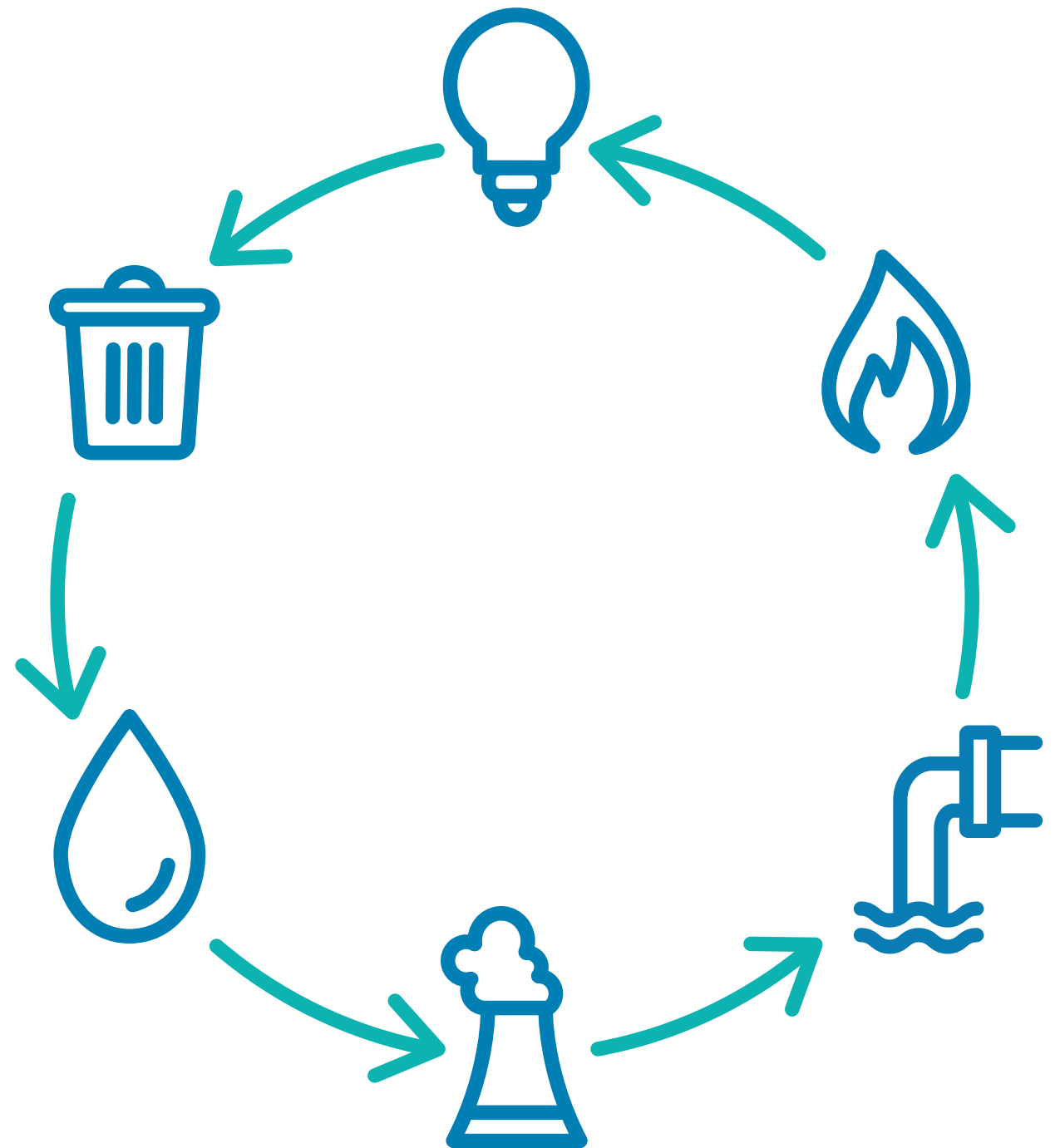


# Sustainable Food Manufacturing

## The Pollution Prevention Approach to Food Waste & Loss Prevention

## Enviro-Stewards.

- We cultivate resilient businesses and
- improve lives in extraordinary ways



# Resilient Businesses

Case study: Maple Leaf Foods.

