Reducing Global Emissions of Methane –
A Research Cluster of the Salata Institute at Harvard

Robert N. Stavins

A. J. Meyer Professor of Energy and Economic Development, Harvard Kennedy School
Director, Harvard Environmental Economics Program
Director, Harvard Project on Climate Agreement
Principal Investigator, Harvard Initiative on Reducing Global Methane Emissions

Reducing Methane Emissions: Frontiers in Science, Policy, & International Cooperation

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THE SALATA INSTITUTE
FOR CLIMATE AND SUSTAINABILITY
at Harvard University

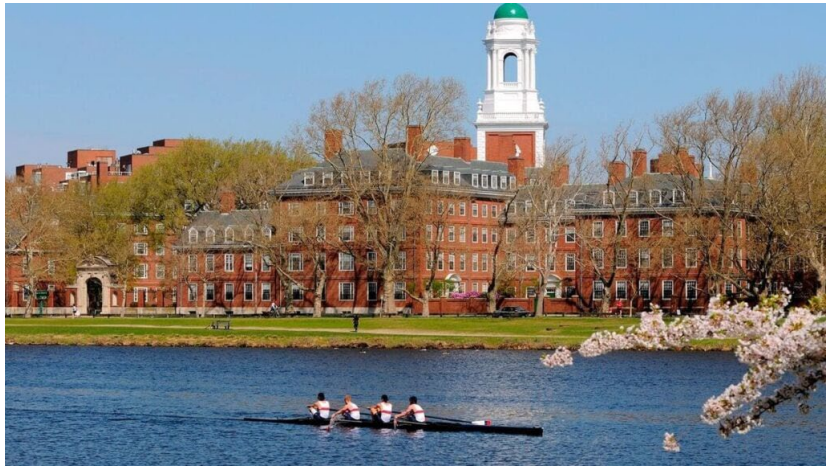
Why Focus on Reducing Global Methane Emissions?

- **Methane has received much less attention than carbon dioxide (CO_2) as a driver of climate change**
  - Anthropogenic emissions of CO_2 much greater than those of methane (CH_4), which come from oil and gas sector, landfills, and agriculture (livestock and paddy rice)
  - And the *half-life* of CO_2 in the atmosphere exceeds 100 years, but atmospheric *total* lifetime for CH_4 is only about a decade
- **However, methane has *very high global warming potential per unit,* compared with CO_2**
  - Over 100 years, each methane unit is *28 times* as effective in radiative forcing
  - And over 20 years, its *84 times* as effective!
  - Historically, methane is responsible for about *30%* of global warming since the industrial revolution
- **So, methane-emissions abatement can significantly reduce GHG concentrations, climate change, and damages … particularly in the *short term, which* can give the world time to:**
  - *"bend the curve"* on CO_2 emissions
  - conduct *research* on carbon mitigation and removal
  - *implement* longer-term strategies to mitigate and adapt to climate change




Harvard Initiative on Reducing Global Methane Emissions

- **In 2023, we launched a Harvard-wide "Initiative on Reducing Global Methane Emissions,"**
  - One of the research clusters of the Salata Institute on Climate and Sustainability at Harvard
- **Goal is to achieve *meaningful and sustained* progress in methane emissions reductions …**
  - … through *research and effective engagement* with key stakeholders …
  - … to deliver information which facilitates the *design & implementation* of emission-reduction *policies & programs*
- **This initiative – and all Harvard Salata climate research & outreach – is now more important than ever …**
  - … *because* of the federal government's political abandonment of climate research and policy!
  - Opportunities abound over the next several years for great progress on reducing global methane emissions.



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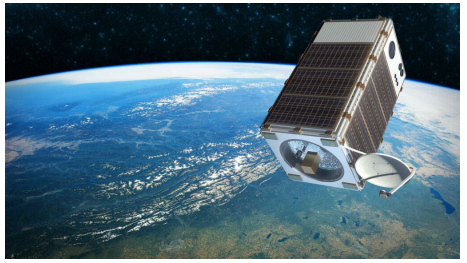
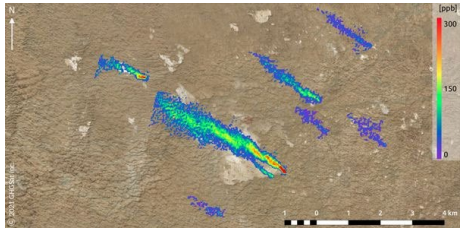
What the Methane Initiative Does & How it's Effective

