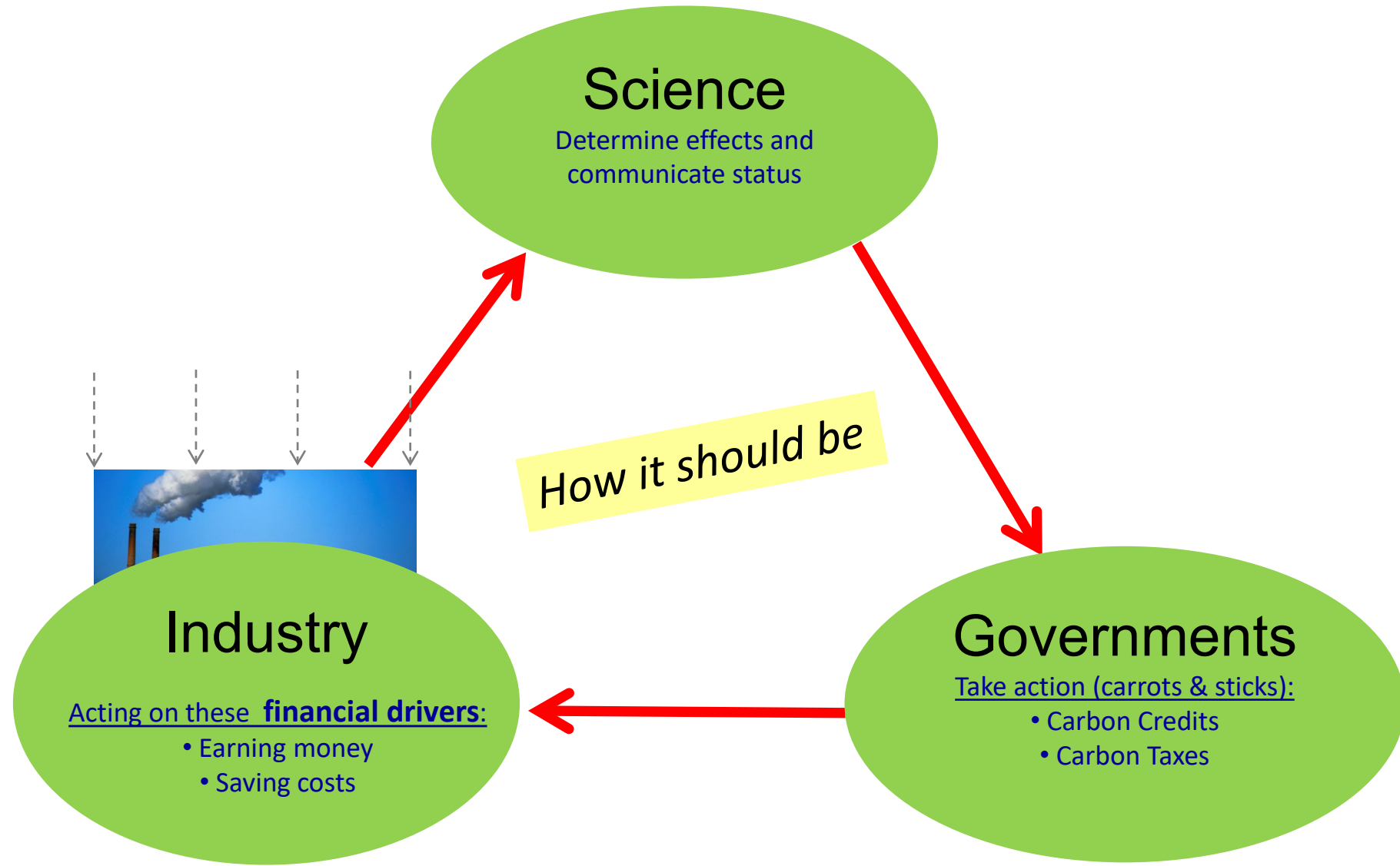
Dealing with the **climate change** issue (CO₂ and methane)



