

The background of the slide is a grayscale photograph of industrial machinery. On the left, there is a circular pressure gauge with a white face and black markings, ranging from 0 to 1.0. The needle is positioned at approximately 0.4. To the right of the gauge, there are various pipes, valves, and mechanical components, including a large vertical pipe with a valve handle. The overall scene is a close-up of a complex industrial system.

# Waste and Resource Minimization Strategies for Food Producers

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**Driven to Discover<sup>SM</sup>**



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# Pollution Prevention (P2)

- **Waste:**
  - no longer useful byproducts of inputs and processes
- **Pollution:**
  - waste or harmful substance that is returned to the environment
- P2 = Eliminating **the source**, generation, or release of toxic pollutants, hazardous substances, hazardous wastes, or industrial wastes
  - Source reduction = pollution prevention



# Resources, Outputs, and Costs

Energy	Electricity	Power Costs
	HVAC / Air Emissions	Permit Fees
Water	Wastewater	Permit Fees, Strength Charges
	Stormwater	Permit Fees
Chemicals	Wastewater	Strength Charges
	Chemical Waste	Disposal Fees
Food/Products	Food Waste	Disposal Fees (trash taxes)
	Packaging Waste	Disposal Fees (trash taxes)

# Understanding Values – ESG and CSR

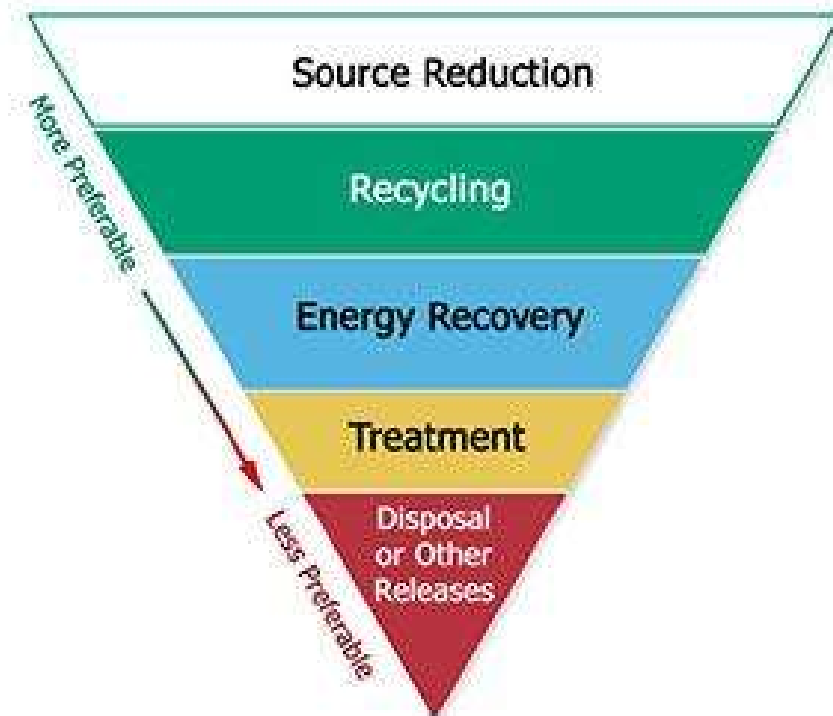


- Community
  - Safety
  - Trust
  - Partnerships
- Environment/Resources
  - Food
  - Animals
  - Planet
- Regulations
  - Compliance
  - Governance

P2 Focus Area	Opportunities	Corporate Value
Water	Permitting	Regulations
	Water conservation, long-term supply	Community, Environment
Wastewater	Strength charges (BOD, TSS, nutrients)	Regulations
	Effluent volume	Regulations, Environment
	Pretreatment scheme	Regulations
Solid/Hazardous Waste	Chemical replacement	Community, Environment
	Generator size reduction	Regulations, Environment
	Worker safety	Community
	Waste reduction	Regulations, Environment
Energy Efficiency	Best management practices	Regulations
	Air emissions reduction	Community, Environment

