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CLIMATE SOLUTIONS

Methane action: Where we are today and what is needed tomorrow

Methane-emissions abatement in the oil and gas sector: Costs and opportunities

Ilissa Ocko, Ph.D.
September 25, 2025

Critical factors for methane action

Critical factors for methane action: evolution over time

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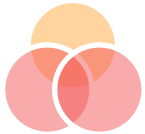

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CLEAR **MOTIVATION**	Building the case for action but **limited awareness**	Major climate **priority** given scientific insights	Understanding risks of rising emissions from **natural systems**
VIABLE **SOLUTIONS**	Available solutions **unclear**	**Proven strategies** to cut emissions in half, many affordable	**Innovations** for difficult-to-reduce sources
ENABLING **FRAMEWORKS**	Mostly **absent**	**Pledges, plans, partnerships, policies, funding, data to action**	More **support** for scaling solutions, **accountability** of progress

Critical factors for methane action: evolution over time

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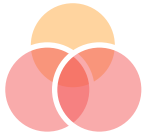

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Methane motivation today: Priority given scientific insights

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1

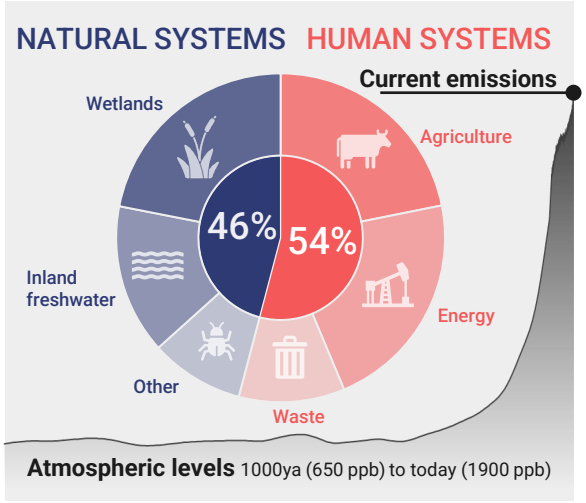
Human activities have **more than doubled** the amount of methane found naturally in the atmosphere and levels continue to rise

2

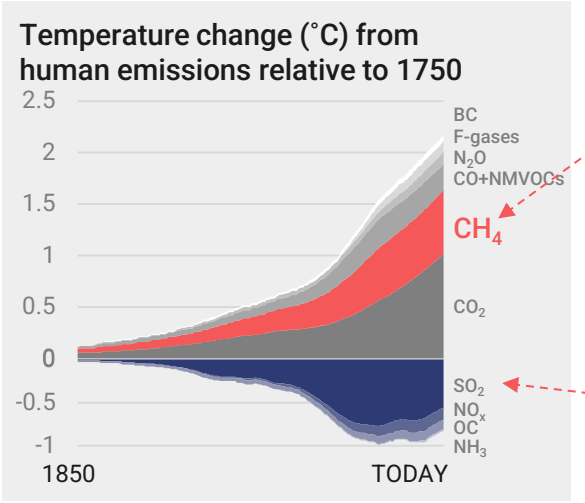
Ongoing methane emissions are a major and growing driver of climate change, responsible for **~30% of today's warming** (0.5˚C /~1˚F)

3

Cutting methane emissions is considered the **fastest way to slow down warming** in the coming decades



Data sources: emissions - 2020 bottom-up estimates from Jackson et al. 2024; atmospheric levels - 2 Degrees Institute



Data source: Buma et al. 2025, relative to 1750 temperature

Large share of current warming

Relatively **short-lived** in atmosphere (lifetime ~decade)