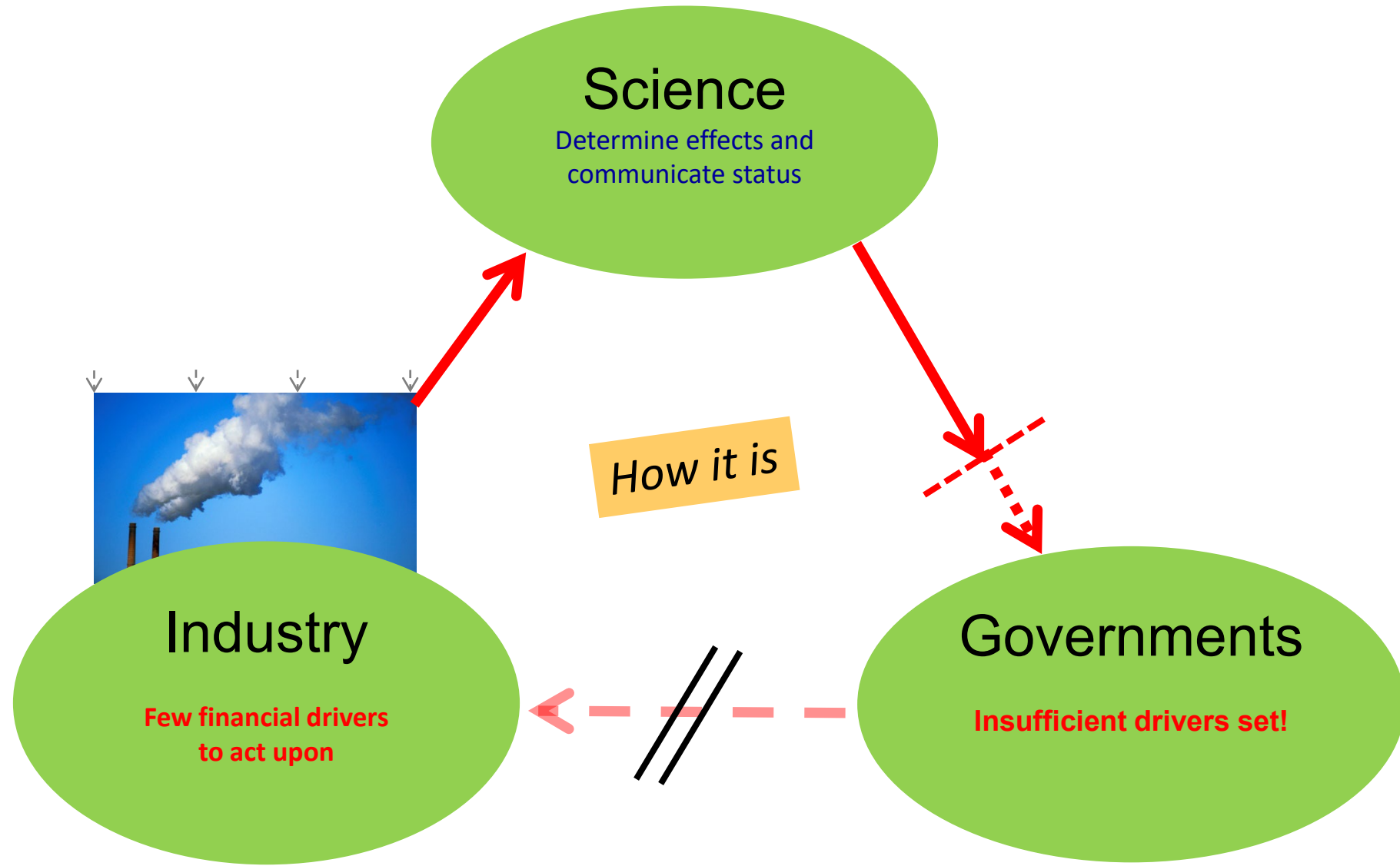
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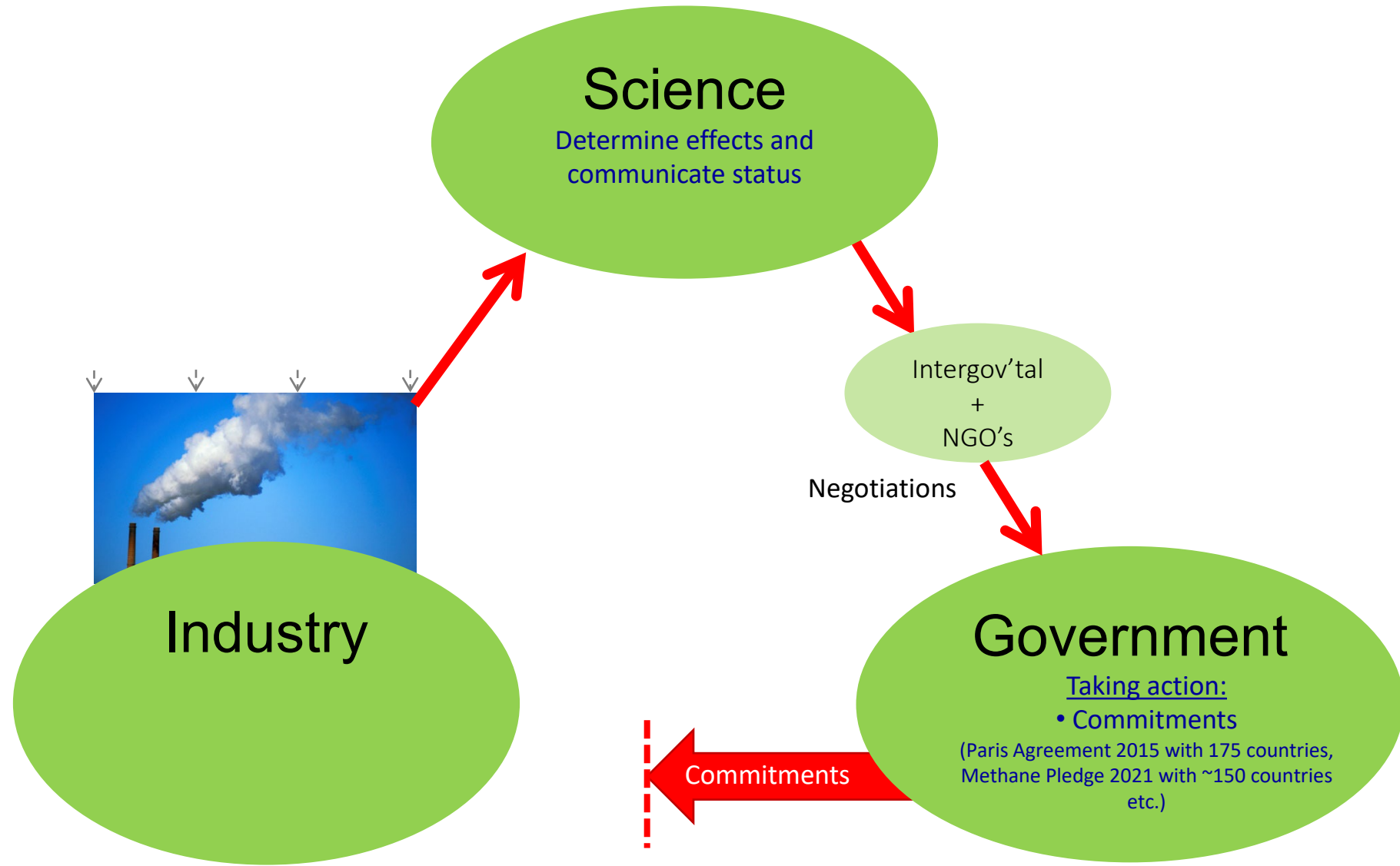