# Resource Optimization

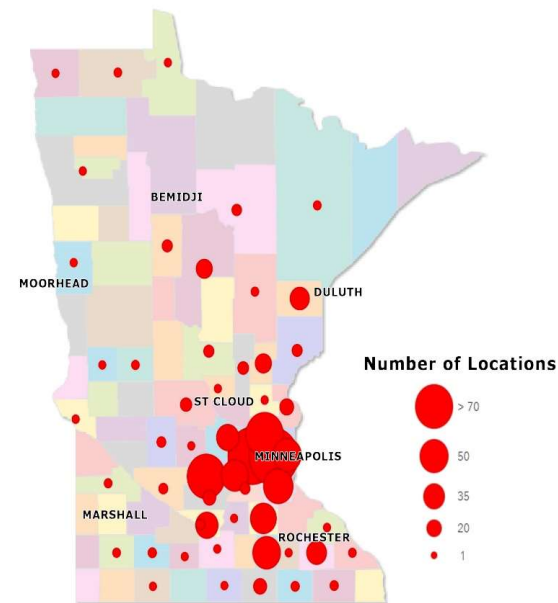
- Reduce excess energy usage (energy efficiency)
- Minimize or reuse water
- Minimize the need for chemicals (which can be expensive!)
- Prevent or reduce waste before moving to reuse, recycling or disposal



<https://www.epa.gov/toxics-release-inventory-tri-program/pollution-prevention-p2-and-tri>

# Minnesota Technical Assistance Program

- Confidential, grant-funded environmental support for MN businesses
  - Prevent pollution at the source
  - Optimize resource consumption
  - Reduce waste and energy use
- 11 engineers and professionals
- Based in School of Public Health at U of M (East Bank)



1,700+ Supported Facilities 2018-2022

# Minnesota Technical Assistance Program

## MnTAP is...

- On-site and remote technical assistance
  - Water and waste evaluations
  - Energy efficiency studies
  - Safer chemicals analysis
  - Pollution prevention training
- Summer internships
- Information repository

## MnTAP is *not*...

- Local, state, or US government
  - Publicly and privately funded
- Regulatory authority
  - No fines, fees, or surcharges
- For-profit engineering firm
  - No shareholders or profit goals

# Varying P2 Needs

- Facility-based P2
  - Building heating/cooling – Any facility
  - Refrigeration – dairy, meat, fruit/vegetable
  - Process heating – bakeries, distilleries/breweries
- Industry-specific P2
  - Dairies/beverage producers – Wastewater flow
  - Shelf-stable food producers – Organic waste
  - Packaged food manufacturers – Edible oil disposal



# Water Conservation – Closed-Loop Cooling

- Single-pass cooling water was discharged to drain
- Pump and tank were installed to close cooling loop
- Annual savings:
  - 7,000,000 gallons of water
  - 34,000 therms
  - **\$74,000**



# Chemical Reduction – Foot Foamers

- 10 foot foamers at production entry points
- Spray rate and duration were adjusted to avoid overuse
- Annual savings:
  - 3,200 gallons of sanitizer
  - 5,000 lbs of chemical
  - **\$11,000**

**AFCO 8078  
BOMB QUAT FLC-8**

Cleaner • Disinfectant • Food Contact Sanitizer •  
Mildewstat • Virucide\* With Organic Soil Load

For Food Handling and Process Areas, Dairy,  
Federally Inspected Meat and Poultry Plants.

