Food Waste Research

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Why Food Waste?

Wastes Resources

Producing and distributing food that is ultimately wasted in the United States uses enough water and energy to supply 50 million homes.

Impacts Environment

Food waste is responsible for more than 8% global anthropogenic GHG emissions.

Meet Commitment

*2015 **U.S. Food Waste Reduction Goal** to halve food waste by 2030 is in line with the UN target adopted by nations representing roughly half the world's population.*

Aligns with Stakeholder Needs and EPA Priorities

Cities and states are passing laws and starting programs to curb food waste in order to feed people, reduce GHG emissions, and aid climate adaptation (through compost).

SHC 2019-2022 Food Waste Research Portfolio

Synthesizing the "State of the Science" and Identifying Future Research Needs

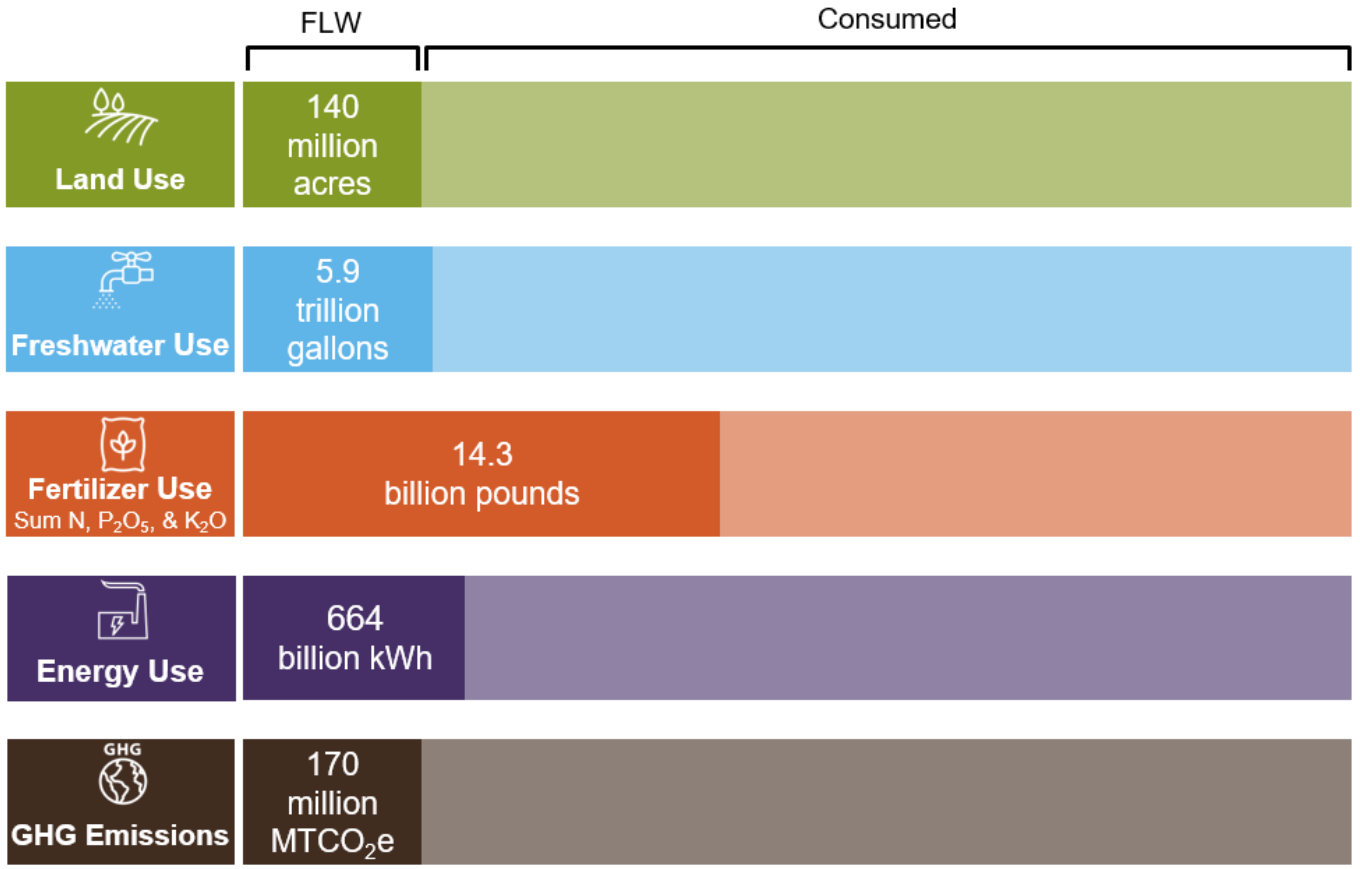
- Environmental Impacts of Food Waste: Part 1 *(Nov 2021)*
- Environmental Impacts of Food Waste: Part 2 *(2022)*
- Persistent Chemicals & Plastic Contamination *(Aug 2021)*
- Pre-Processing Technologies *(Sept 2021)*