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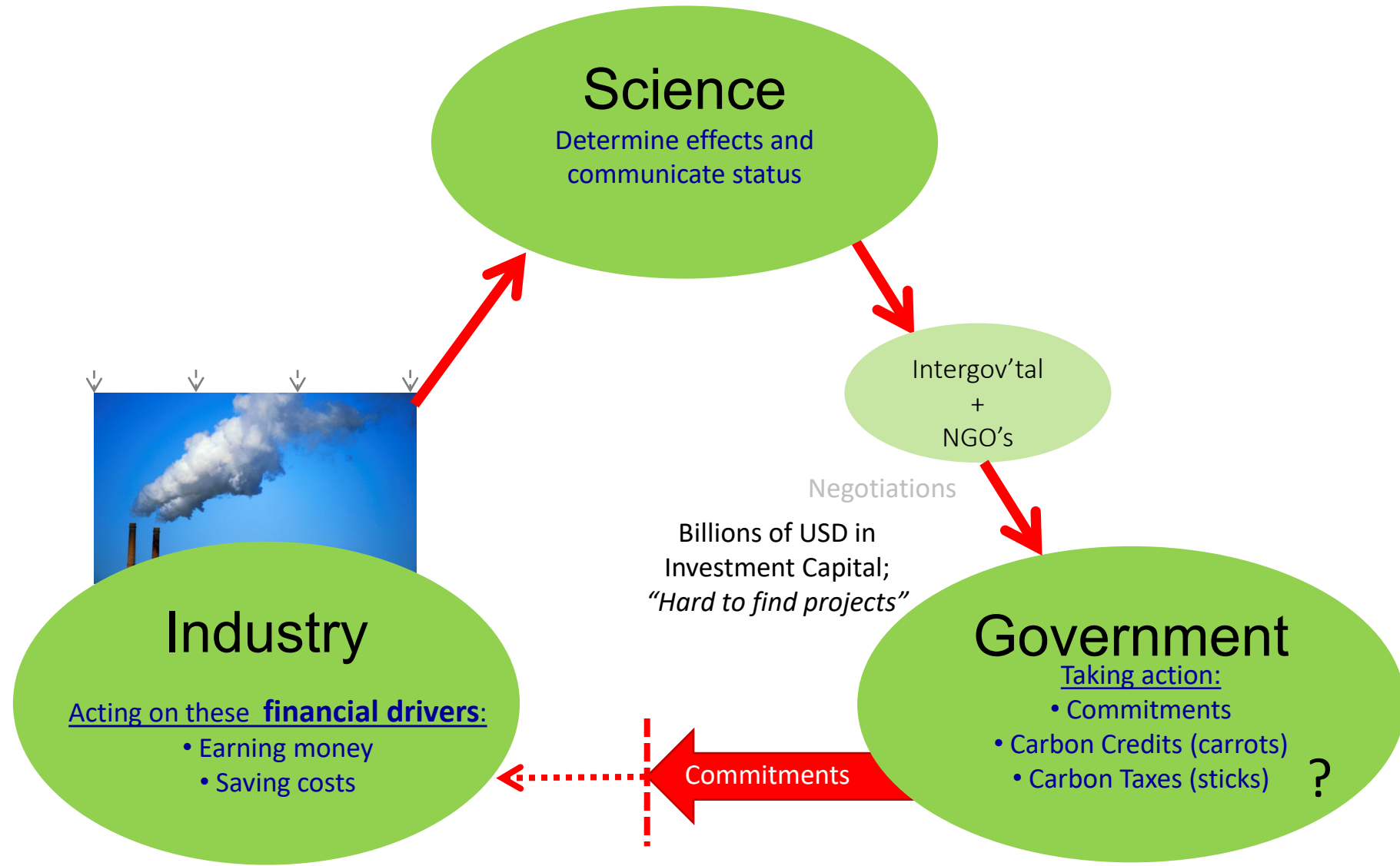
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