

Welcome to the 2021 JISEA Annual Meeting!

Industrial Clean Energy

12 April 2021

Introduction: Jill Engel-Cox, JISEA Director

Moderator: Mark F. Ruth, JISEA

 @JISEA1

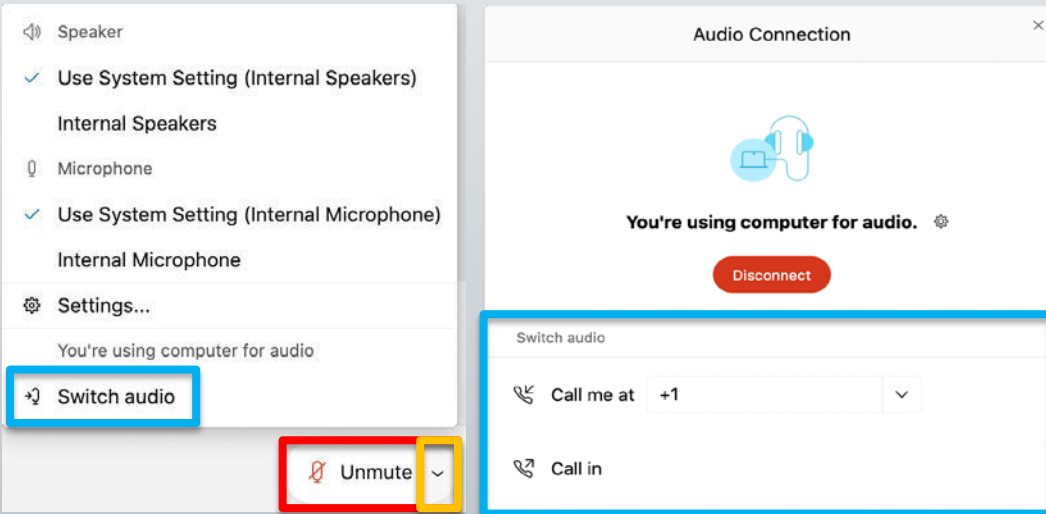
www.jisea.org



Housekeeping and WebEx Tips

To find or switch audio options:

1. Select carrot next to Mute/Unmute button
2. Select Switch Audio
3. WebEx will display your current audio option at the top
4. Other audio options displayed under “Switch audio”



To change view options:

1. Select layout button

Layout

2. Change to:

Grid – All videos shown

Stage – Speaker highlighted, other videos below

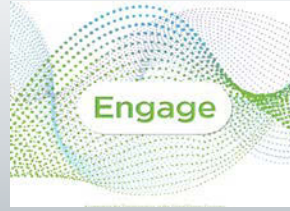
Focus – Only speaker video shown

Message Isabel McCan if any technical problems.

Housekeeping and WebEx Tips

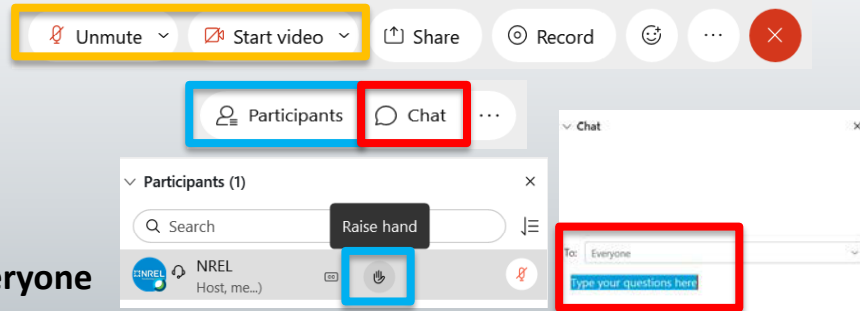
Engage!

- Answer polls
- Comment in the chat
- Ask questions



During the presentation(s):

- Stay muted
- Camera off
- If you have a question:
 - Raise your hand, or
 - Type it in the chat box to Everyone



Asking questions:

- Unmute
- Camera on



Overall Agenda: All Sessions 8:30-9:45 am MT

Monday, April 12: **Industrial Clean Energy**

At 1:00 pm MT: Interactive virtual campus tour

Tuesday, April 13: **Energy, Climate, and Air Pollution**

Wednesday, April 14: **Keynote Discussion: Energy Equity**

Thursday, April 15: **Sustainable Communities**

Friday, April 16: **Topic “Tables” Discussion with Experts**

All sessions include ~45-minute presentations and ~30-minute open questions & discussion.

