

Methane reduction

with Professor Akshat Tanksale

Talking points

Knowledge

1. What is dry reforming of methane?
2. What is syngas?

Comprehension

3. Why is methane reduction important?
4. What are the limitations of current dry reforming processes?

Application

5. Methane is highly flammable. What safety precautions might Akshat's team undertake to reduce the risk of combustion in their reactor?
6. Take another look at the materials and processes that Akshat's team use in their research and development. Which of these have only emerged in the past decade or two? How might other emerging technologies influence their research?

Analysis

7. Given that both carbon dioxide and methane are present in the atmosphere, why do you think syngas production tends to draw from sources such as biogas rather than extracting these gases from the atmosphere?
8. Why might processes that work in the lab not work in real-world industrial settings? Give some potential examples.

Evaluation

9. Both syngas technology and the need to reduce methane emissions have been around for quite a long time. Why do you think technologies like Akshat and his team's new reactor haven't been developed sooner?
10. To what extent do you think it is necessary for green technologies to show financial benefits before they are widely adopted?

Activity

Reducing methane emissions into the atmosphere is a huge and complicated global challenge – but one that is possible to meet.

Research the following topics:

- The main sources of human-made methane emissions (e.g., agriculture, oil and gas, waste management)
- The main methods of mitigating methane emissions (e.g., dry reforming, better industry practices, agricultural innovations, waste reduction)
- The impacts of methane on global climate

Draw an illustrated diagram that shows the sources of methane emissions and how they can be mitigated. Use arrows to show the flow of methane.

Aim to make your diagram as engaging and accessible as possible. It should be clear to someone who has not read Akshat's article, so think carefully about the information that you should include.

Once completed, compare your diagram to a classmate's. Discuss with them how you approached the task and which aspects you picked out as the most important or interesting.

Now, consider how you could use your diagram to persuade a government official to make policy changes that mitigate methane emissions. What would your main recommendations be? How would you make these recommendations attractive in terms of competing priorities (e.g., economic, social, environmental)? In your pairs, choose one of you to play the role of the policymaker while the other tries to convince them to enact new methane reduction policies.

More resources

- This TED Talk by Daniel Zavala-Araiza highlights the policies and technologies aiming to reduce global methane emissions by holding emitters accountable: [youtube.com/watch?v=YPvP_C4qy0E](https://www.youtube.com/watch?v=YPvP_C4qy0E)
- This article from the US Department of Energy explains how steam reforming of methane can be used to produce hydrogen fuel: [energy.gov/eere/fuelcells/hydrogen-production-natural-gas-reforming](https://www.energy.gov/eere/fuelcells/hydrogen-production-natural-gas-reforming)
- This press release from UNEP explains a new research project aiming to accurately monitor methane emissions from coal mines: [unep.org/news-and-stories/press-release/unep-australia-announce-landmark-study-improve-understanding-coal](https://www.unep.org/news-and-stories/press-release/unep-australia-announce-landmark-study-improve-understanding-coal)