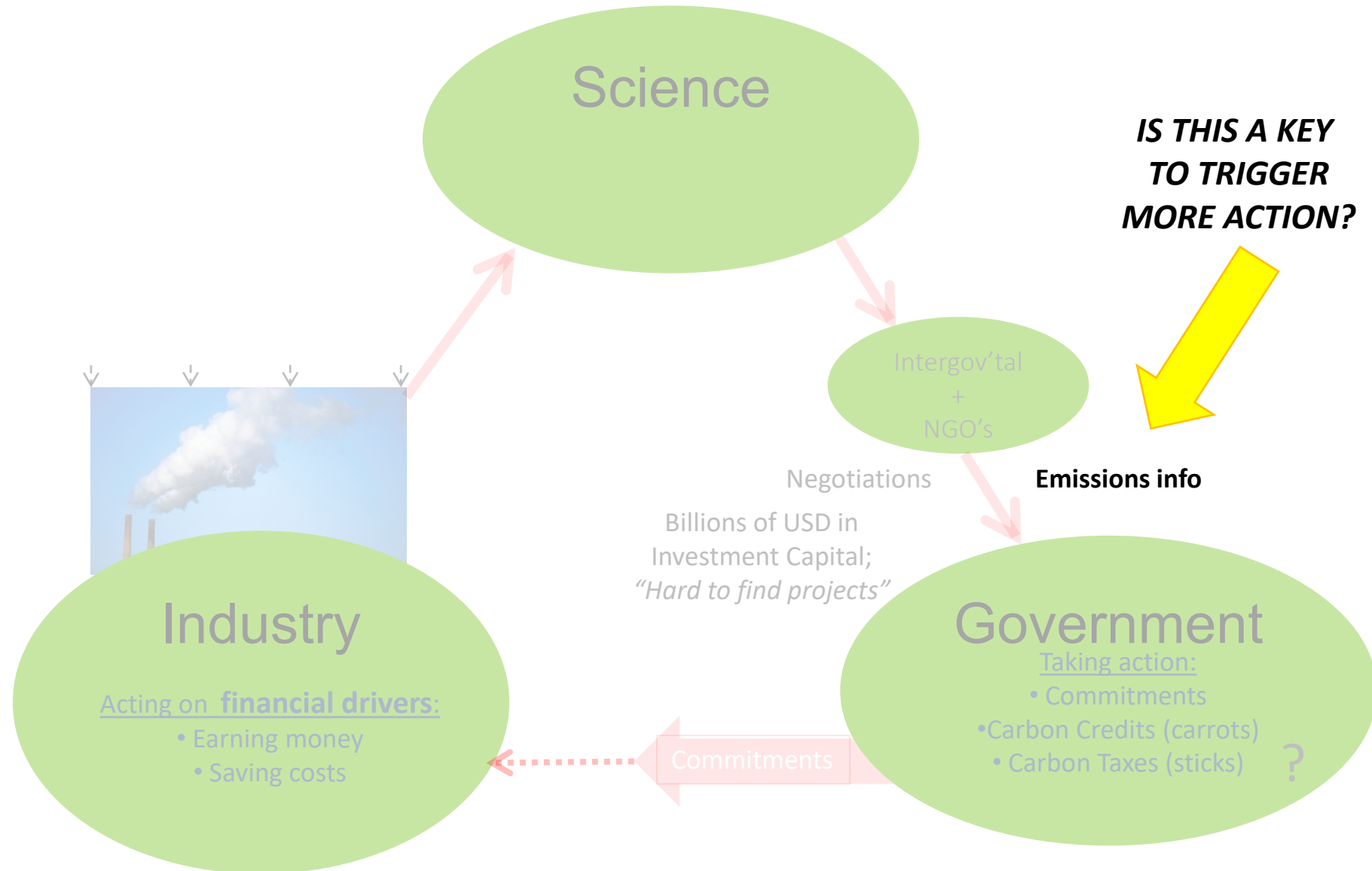
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Dealing with the *climate change* issue (CO₂ and methane)

