

# Welcome to the 2020 JISEA Annual (Virtual) Meeting!

## Energy For Future Food Systems

28 July, 2020

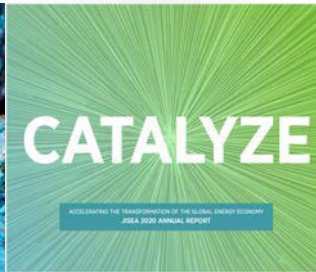
Introduction: Jill Engel-Cox, JISEA Director

Moderator: Darlene Steward, JISEA



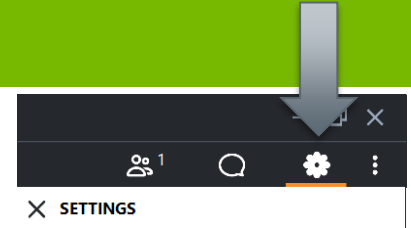
@JISEA1

[www.jisea.org](http://www.jisea.org)



# Some Housekeeping Items

## TWO OPTIONS FOR AUDIO SELECT SETTINGS WHEEL



1

### Listen through your computer.

Please select the “Computer” option and review your Microphone and Speakers selection.

2

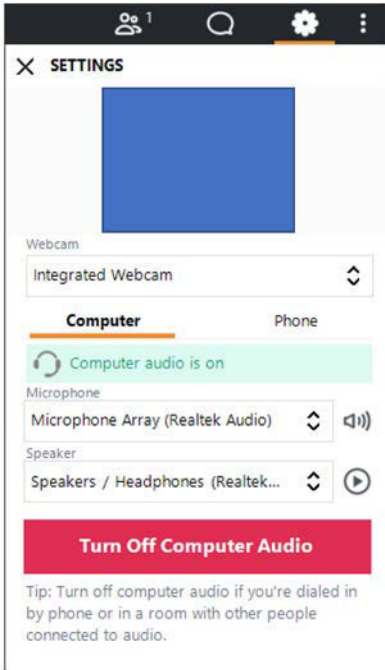
### Listen through by telephone.

Please select the “Phone” option and a phone number and access code will display.

**Unless presenting, please mute your audio device.**

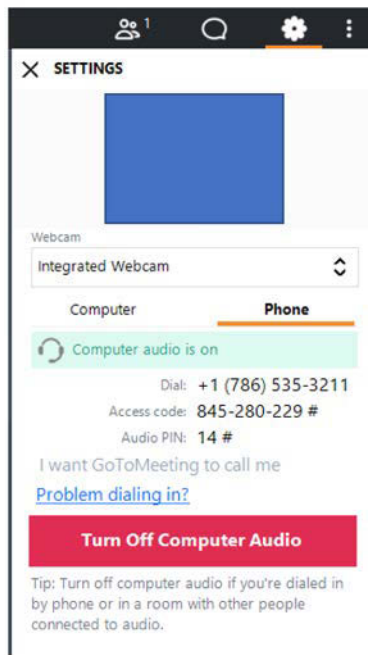
# GoToMeeting: Attendee Participation

## Computer Audio



The screenshot shows the 'SETTINGS' panel for 'Computer Audio'. The 'Computer' tab is selected, and a green bar indicates 'Computer audio is on'. Below this, there are dropdown menus for 'Microphone' (set to 'Microphone Array (Realtek Audio)') and 'Speaker' (set to 'Speakers / Headphones (Realtek...)'). A red button at the bottom says 'Turn Off Computer Audio'. A tip at the bottom reads: 'Tip: Turn off computer audio if you're dialed in by phone or in a room with other people connected to audio.'

## Phone Audio



The screenshot shows the 'SETTINGS' panel for 'Phone Audio'. The 'Phone' tab is selected, and a green bar indicates 'Computer audio is on'. Below this, there is a red button that says 'Turn Off Computer Audio'. The phone dialing information is displayed: 'Dial: +1 (786) 535-3211', 'Access code: 845-280-229 #', and 'Audio PIN: 14 #'. A link for 'Problem dialing in?' is also visible. A tip at the bottom reads: 'Tip: Turn off computer audio if you're dialed in by phone or in a room with other people connected to audio.'

## Your Participation

- Open and close your control panel.
- Join audio:
  - Choose **Computer** to use VoIP
  - Choose **Telephone** and dial using the information provided
- Submit questions and comments via the Chat panel (note if you don't want to ask verbally)
- We will call on and unmute you to ask question verbally with video on
- Be sure to answer the polling question!

