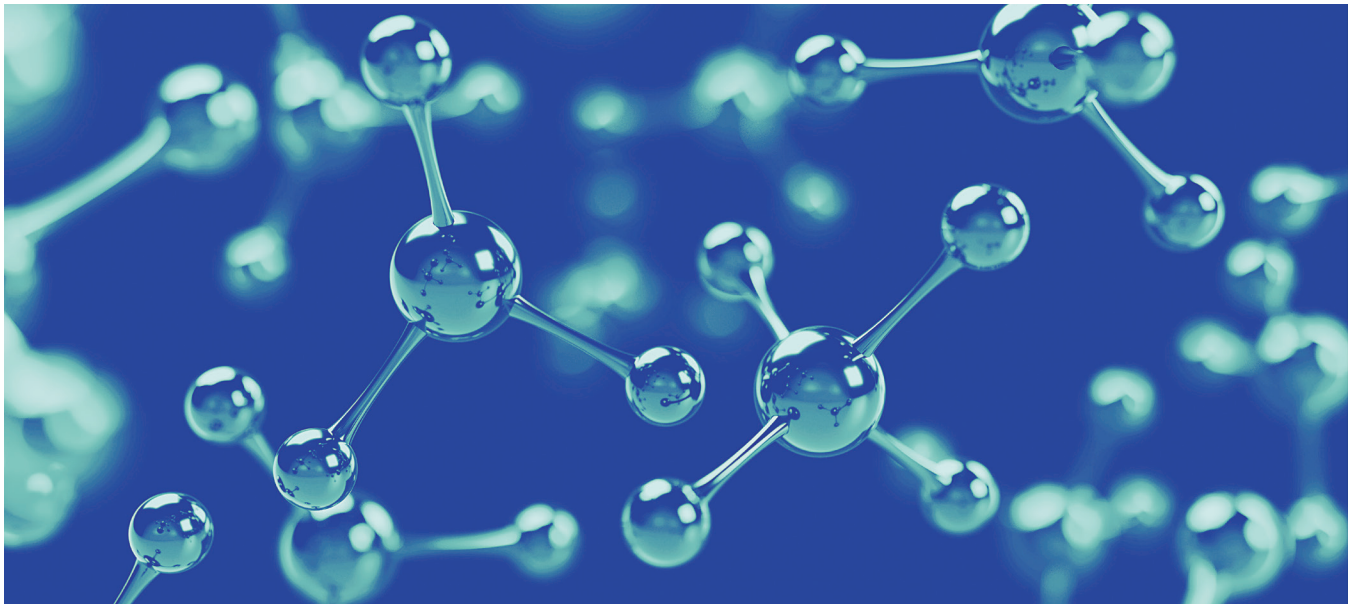
MIT CLIMATE GRAND CHALLENGES

Massachusetts Institute of Technology



*"I like to call methane the 'elephant in the atmosphere.' It's the gas everyone should be talking about, but few people know about."*

Desirée Plata PhD '09

*Gilbert W. Winslow Associate Professor of Civil and Environmental Engineering; director, MIT Methane Network*

# MIT Methane Network

Methane is a powerful greenhouse gas with more near-term global warming potential than $CO_2$. Urgent methane mitigation is required in all climate-change scenarios that limit temperature rise to less than 1.5–4 degrees C. But few technologies exist to reduce atmospheric methane.

The **MIT Methane Network** seeks to change that. Guided by an understanding of Earth processes and industrial activities, the effort aims to capture and convert methane to value-added or reduced-warming materials and to lower methane emissions. To chart a path to a decarbonized, more equitable future, the network will create policy test beds to quantify the impact of technologies and policies. The approach integrates social, economic, and environmental metrics to address climate change over the next 10-20 years.

**Leveraging fundamental advances in science to detect, stop, and destroy methane**

The United Nations and the Intergovernmental Panel on Climate Change estimate that 45% of methane emissions must be stopped by 2030 to avoid a climate crisis. No single action can achieve this goal because methane emissions come from many sources: agriculture and waste (28%); fossil fuels (18%); wetlands (20%); other natural sources, such as lakes, permafrost, and seeps (30%); and biomass burning (4%).

Making an impact on atmospheric methane levels requires innovation across these multiple sectors. The multidisciplinary MIT Methane Network has designed an integrated approach that will impact 66% of all sources within 3 to 10 years, removing methane quickly enough to directly alter the rate of climate change.