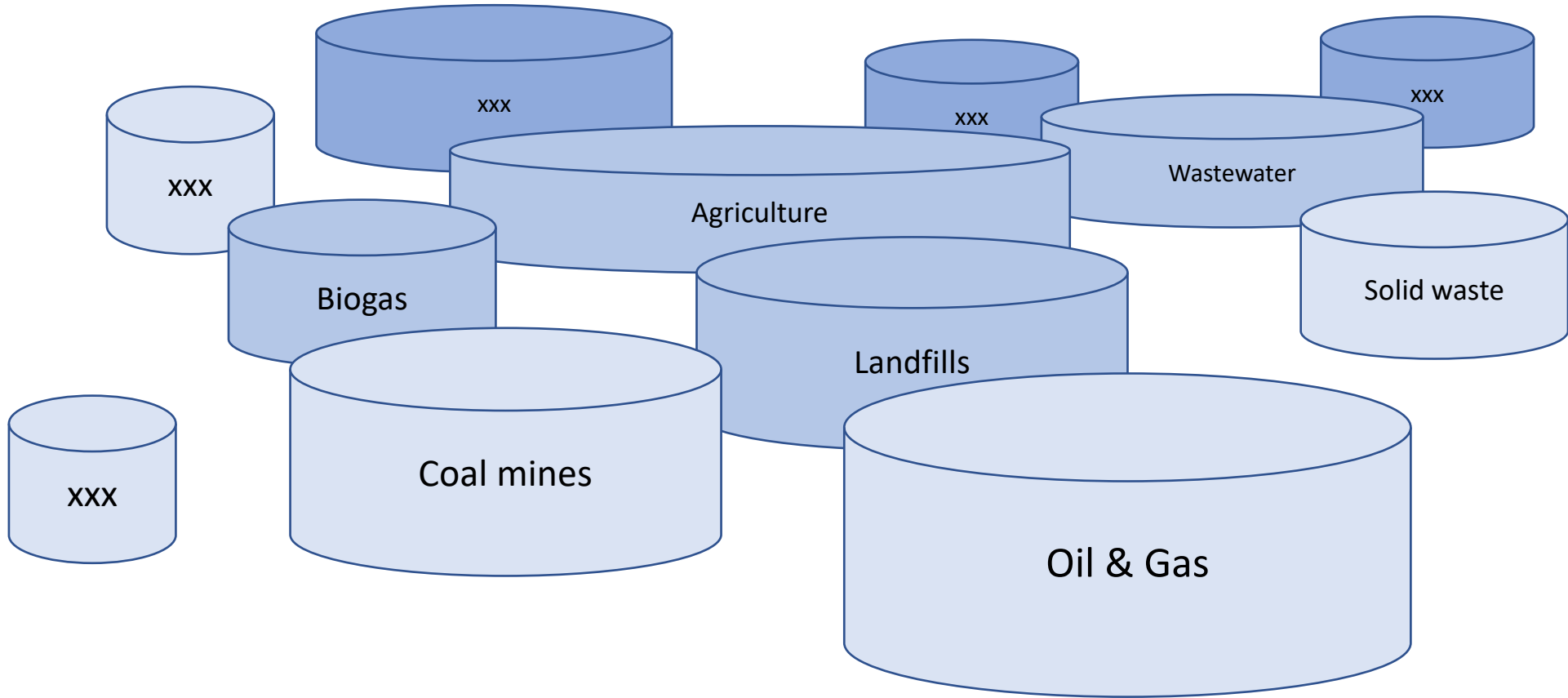


Dealing with the *climate change* issue (CO₂ and methane)

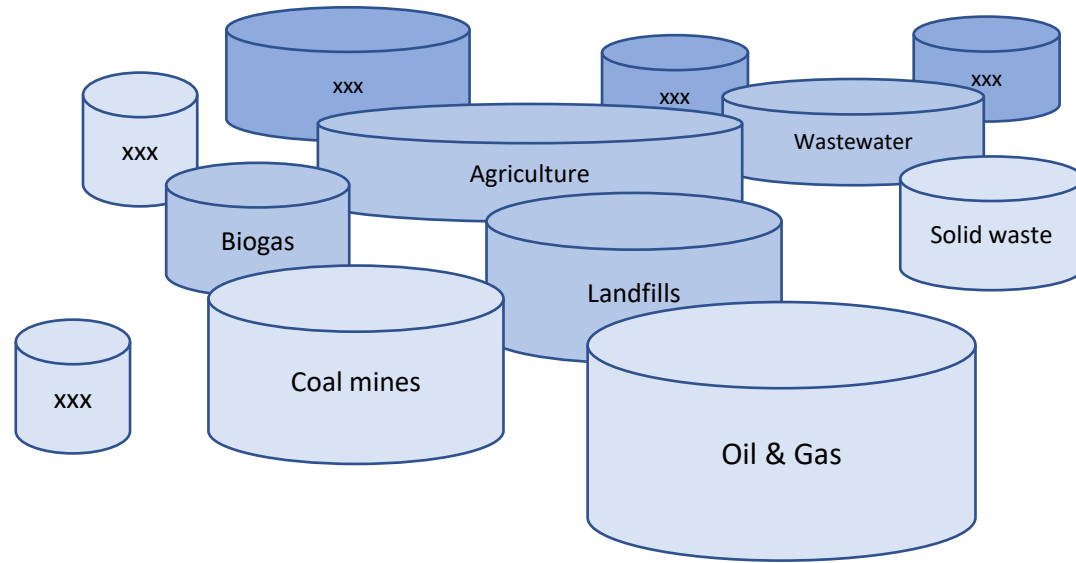


Dealing with the *climate change* issue – focus on methane

Methane emissions from different sectors ..



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



.. have for 2 decades been focused on by:

- GoE's of Sustainable Energy Division, UNECE
- GMI, Global Methane Initiative

.. creating a "gold mine" of info on:

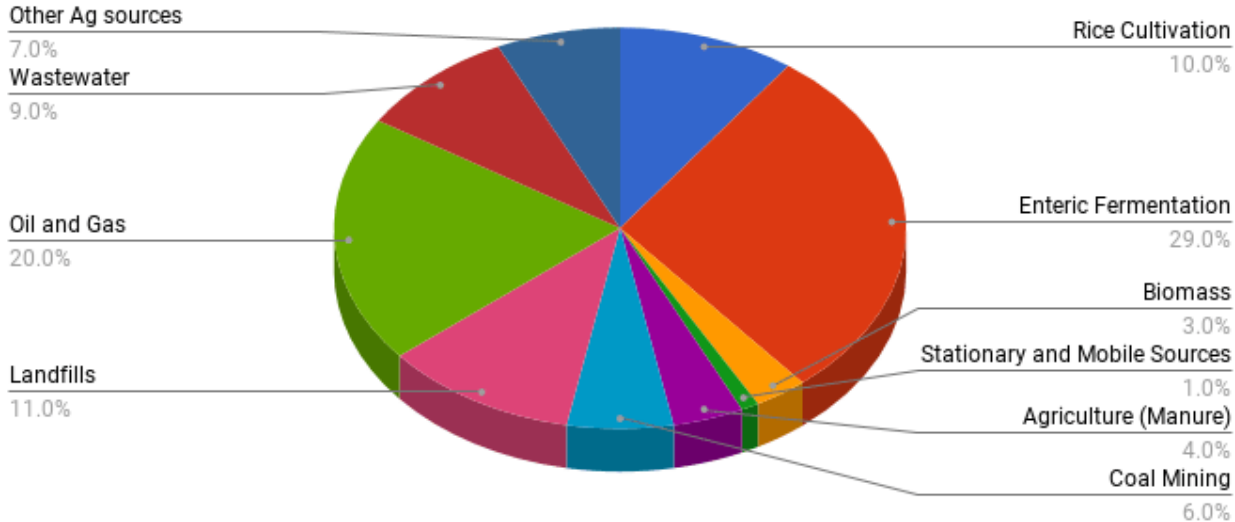
- Inventories of emission sources.
- Technology demonstrations.