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

## July 27-30: Sustainability in a Changing World

- Technical “Poster” Session and JISEA Intern Experience
- Energy for Future Food Systems
- Keynote Discussion: Rural Economies & Social Systems
- Circular Economy of Materials and Global Supply Chains

## Aug 3-6: Big Data and Business Systems

- Machine Learning and Artificial Intelligence for Energy Solutions
- Financial Risks and Opportunities of Decarbonization
- Keynote Discussion: Corporate Decision Making for Systems Innovation & Disruption
- Topic “Tables”: Open Discussion Breakouts with Experts

***All sessions about 45 minutes presentation and 30 minutes open questions & discussion***

# Goals

Identify opportunities to increase adoption of energy efficiency and renewable energy technologies in the food supply chain.

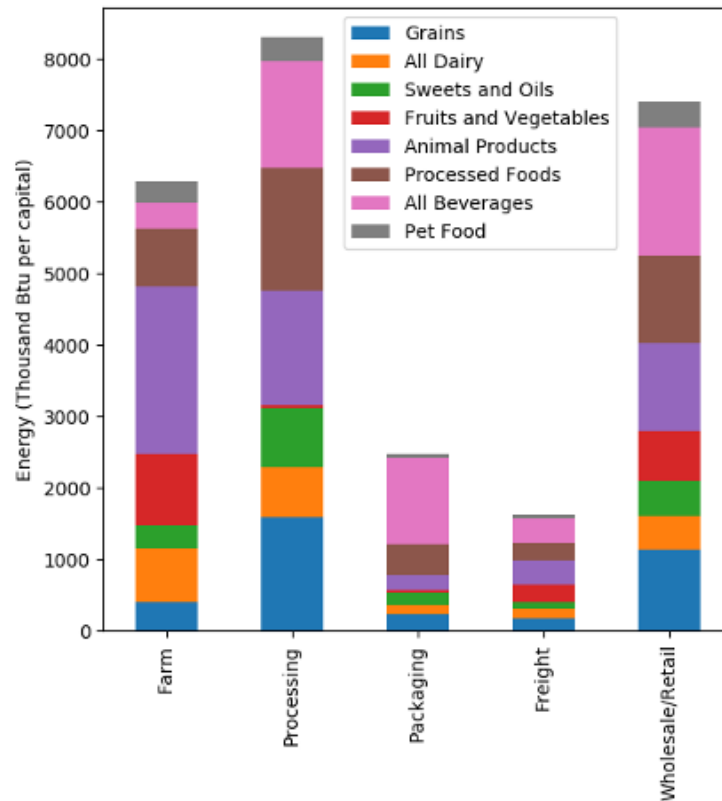
- There are many aspects of sustainability that directly or indirectly impact energy use, so looking at energy and sustainability is **broad**
- This is somewhat of a new area for JISEA, so one of our primary goals is to listen/learn from panelists

# Motivation-Food System Energy Use & GHG Emissions

The food system (agriculture and food processing) accounts for over 9% of the energy and 12% of the CO2 emissions for U.S. industrial sector in 2018

- EIA Annual Energy Outlook 2019

- Most energy used in the food system is from fossil fuels
- Renewable energy, energy recovery and energy efficiency offer opportunities for improved resilience and sustainability