**ACTIVE INGREDIENTS:**  
Alkyl (50% C14, 40% C12, 10% C16)  
Dimethyl Benzyl Ammonium Chloride..... 4.0%  
Octyl Decyl Dimethyl Ammonium Chloride..... 3.0%  
Didecyl Dimethyl Ammonium Chloride..... 1.5%  
Dioctyl Dimethyl Ammonium Chloride..... 1.5%  
**OTHER INGREDIENTS:**..... 90.0%  
**TOTAL:**..... 100.0%

**NON-FOOD CONTACT SURFACE SANITIZING DIRECTIONS**  
**NON-FOOD CONTACT SURFACE SANITIZING:** Pre-clean heavily soiled surfaces. Add 1- 3.2 oz. of this product to 5 gal. of water (or equivalent use dilution) (150-400 ppm active). Apply solution to hard, non-porous surfaces with a sponge, brush, cloth, mop, by immersion, auto scrubber, mechanical spray device, hand pump trigger spray device, coarse trigger spray device. For spray applications, spray 6-8 inches from surface. Do not breathe spray. Treated surfaces must remain wet for 3 minutes. Rinse with potable water after use on surfaces that come in contact with food. Prepare a fresh solution daily or when visibly dirty.

*(For food processing or other facilities that have installed entryway sanitizing systems.)*  
**ENTRYWAY SANITIZING SYSTEMS:** To reduce cross-contamination on treated surfaces from area to area, set the system to deliver 1.25 – 2.75 oz. of this product per 2.5 gal. of water (or equivalent use dilution) (400-850 ppm active) of sanitizing solution. The spray must cover the entire path of the doorway. Set the system so that a continuous wet blanket of sanitizer solution is delivered to the floor. Do not mix other foam additives with the sanitizing solution.

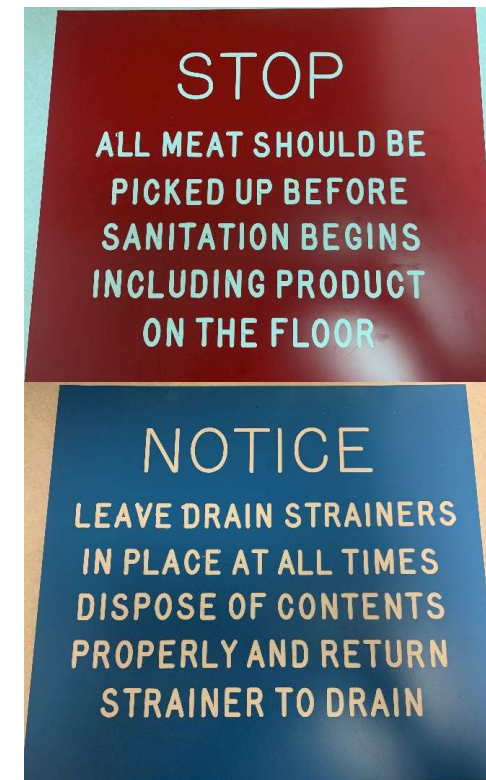
**TO CONTROL MOLD/MILDEW:** Prepare use solution by adding 3 oz. of this product per 5 gal. of water (0.6 oz. of this product per gal. of water) (or equivalent use dilution). Apply use solution to hard, non-porous surfaces which will effectively inhibit the growth of mold and mildew and their odors. Repeat treatment every seven days, or more often if new growth appears.



Bomb Quat FLC-8 AFCO 8078 Label.pdf

# Waste Reduction – Manual Pre-Cleaning

- Solid food waste was discharged to wastewater
- Remove waste by hand prior to cleaning
- Separate like with like
- Annual savings:
  - 15,000 pounds of meat waste
  - COD and TSS reduction in WW
  - **\$13,500**



# Waste Reduction – Sorting Optimization

- Facility evaluated sorting machines for removal efficiency
- MnTAP intern identified machines for improvement
- Real-time results were made visible
- Annual savings:
  - 66,000 pounds of organic waste
  - **\$33,000**