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

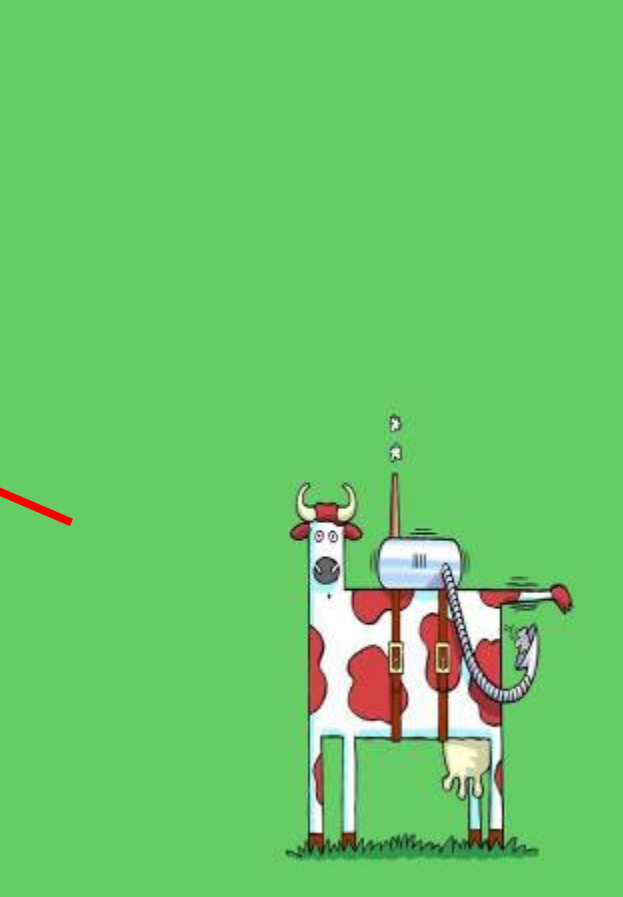
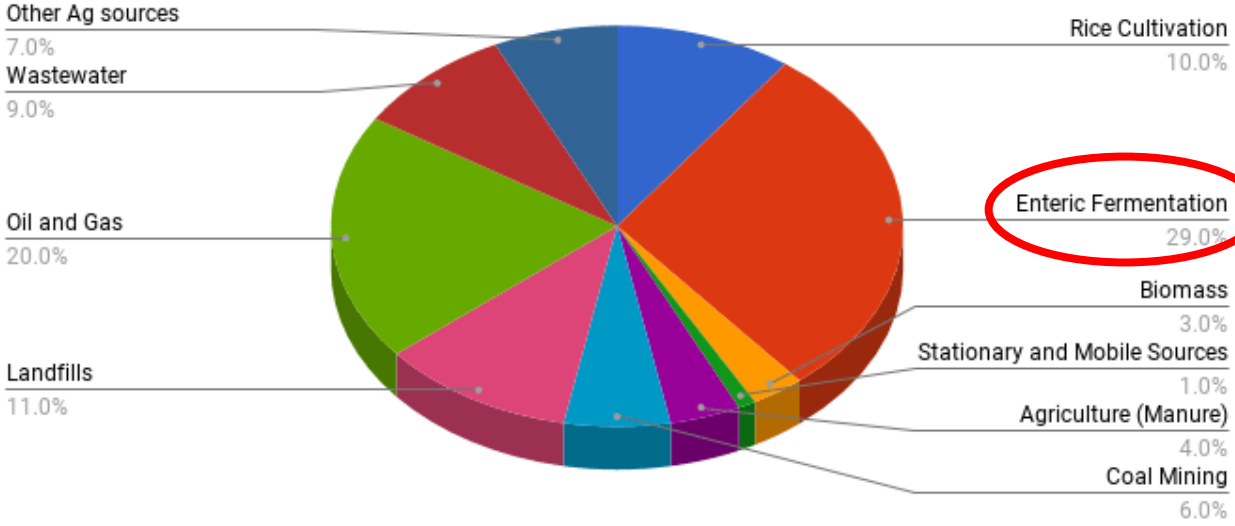
Global Anthropogenic Methane Emissions by source (2010)

- Importance of Size of Source



Global Anthropogenic Methane Emissions by source (2010)