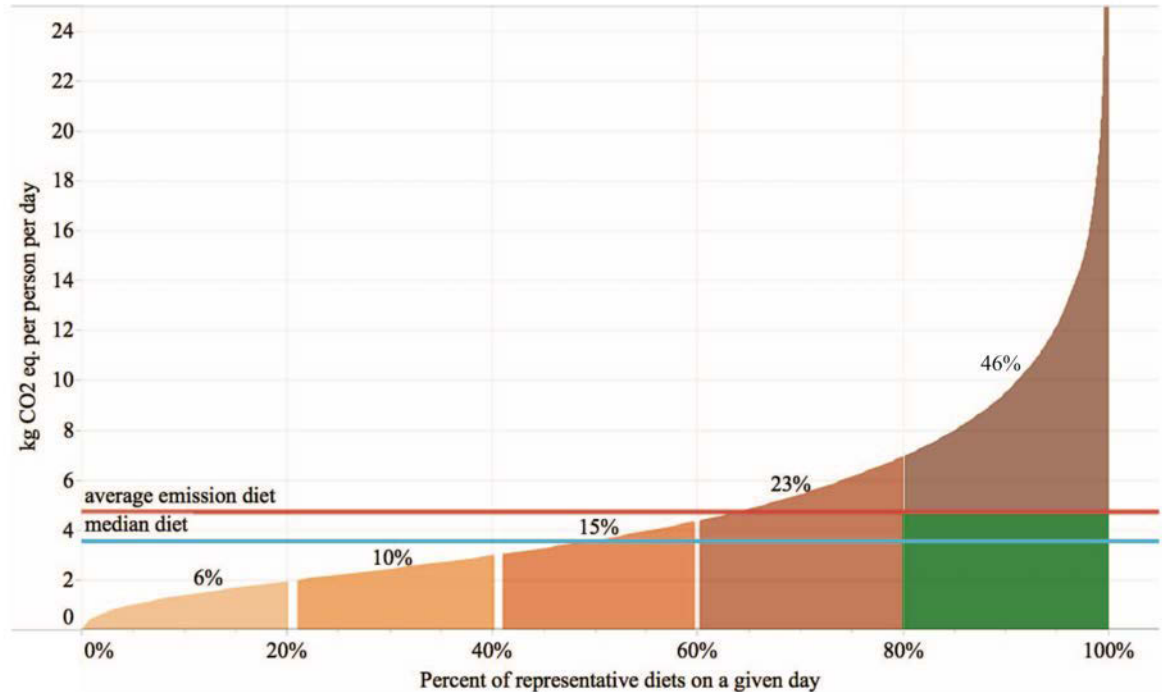


Source: USDA Report

# Energy Use & GHG Emissions Vary – A Lot

## By diet (i.e., the types of food people eat)

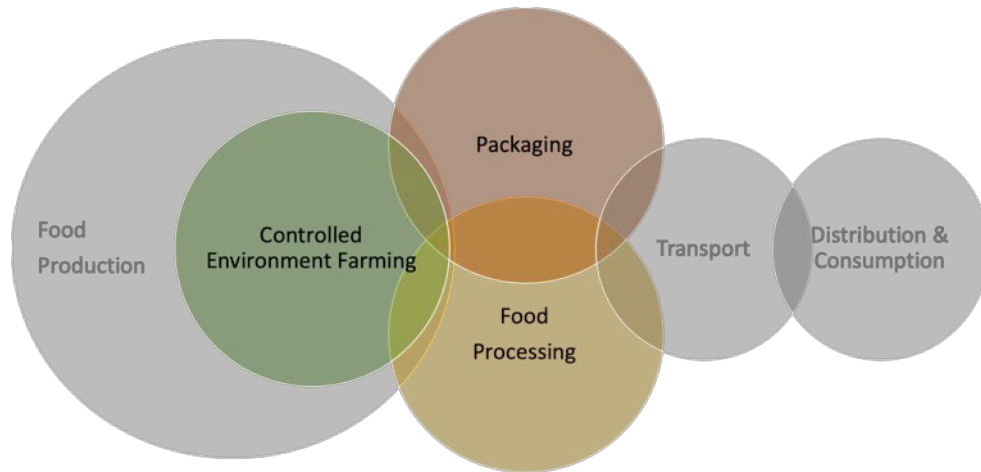
The authors of this study estimated that if the people in the highest impact quintile were to adopt the average diet (green), they would achieve between 9% and 9.6% of the remaining emissions reduction needed to achieve the U.S. pledge under the U.N. Framework Convention on Climate Change (UNFCCC)



Cumulative greenhouse gas emissions intensity for U.S. 1-day diets ranked in order of impact from least to highest. Figure from Heller et al. 2018.

Heller, Martin C., Amelia Willits-Smith, Robert Meyer, Gregory A. Keoleian, and Donald Rose. 2018. "Greenhouse Gas Emissions and Energy Use Associated with Production of Individual Self-Selected US Diets." *Environmental Research Letters* 13 (4): 044004. <https://doi.org/10.1088/1748-9326/aab0ac>.

# Potential for High-Impact Analysis



A significant fraction of the energy use in the food supply chain is consumed in controlled environment (CE) food production (e.g. poultry production and indoor agriculture) food processing and packaging. However, integrated energy-focused research on these aspects of the food system is lacking.



# Future Food Systems – Scoping Workshop



The banner features a geometric background of light green and grey triangles. On the left, the JISEA logo consists of a stylized grid of squares above the text 'JISEA' and 'Joint Institute for Strategic Energy Analysis'. On the right is the Colorado State University logo, a circular emblem with a ram's head, above the text 'COLORADO STATE UNIVERSITY'. The main title 'Sustainable Energy Opportunities in Food Systems' is in large blue font, with 'Program Scoping Meeting' below it. The dates '16-18 June 2020' are at the bottom left.