Unlike CO_2, **not co-emitted** with major cooling pollutants

Methane solutions today: Proven solutions to cut emissions in half

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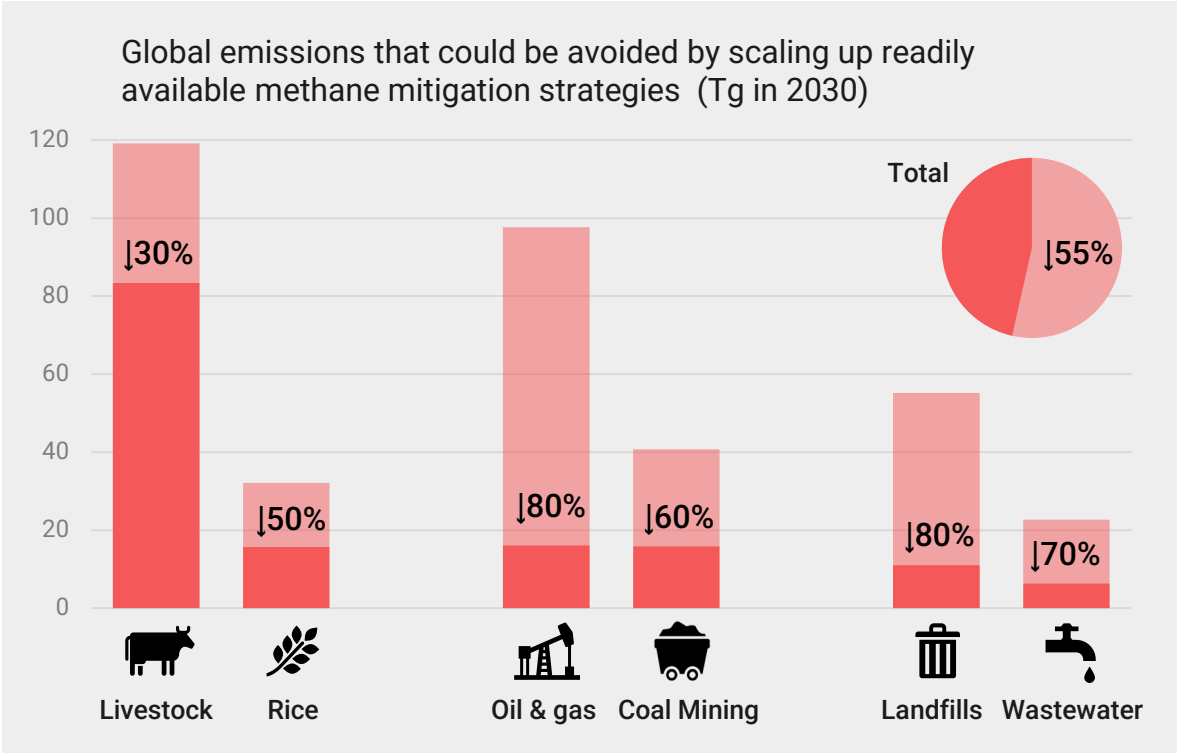
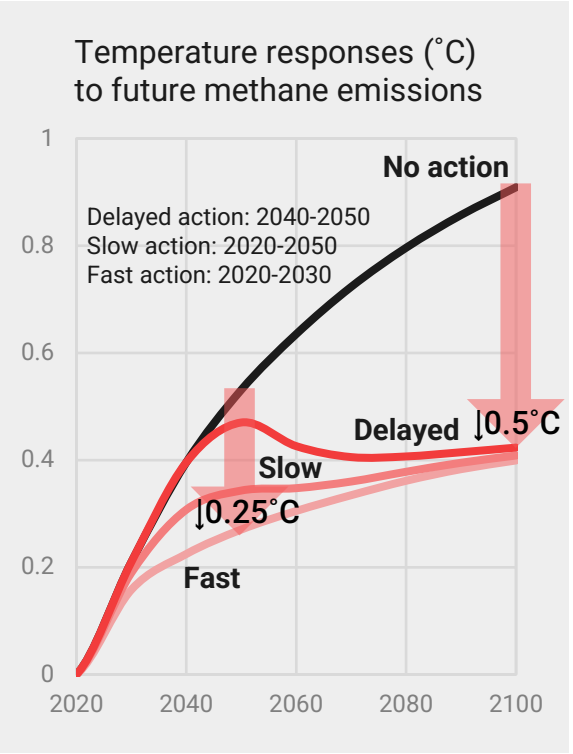
Emissions abatement potential with existing solutions



Ocko et al. 2021

Faster we deploy solutions, better the outcome



Ocko et al. 2021

Methane frameworks today: Progress on paper

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Pledges

159 countries participate in the **Global Methane Pledge** to cut methane emissions by 30% below 2020 levels by 2030