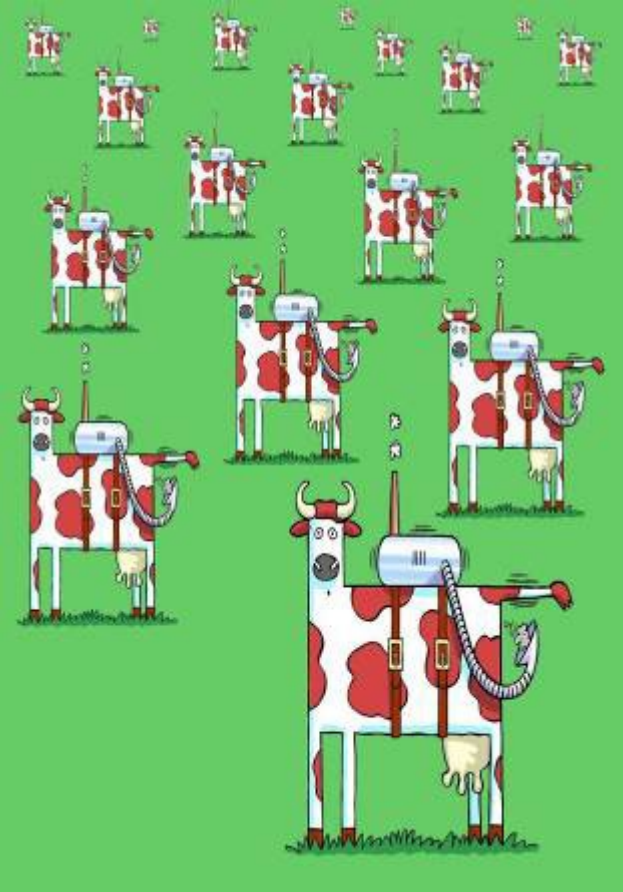
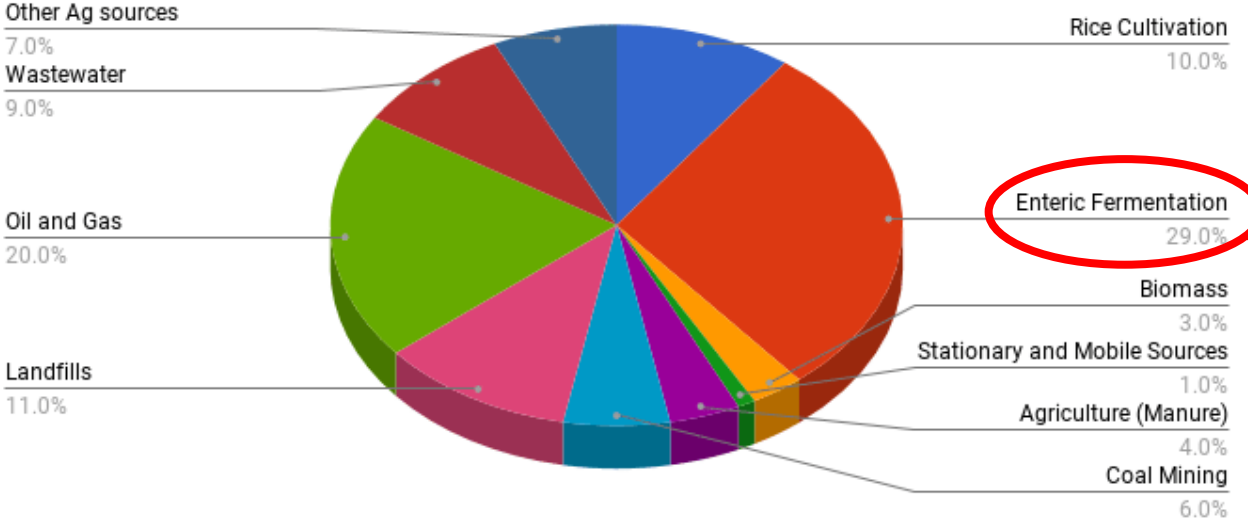
- Importance of Size of Source



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

Global Anthropogenic Methane Emissions by source (2010)