**JISEA** Joint Institute for  
Strategic Energy Analysis

**COLORADO STATE  
UNIVERSITY**

**Sustainable Energy Opportunities in Food Systems**  
**Program Scoping Meeting**

**16-18 June 2020**

Goal: Identify opportunities to increase adoption of energy efficiency and renewable energy technologies in the food supply chain.

# Controlled Environment Farming

## Themes

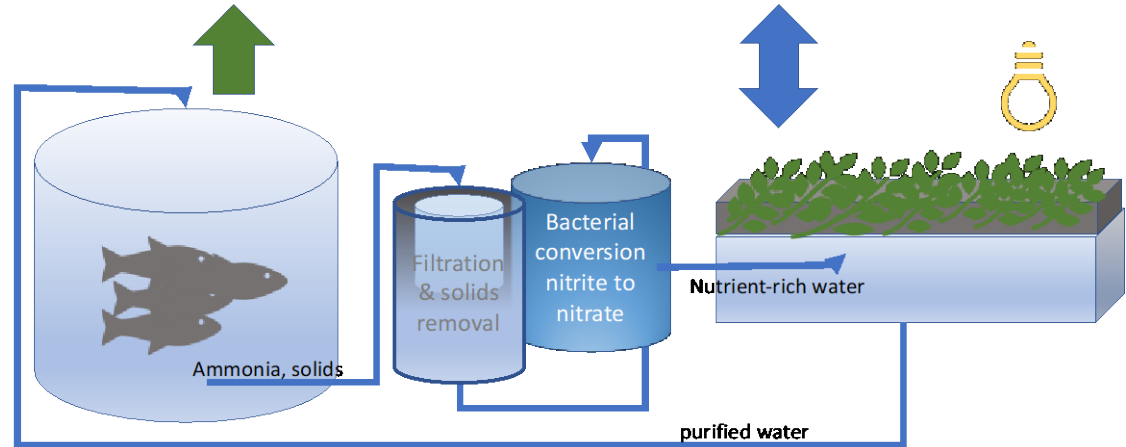
- **Valorize benefits/ disbenefits** such as water use, waste disposal, resilience, and animal welfare
- **Scale matters!** What are the best ways to look at distributed v. centralized food production to reveal new opportunities for significantly improving the food system?



- Fresh food/reduced processing
- Urban jobs
- Less transport/storage
- Intensification & Integration into built environment conserves land
- More resilient food supply



- Waste heat / geothermal heating & cooling
- Demand response
- Energy efficiency
- Recovery of nutrients from wastes
- Water reuse
- HVAC integration



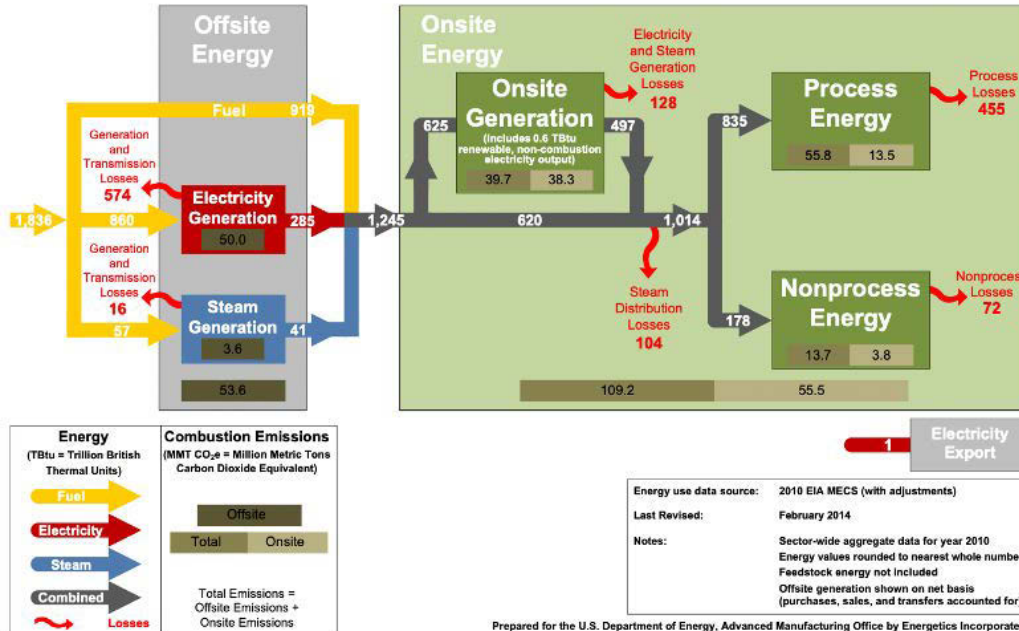
Graphic adapted from National Geographic Magazine, Aug. 2019