# Waste Reduction – Product Re-Work

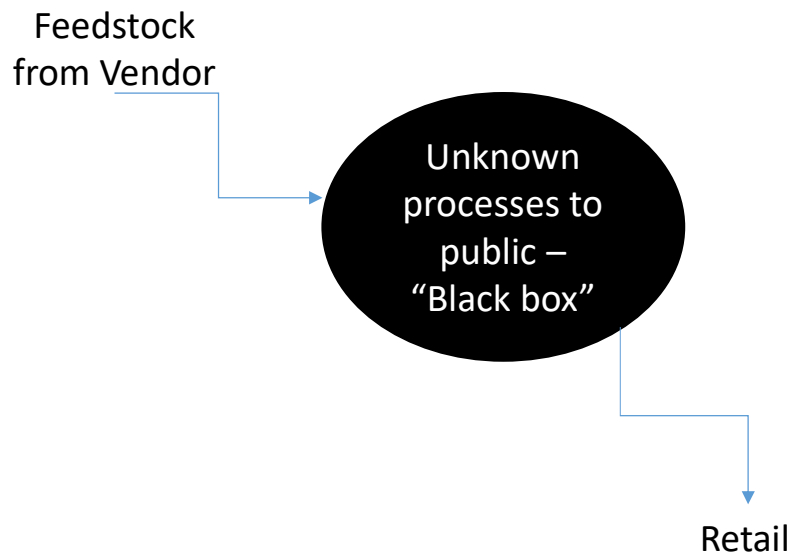
- Product expired in cooler before it was re-worked
- Disposed as animal feed instead of reprocessed into saleable good
- Tag system planned to prevent loss from expiration (\$140/year)
- Annual savings:
  - 233,000 gallons of product
  - **\$284,000 in revenue**
  - **\$123,000 in transport costs**



# Food Waste Minimization

- 35% of US food (\$418B) is unsold or uneaten annually
- Opportunities:
  - Source Reduce
  - Reuse (internally) or Upcycle
  - Donate (people) or divert to animal feed
  - Compost/Anaerobically Digest

# Source Reduction



- Seneca Foods -optical color sorting for quality differentiation
  - 18 tons of peas saved
- Analyze any bottlenecks or processes that need to be recalibrated
- Speak with growers of feedstock
  - Analyze logistical concerns prior to arrival

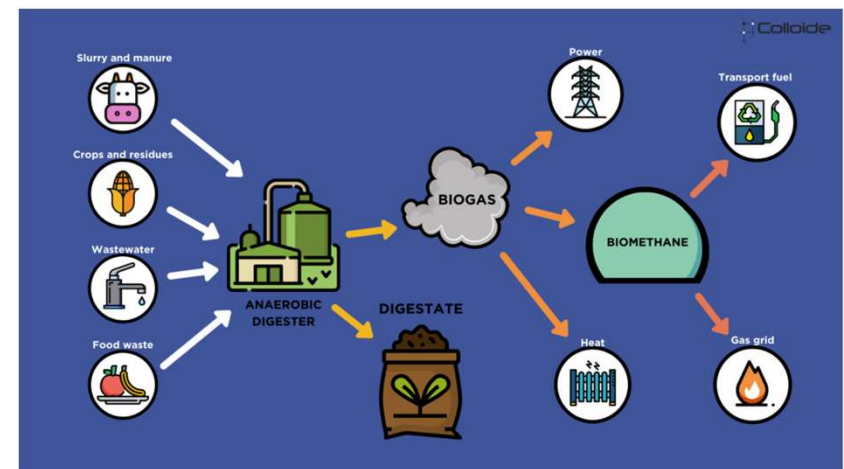
# Upcycle and Feed-to-Hogs

- 6.2 million lb. of produce potential
- 17 feedstocks currently being researched by UoM LCA class
- Moving up the waste valorization pathway