Original Research

- Microplastics from De-Packaging Technologies
- Output and Downstream Impact of Kitchen Digesters
- LCA of Food Waste Management Strategies with USEEIO model (informed by first two "State of the Science" reports above)

Environmental Indicators

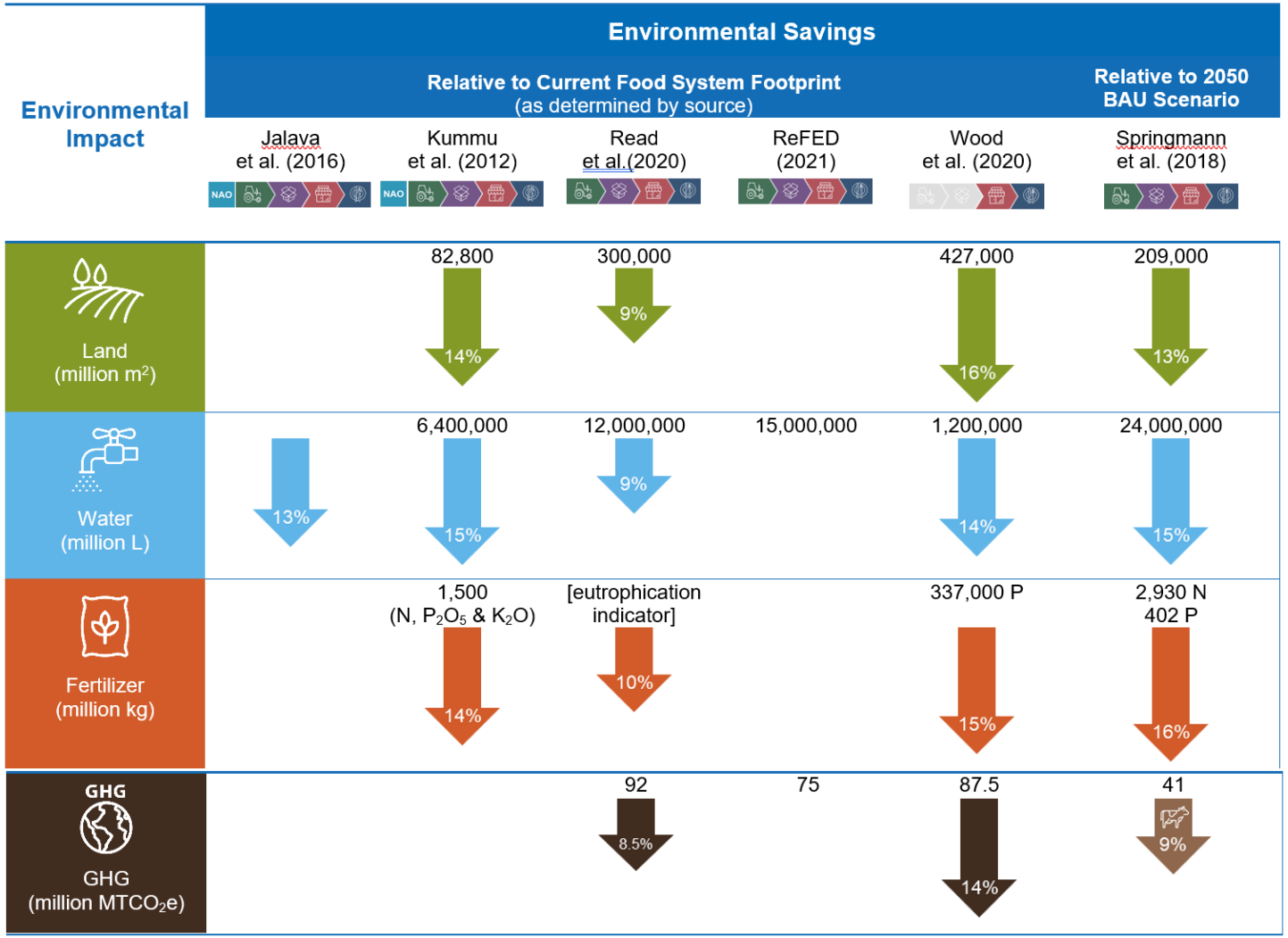
What have we learned?