# Food Processing

**Manufacturing Energy and Carbon Footprint**  
Sector: Food and Beverage (NAICS 311, 312)

Total Primary Energy Use: 1,836 TBtu  
Total Combustion Emissions: 109 MMT CO<sub>2</sub>e

Total Primary Energy, 2010



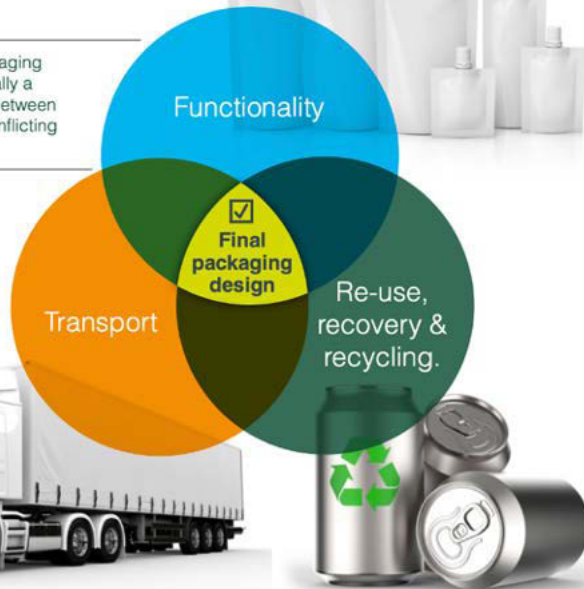
## Themes

- **Integrate energy systems** to maximize efficiency, use of waste heat and opportunities for renewables
- **Consider novel strategies** such as on-site processing and smart sensors to capture energy benefits

The figure was compiled by the Advanced Manufacturing Office of the U.S. Department of Energy.  
[https://www.energy.gov/sites/prod/files/2018/11/f57/2010\\_food\\_beverage\\_energy\\_carbon\\_footprint.pdf](https://www.energy.gov/sites/prod/files/2018/11/f57/2010_food_beverage_energy_carbon_footprint.pdf)

# Food Packaging

The final packaging design is usually a compromise between sometimes conflicting demands.



## Themes

- **Food packaging impacts the entire food supply chain** so a whole-system / whole lifecycle approach is needed
- **Consider novel strategies** to address the reverse supply chain of packaging

Packaging design considerations. from The Industry Council for research on Packaging & the Environment (“Sustainability Checklist for Packaging.” 2017. INCPEN. <https://www.incpen.org/sustainability-checklist-for-packaging/>)

# Energy for Future Food Systems

## Panel:

**Jennifer Amann (ACEEE)**

**Pernilla Audibert (Bond Pet Foods)**

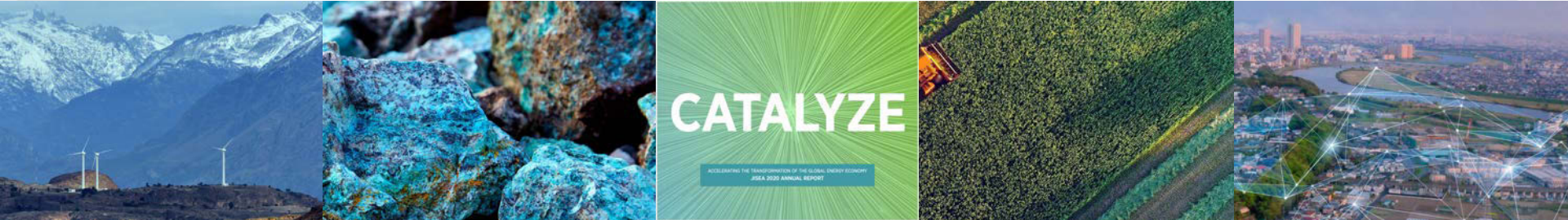
**Joe Gold (Pepsico)**

*Moderator: **Darlene Steward (JISEA/NREL)***

# Polling Question

What aspect of the food system presents the best opportunity to improve the sustainability of our food supply?

- A. Reduce food waste
- B. Reduce meat consumption
- C. Increase efficiency in the food supply chain
- D. Change how & where food is produced



# Thank you

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NREL/PR-6A50-77467

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