- **Brings together two dozen researchers, including Harvard faculty, fellows, and PhD students from across the university (plus external collaborators), engaged in *22 individual research/outreach projects***
  - *Seven departments* in FAS – from Natural Sciences, Social Sciences, and Humanities
  - *Five professional schools*: Business, Engineering, Government, Law, and Public Health
  - *Disciplines*: physics, chemistry, biology, engineering, economics, political science, law, business, and history
  - We're not satisfied with carrying out path-breaking research – all research teams are also engaged in outreach with critical stakeholders
  - By collaborating across research teams, *the whole is already greater than sum of its parts*: advancing cross-disciplinary understanding; delivering the information and solutions that governments, NGOs, and businesses need to take effective action
  - We've published dozens of policy briefs and scholarly articles; and we have engaged in more than 50 convenings and meetings with governments, NGOs, and businesses

- **Examples include: Making Methane Leaks Visible**
  - Created Integrated Methane Inversion (IMI) tool to use satellite observations of atmospheric concentrations to produce accurate estimates of time & location of specific emissions
    - Have made IMI tool freely available (with instruction) to regulators, researchers, and emitters seeking to advance abatement





More Examples of Our Research and Outreach

- **Pinpointing Low-Cost Abatement Opportunities in O&G Sector**
  - Demostrating cost-effective ways to reduce emissions
  - By linking detailed satellite-derived emission maps with local natural gas price data, research team builds supply curves showing the quantity of methane emissions can be stopped at each price point (in short run and long run)
  - Results made available to all stakeholder groups – to help regulators design sensible policies and help businesses achieve their goals

- **Development (at School of Engineering) of Accurate, Wearable Methane Sensor for Livestock**
  - This will be the first available technology to provide accurate measurements in real time in actual field conditions, …
    - … which is essential for testing of methods to reduce emissions, such as feed additives

- **HLS team has developed list of Best Practices by State Governments**
  - Through survey and legal literature review, created the first map of state-level farm methane laws and regulations
    - Working with state governments to disseminate best-practices

More Examples of Valuable Research and Outreach

- **Working with Chinese Government to Reduce Rice Paddy Emissions**
  - First step: satellite data to examine how much Chinese dry cultivation reduces emissions
    - China has a subsidy for dry cultivation (for water conservation purposes)
    - Project will advise how this subsidy could also account for methane savings

- **Full Life-Cycle Studies of Liquified Natural Gas (LNG) Projects**
  - Test whether new export terminals raise or lower total greenhouse gas emissions
  - Provide decision-makers with hard numbers instead of marketing claims

- **Facilitating International Cooperation to Reduce Methane Emissions**
  - There is now a complex landscape of international initiatives to reduce emissions
    - These include not only governments, but numerous industry groups, & NGOs
  - Produce and distributing to negotiating teams, as well as industry associations, an enumeration and assessment of the initiatives, including:
    - Paris Agreement NDCs; Global Methane Pledge; industry consortia, pledges & mechanisms; and NGO partnerships

The Path Ahead

- **This overview is not comprehensive – just 7 of our 22 projects, and we are only at the beginning of the third year of three-year initiative**
  - We anticipate that more Harvard faculty (and more students!) will become participants
  - We also expect more external, individual collaborators, as well as more collaborating institutions
- **The importance, indeed, the urgency of this initiative is particularly pressing now, given political realities**
  - The need for rigorous, university-based research has never been greater than it is now, due to Washington's abdication of climate research and retrenchment from policy action
  - In particular, the need to develop new strategies to reduce methane emissions has never been greater,
  - … and the Harvard Salata Institute will continue to show global leadership!

Thank You!

For More Information

Harvard Project on Climate Agreements
www.belfercenter.org/climate

Harvard Environmental Economics Program
www.hks.harvard.edu/m-rcbg/heep

Website
www.stavins.com

Blog
http://www.robertstavinsblog.org/

BlueSky
@robertstavins.bsky.social

Salata Institute Initiative on Reducing Global Methane Emissions
https://salatainstitute.harvard.edu/projects/methane/