Annual Environmental Footprint of U.S. Cradle-to-Consumer Food Supply Chain

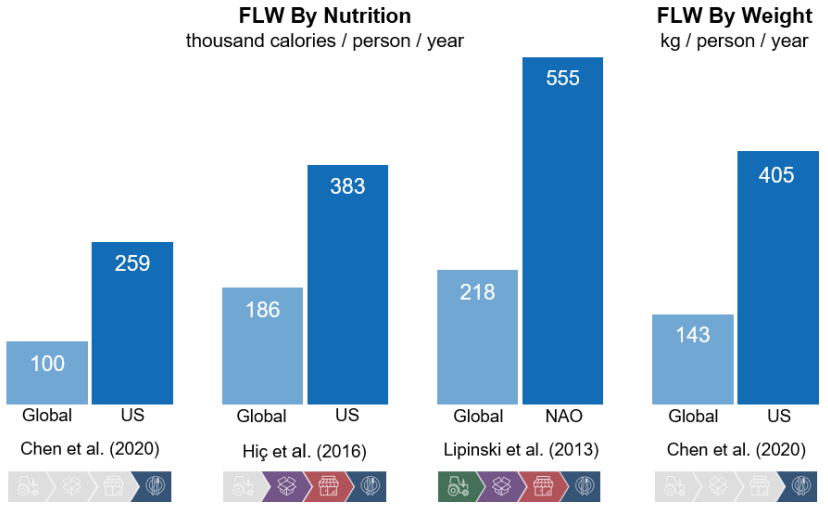
Data Sources: Read et al. (2020) (land, freshwater, GHG); Toth and Dou (2016) (fertilizer); Pagani et al. (2020) & Vittuari et al. (2020) (energy)

What have we learned?



Maximum Cradle-to-Consumer Environmental Benefits of Halving U.S. Food Waste

What have we learned?



Global and U.S. Per Person Annual FLW

	FLW g	Cropland m^2	Freshwater L	Fertilizer g N + g P	Non-CO_2 GHG Emissions g CO_2e
U.S.	503	103	151	9	457
High Income	371	81	118	7	315
Upper-Middle Income	222	45	77	5	144
Lower-Middle Income	52	10	19	1	33
Low Income	39	8	12	1	32

Daily Per Person FLW and FLW Environmental Footprint, by Global Income Group

Data Source: Chen et al. (2020)

What have we learned?

- The life cycle environmental benefits of food waste pre-processing technologies (such as grinders and aerobic digesters) are unclear.
- Contamination of food waste streams by plastic and PFAS is a barrier to increasing food waste recycling.
  - Plastics, including microplastics, have been repeatedly observed in compost made from food waste. Food waste is more contaminated with plastic than yard waste.
  - PFAS have been reported in food, food packaging, food waste, and compost made from food waste. Limited research indicates food waste contains lower concentrations of PFAS than biosolids, but greater concentrations than other organic wastes.
  - Risks to human health and environment of applying PFAS-contaminated compost to soil is not yet well characterized in the literature.
- **Next Step: Examine EPA Food Recovery Hierarchy**

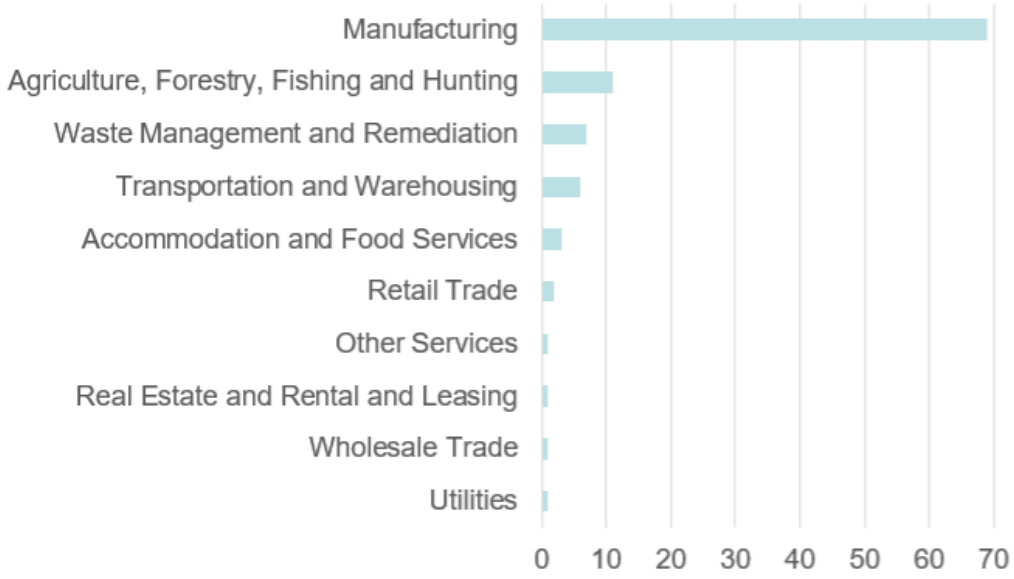
The Environ-mental Impacts of the US Food System