Industrial Clean Energy

Kimberly Kupiecki (DuPont)

Tony Wood (Grattan Institute)

Marlene Arens (Fraunhofer ISI)

*Moderator: **Mark Ruth** (JISEA/NREL)*

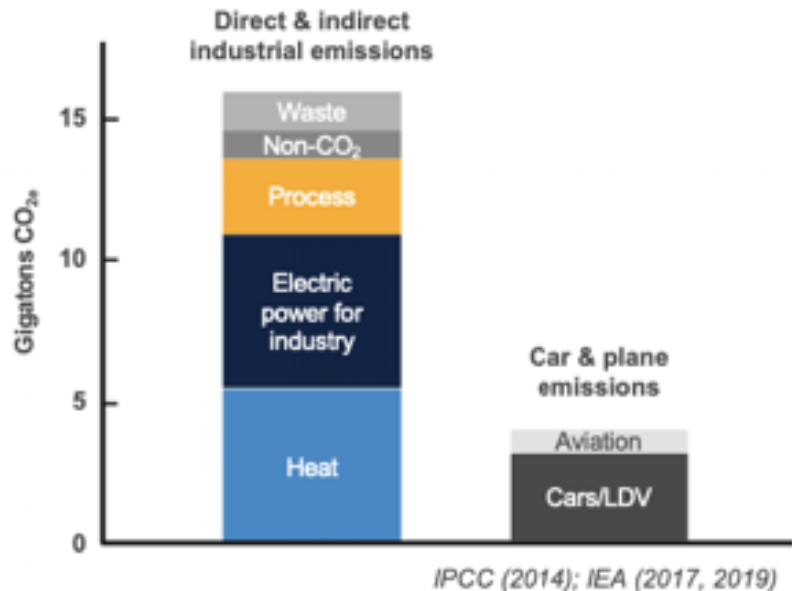
Poll Question

Who will take the lead in driving the industrial sector toward sustainability?

1. Government (policy)
2. Companies (commitments)
3. Customers (paying a green premium)
4. No one – Industry will never be sustainable

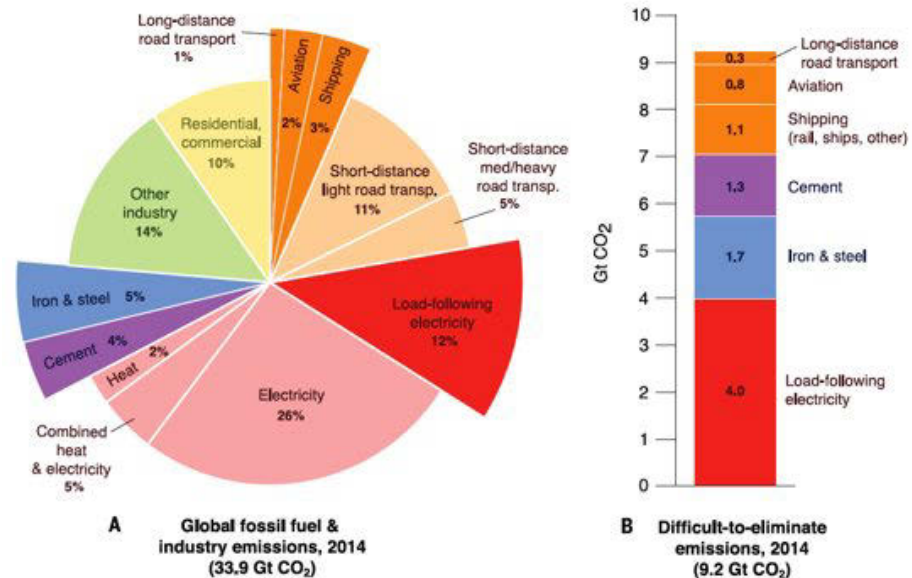
Industrial Energy is “Forgotten” Demand

Globally, emissions from industrial heating *only* are greater than cars and aviation combined



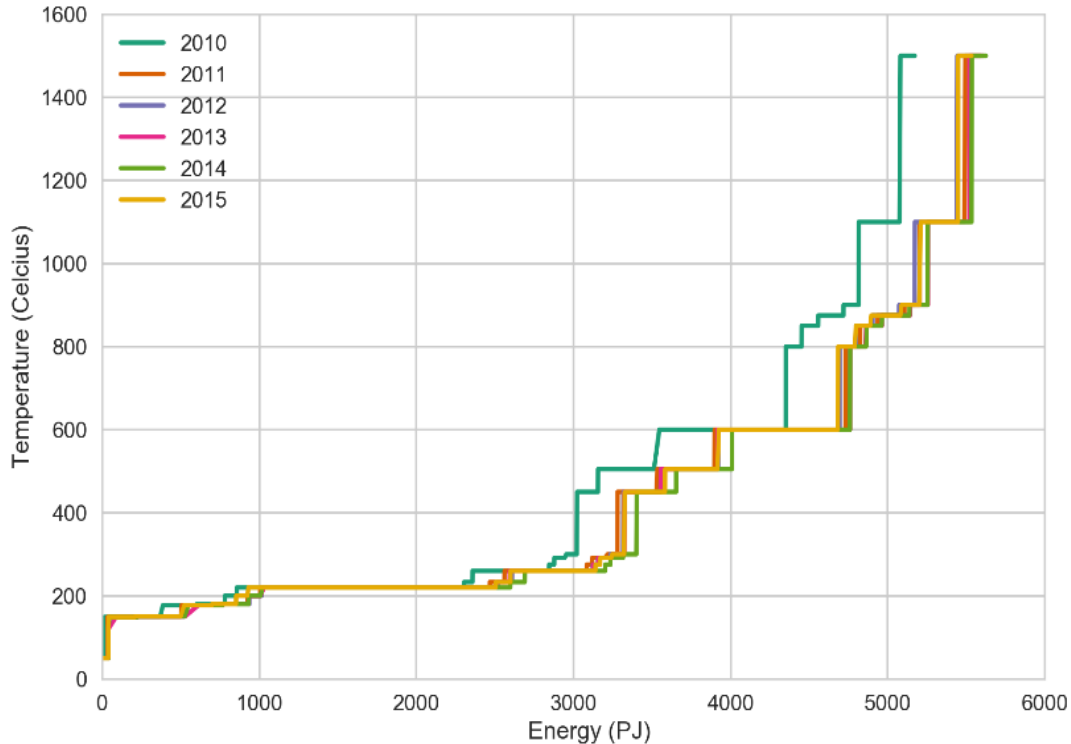
https://energypolicy.columbia.edu/sites/default/files/file-uploads/LowCarbonHeat-CGEP_Report_100219-2_0.pdf