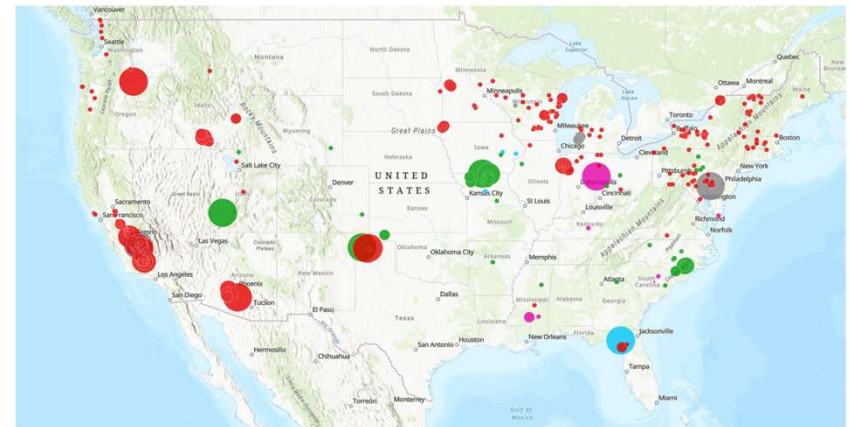
# Compost or Digest

- Good relationship with various digesters
- Capacity for food waste
- Beverage vs food manufacturers
  - FOG
  - Slaughterhouse
  - Other



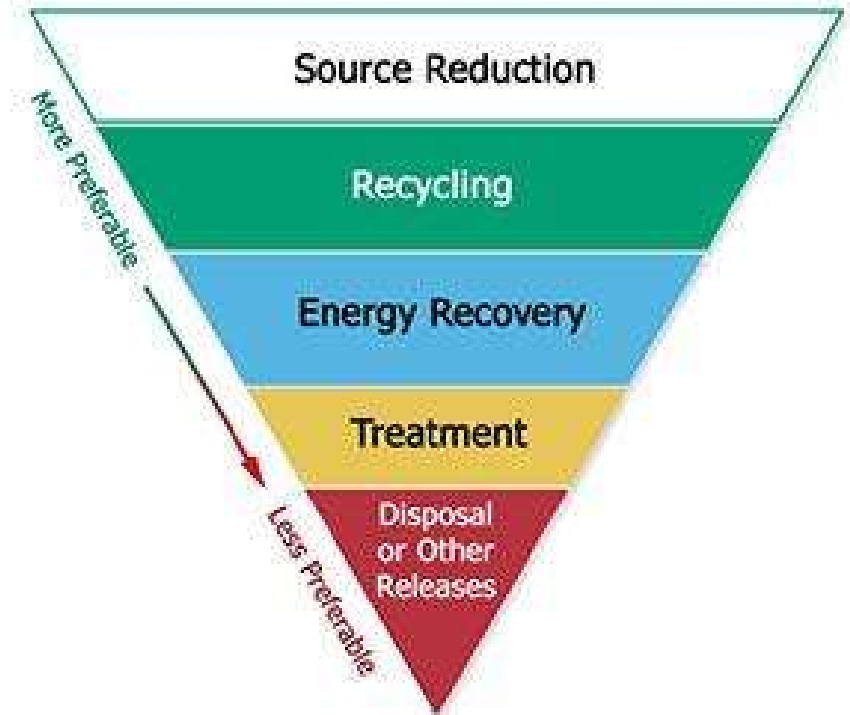
# AD Map Resources

- [Anaerobic Digester Map \(arcgis.com\)](https://arcgis.com) - EPA
- [Microsoft Power BI](https://www.microsoft.com/powerbi) - WEF
- <https://geopub.epa.gov/ExcessFoodMap/> - EPA
- Google



# Source reduction is the goal!

- One person's waste is another's:
  - Digester feedstock
  - Compost starter
  - Animal feed
  - Upcycling material
  - Recyclable resource



<https://www.epa.gov/toxics-release-inventory-tri-program/pollution-prevention-p2-and-tri>

# Thank You!

*Strengthening Minnesota businesses by improving efficiency  
while saving money through energy, water, and waste prevention*



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