Above: TK stock image of methane molecule from 103 Book (colorized with CGC brand colors)

## TACKLING METHANE EMISSIONS REQUIRES EXPERTS ACROSS ALL FIELDS OF KNOWLEDGE

The MIT Methane Network is composed of 21 faculty members across all five schools at MIT, the Stephen A. Schwarzman College of Computing, and the Institute for Data Systems and Society (IDSS). A panel of external advisors includes industrial, nongovernmental, and governmental stakeholders. Transdisciplinary synergies pave the way for rapid implementation, where science, engineering, policy, business, design, social justice, and communications happen in concert to anticipate and address barriers.

**A sampling of projects:**

Desirée Plata PhD ’09, the Gilbert W. Winslow Associate Professor of civil and environmental engineering and director of the MIT Methane Network, is developing a new process for removing methane emissions from the air using an inexpensive and abundant type of clay used in cat litter.

A. John Hart SM ’02, PhD ’06, professor of mechanical engineering, is developing an automated process to detect and repair methane leaks in municipal and industrial gas pipes.

Charles Harvey, professor of civil and environmental engineering, is developing computational tools to better measure methane emissions from two of the world’s largest sources, wetlands and rice fields.

Harry Hemond PhD ’77, professor of civil and environmental engineering, is working toward a miniaturized, ultra-low-power mass spectrometer for methane sensing in air and water.

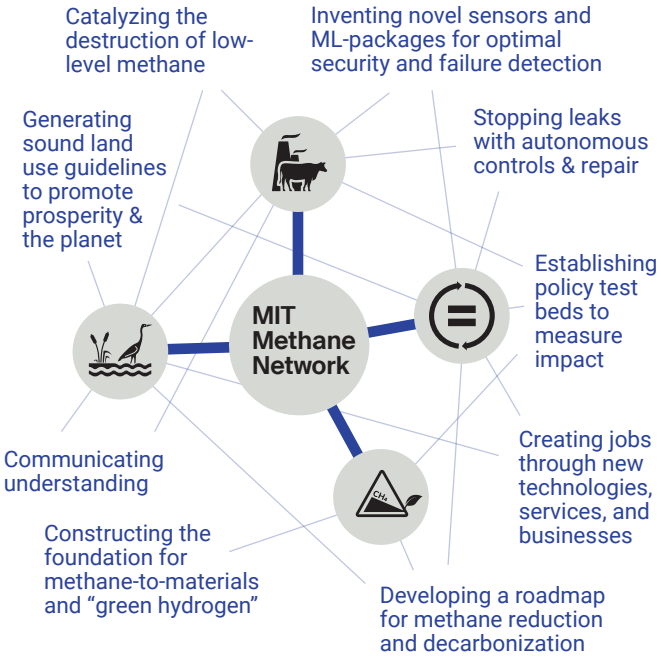
Asegun Henry SM ’06, PhD ’09, associate professor of mechanical engineering, is working on a high-temperature reactor powered by renewable electricity that splits methane into hydrogen and solid carbon.

Valerie Karplus SM ’08, PhD ’11, visiting associate professor at the MIT Sloan School of Management, is using satellite data to track fugitive methane emissions from gas and oil infrastructure.

Heather Kulik PhD ’09, associate professor of chemical engineering, is developing a data-driven approach to discovering new catalysts for methane to methanol.

Leslie Norford, professor of architecture, is working on a project to reduce pipeline methane leakage via electrified building heating.

**The MIT Methane Network: Driving down atmospheric methane levels by inventing new technologies, business models, and policy solutions in the framework of equity and social justice.**




A public outreach initiative to advance awareness of the sustainable management of methane is proposed by James Paradis, professor of writing and comparative media studies; Sheila Kennedy, professor of the practice in the Department of Architecture; and Jessika Trancik, professor at IDSS.

Michael Strano, the Carbon P. Dubbs Professor in Chemical Engineering, is designing an active polymer system in the form of a coating that will plug methane leaks in natural gas pipelines.

Timothy Swager, the John D. MacArthur Professor of Chemistry, is devising inexpensive, low-power sensors to detect methane sources as a first step in a mitigation strategy.

**To learn more about the MIT Methane Network and the researchers who are working to reduce methane emissions on a global scale, contact Professor Desiree Plata at mititgatemethane@mit.edu or visit methane.mit.edu.**



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