Some of the most difficult areas to decarbonize are in the industrial sector



Adapted from S. J. Davis et al., *Science* **360**, eaas9793 (2018). DOI: 10.1126/science.aas9793

Thermal Energy is a Priority Opportunity

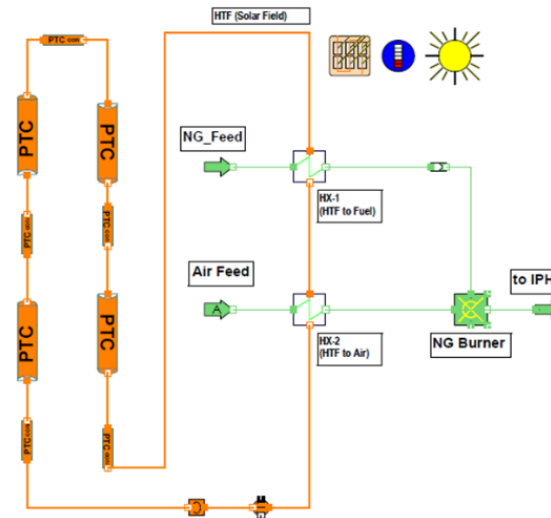
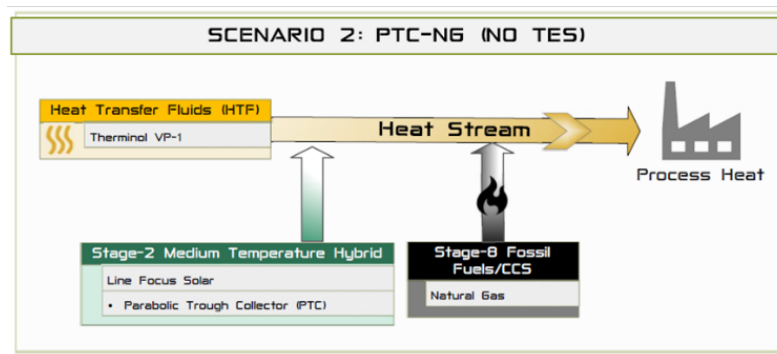


- In the U.S., 79% of industrial energy demand is for heating
 - 51% for process heating
- Over half of that heating demand is <math><300^{\circ}\text{C}</math>

Colin A. McMillan, Mark Ruth. "Using facility-level emissions data to estimate the technical potential of alternative thermal sources to meet industrial heat demand" *Applied Energy*, V. 239, (2019) p.1077-1090, ISSN 0306-2619, <https://doi.org/10.1016/j.apenergy.2019.01.077>.

Opportunities for Alternative Thermal Sources

Hybrid Parabolic Trough Collector (PTC) using a heat transfer fluid (HTF) and natural gas to boost temperature



Dynamic model developed with and without thermal energy storage (TES) and tested with multiple industrial loads

Clean Energy for Oil & Gas Consortium

JISEA established a collaborative program for the identification, development, modeling & analysis, and demonstration of clean power for oil and gas operations. The program will:

- Support the identification, development, and adaptation of **highly reliable, cost-effective clean energy solutions** for oil and gas operations
- Perform techno-economic analysis and **site-specific optimization** of combinations of renewable and conventional generation, storage, and energy conservation
- With industry partners, **demonstrate the most promising technologies** for validation of performance in a variety of field environments, while analyzing optimization scenarios.



Value Proposition

Demonstrate reliable, affordable, clean power for oil & gas operations.

- **Reduce risk to operations**
- **Collaboratively identify 'best practices' to reduce cost**
- **Access to unique, world class capabilities**
- **Leverage research/testing dollars**



Thank you!

NREL/PR- 6A50-79647

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 Joint Institute for
Strategic Energy Analysis