Policies

Several countries have or are developing **regulations, guidelines, requirements** for oil and gas operations and landfills

Plans

Nealy **100 countries** have national methane action plans

Partnerships

E.g. Oil and Gas Methane Partnership 2.0, Dairy Methane Action Alliance, Subnational Methane Action Coalition, LOW-Methane

Funding

More than $2 billion in grants—$500 million in announced last year alone—plus billions more in project finance

Data to Action

Technology advances enabling **detection** of emissions and systems to **notify** responsible parties, such as UNEP's MARS

Critical factors for methane action: evolution over time

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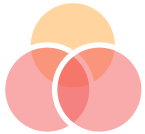

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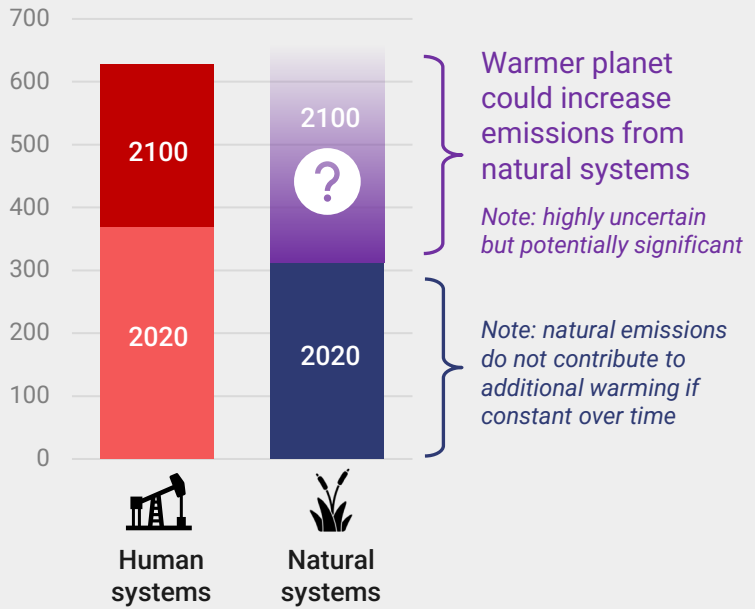
Methane motivation tomorrow: Emissions from natural systems

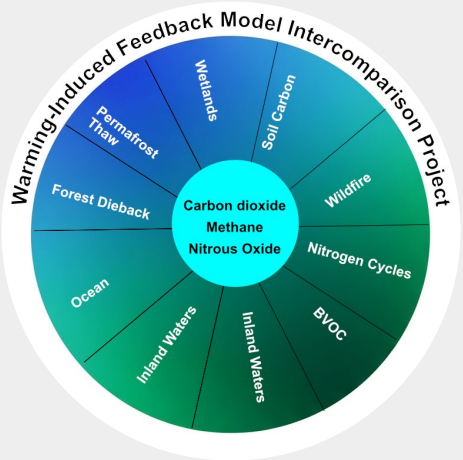
More methane from natural systems

Methane emissions in 2020 and 2100 without action (Tg)