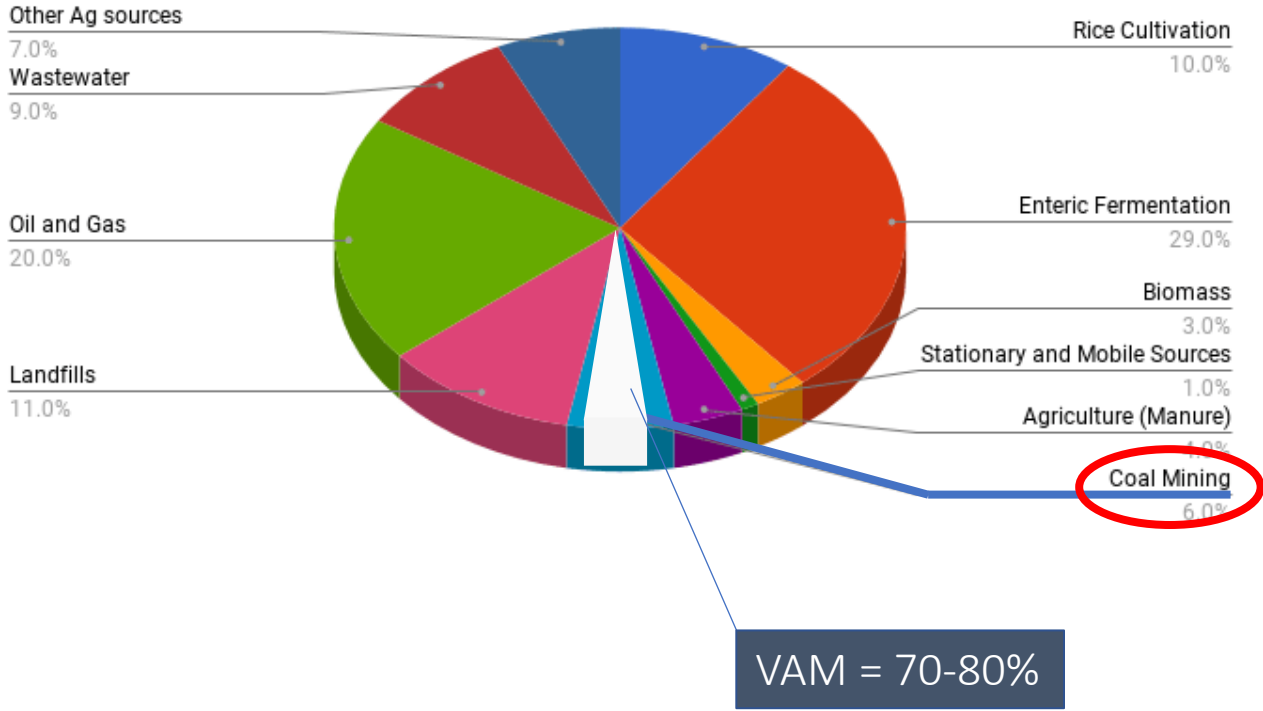
- Importance of Size of Source



But they are many!

Global Anthropogenic Methane Emissions by source (2010)

- Importance of Size of Source



Coal Mine VAM = singular large source of methane emission

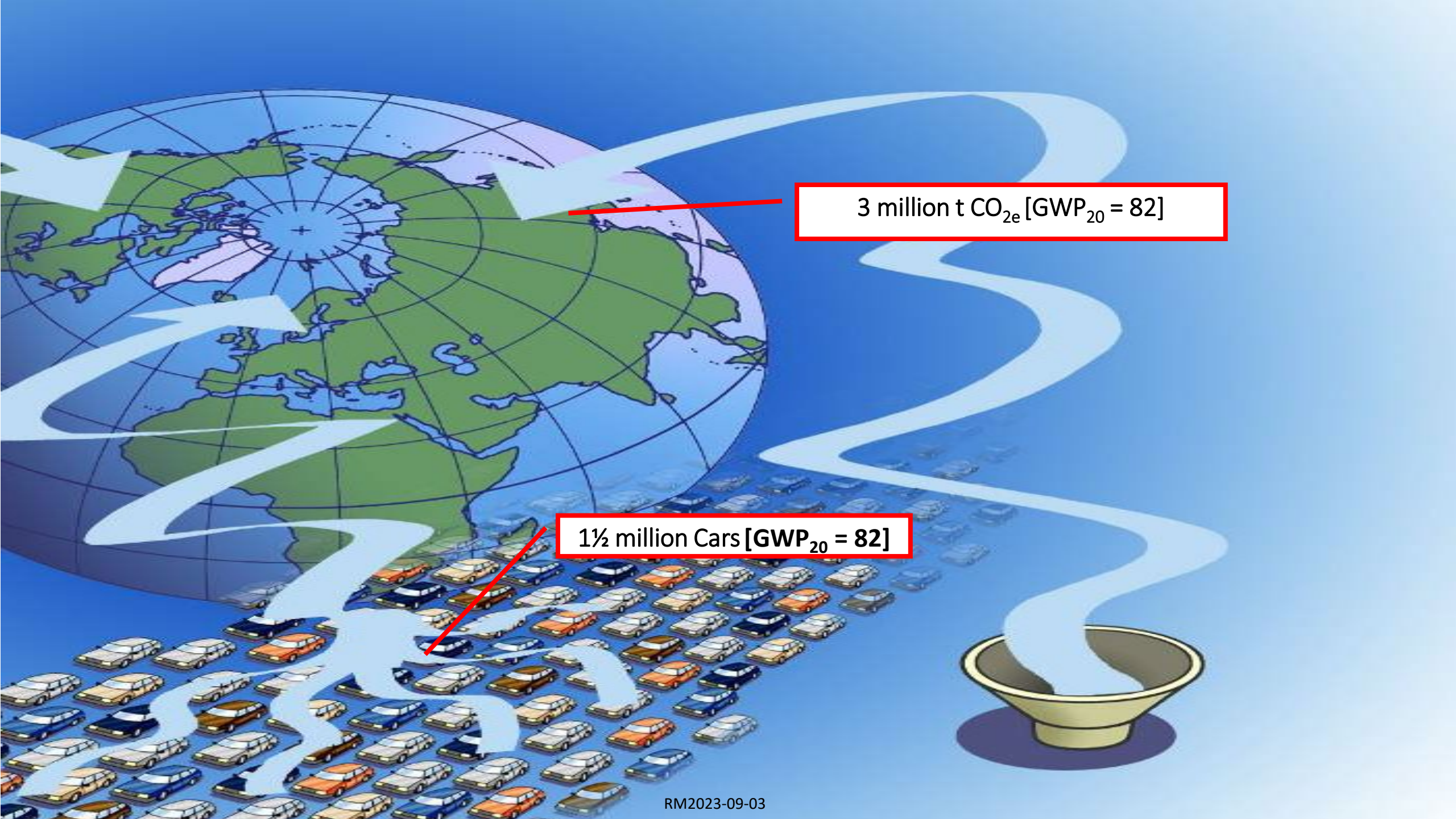


1 million t CO_{2e} [GWP₁₀₀ = 25-30]

3 million t CO_{2e} [GWP₂₀ = 82]



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



3 million t CO_{2e} [GWP₂₀ = 82]

1½ million Cars [GWP₂₀ = 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 ..

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 penalties/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.