Objective:

- Model the US food system by combining USEEIO and the USDA's Food Environmental Data System
- Identify hotspots and opportunities for making the food system more sustainable
- Make this food system model available for user exploration via the in the Sustainable Materials Management National Prioritization Tool

Definition*:*

All economic (industrial, agricultural, commercial) and household activities and their associated natural resource needs and potential environmental impacts required for the production, distribution, storage, preparation, consumption and disposal of food and beverages for people and their pets and all associated materials and wastes.

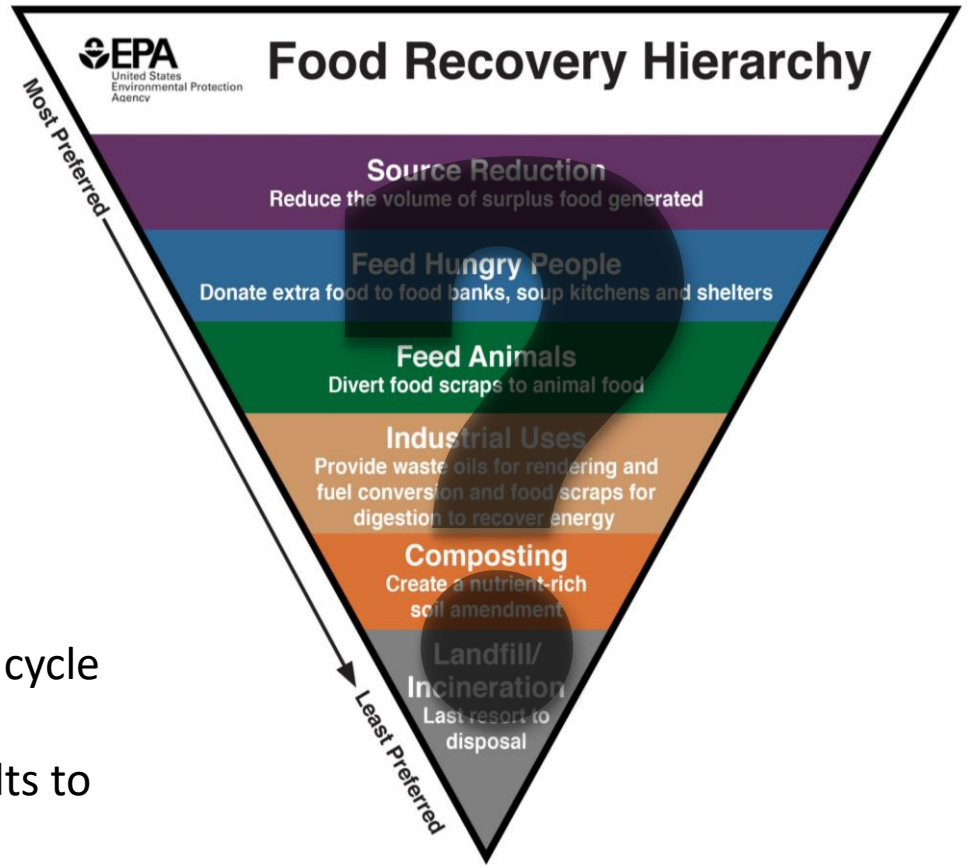


Preliminary estimate of the # of USEEIO industries whose output fully or partially supports the US food system

Progress Update: MOU signed 10/2021 with Cornell and Argonne National Laboratory with USDA informally involved

LCA Study to Evaluate Food Recovery Scenarios

Are there exceptions or nuances to the food waste hierarchy for food waste management when considered from a life cycle perspective?



Approach

Leverage USEEIO-WARM to evaluate life cycle impacts of food waste generation and management scenarios, comparing results to a baseline case for the US food system

Potential Future Research