What's needed next

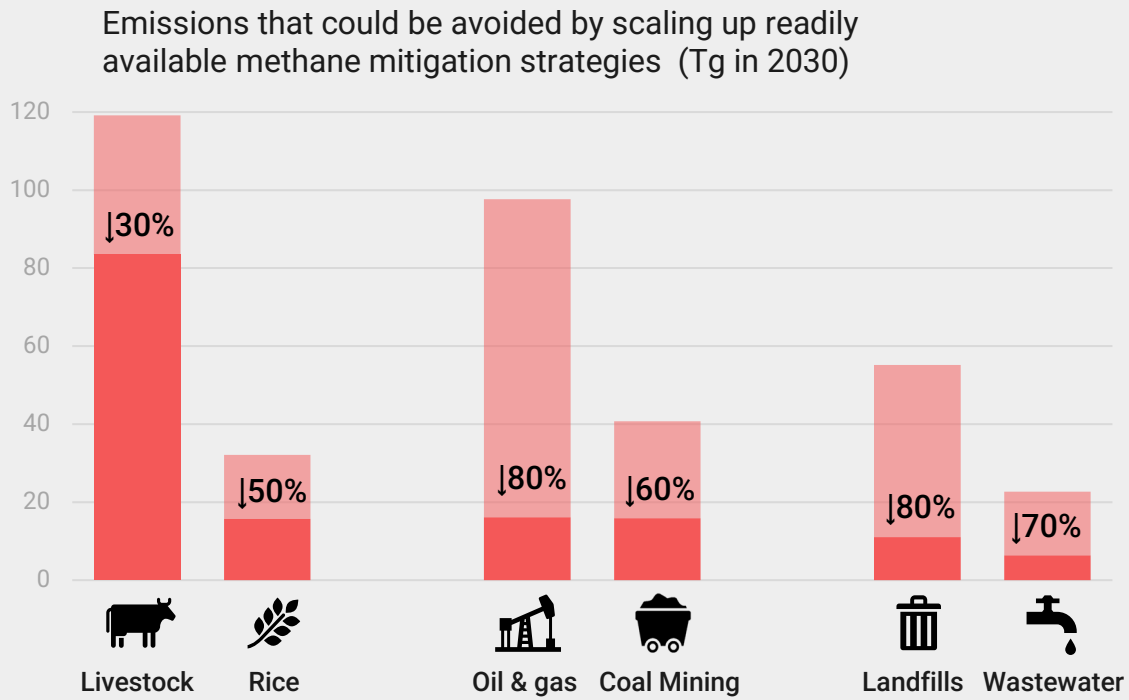
- ✓ Strengthen monitoring to track and attribute natural emissions
- ✓ Integrate natural emissions into models, inventories, and policy frameworks
- ✓ Advance solutions through research on source-specific mitigation and remediation



Current emissions: Jackson et al. 2024; future human systems: Ocko et al. 2021; future natural systems: Zhang et al. 2023

Methane solutions tomorrow: Innovations for difficult sources

Livestock enteric emissions remain a challenge



Ocko et al. 2021

What's needed next

- ✓ Innovation for pasture-based livestock (<2% of animals raised in feedlot settings)
- ✓ Improved measurements
- ✓ Development of markets, policy pathways

Livestock Enteric Methane Mitigation Roadmap, Spark Climate Solutions, 2025

Methane solutions tomorrow: Innovations for difficult sources

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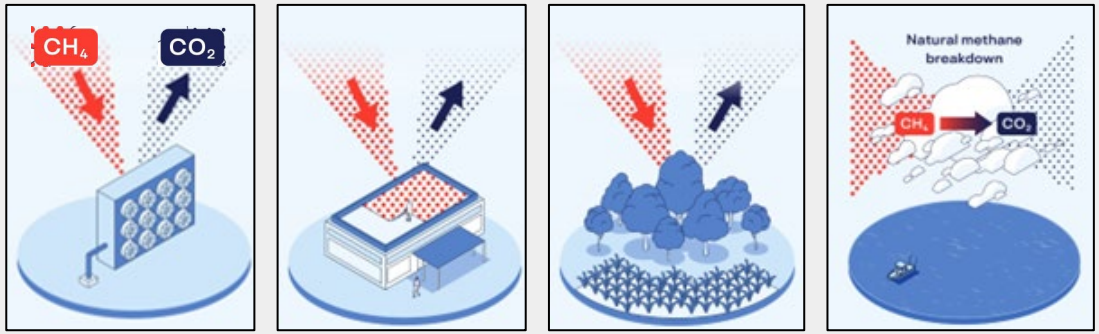
Methane removal in early stages of research

A set of climate solutions that break down methane into carbon dioxide and water faster than nature does alone, potentially significantly reducing atmospheric methane's impact.

Categories of methane removal approaches:



METHANE REMOVING REACTORS

METHANE REMOVING SURFACES

ENHANCING METHANE BREAK DOWN IN ECOSYSTEMS

ENHANCING METHANE BREAK DOWN IN ATMOSPHERE

Spark Climate Solutions, 2025

What's needed next

- ✓ Research and funding
- ✓ Establishment of governance structures and mechanisms for emerging approaches

NASEM, 2024

Methane frameworks tomorrow: More support and accountability

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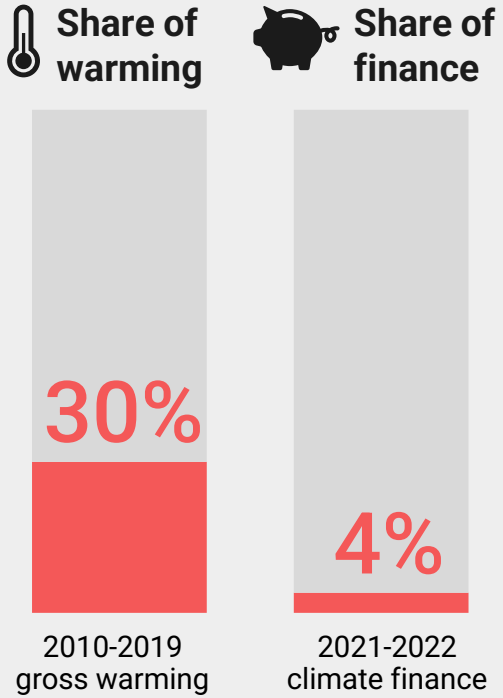
What's needed to scale today's and tomorrow's solutions

More political will – more and stronger policies, enforcement of policies

More funding – small fraction of total climate finance goes into direct methane abatement

Equity/access – support for developing countries through financing, technology transfer, training programs, and capacity-building

Accountability – moving from pledges and plans to real emissions reductions, e.g. through robust monitoring, reporting, and verification (MRV) programs



Data sources: Warming - IPCC AR6 WGI 2021; Finance - Climate Policy Initiative Global Landscape of Climate Finance a et al. 2025, 2023

Bottom line: tremendous progress but more to be done!

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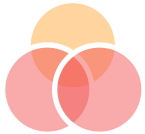

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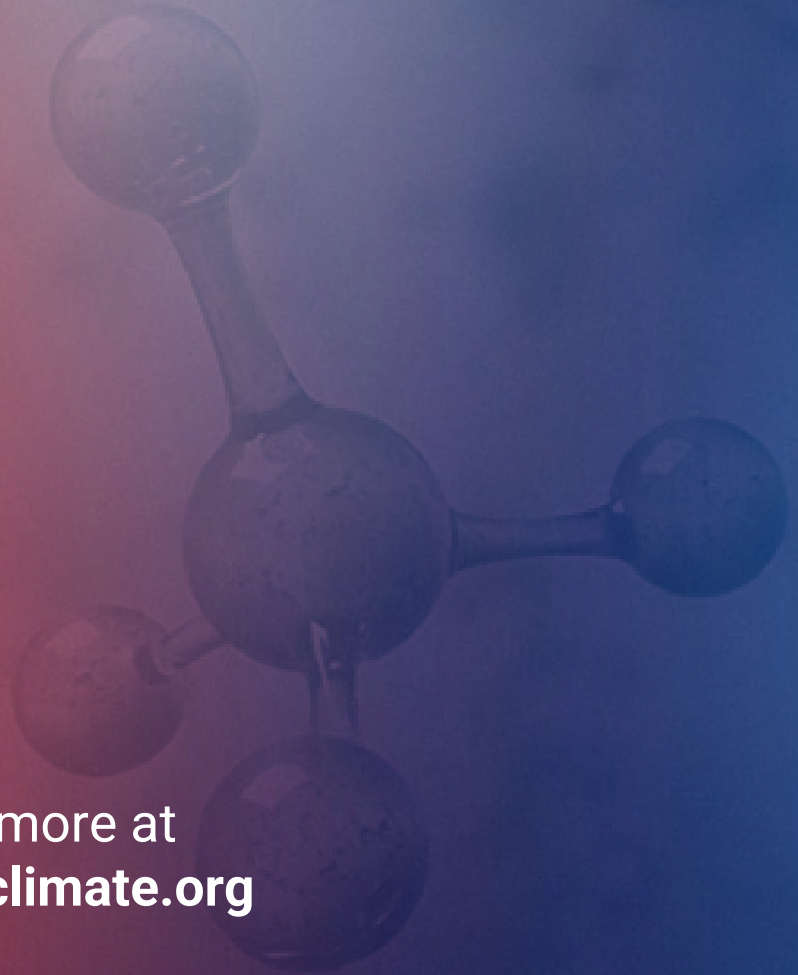

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