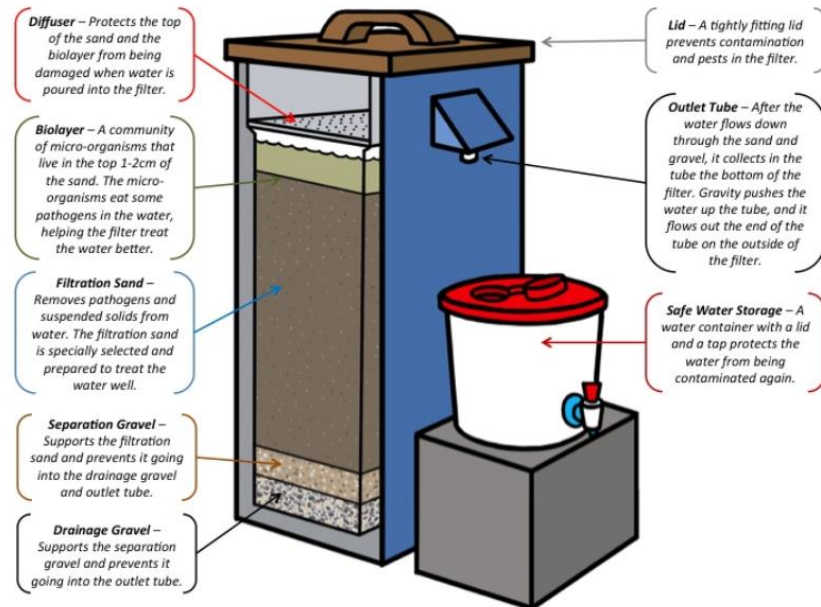


- Maple leaf Foods (MLF) has bold targets to reduce water, energy, and waste 50% by 2025
- Completed energy, water, and pollution prevention assessments at 33 facilities
- Currently 1/2 way to 2025 target and saving >\$2,000,000/yr



# Improved lives.

## SAFewater PROJECT



# Pollution Prevention.

A piece of the puzzle.





# Pollution Prevention.

A piece of the puzzle.



Food waste **management** is a cost item.

Food waste **prevention**, through the application of P2 principles, is a revenue stream.

# **Food waste in North America.**

An overview

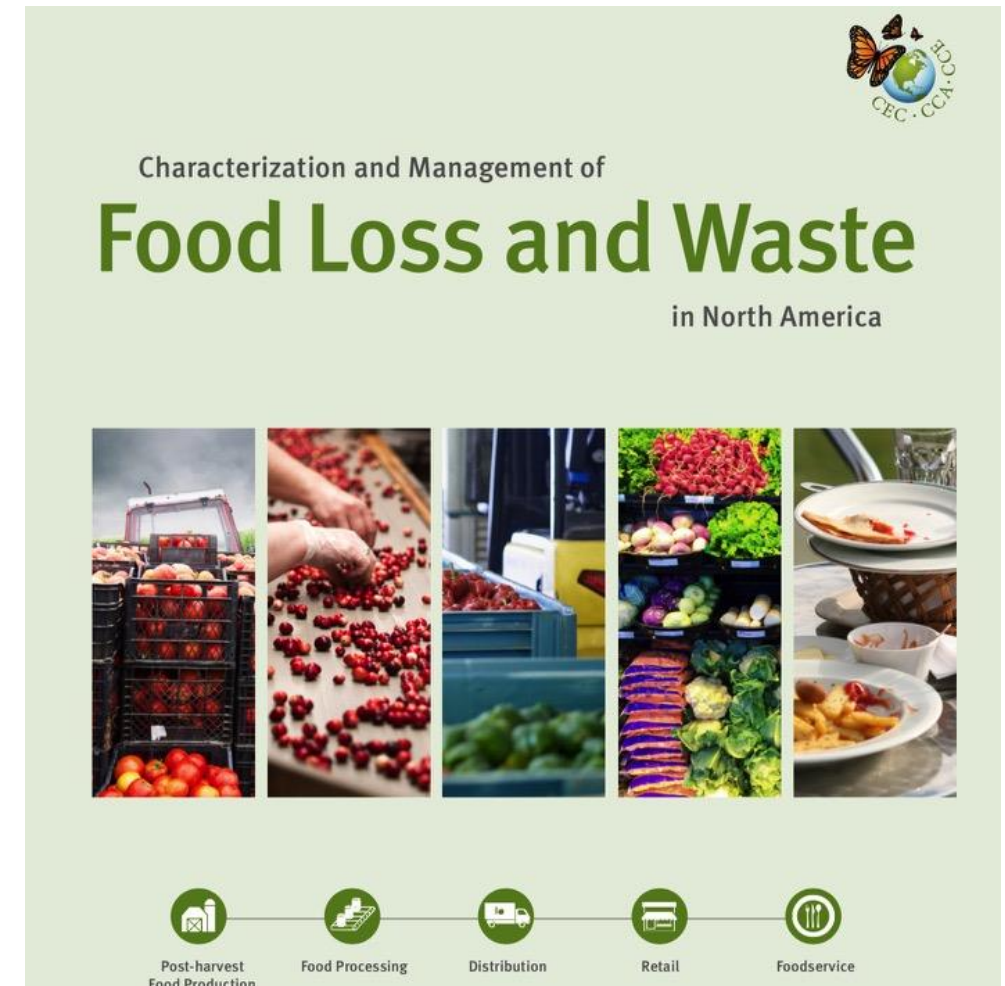




# The cost of food waste in North America.

Commission for Environmental Cooperation (CEC).

- CEC is a partnership between USA, Canada, and Mexico



## **The cost of food waste in North America.**

Commission for Environmental Cooperation  
(CEC).

**168,000** tonnes/year

## **The cost of food waste in North America.**

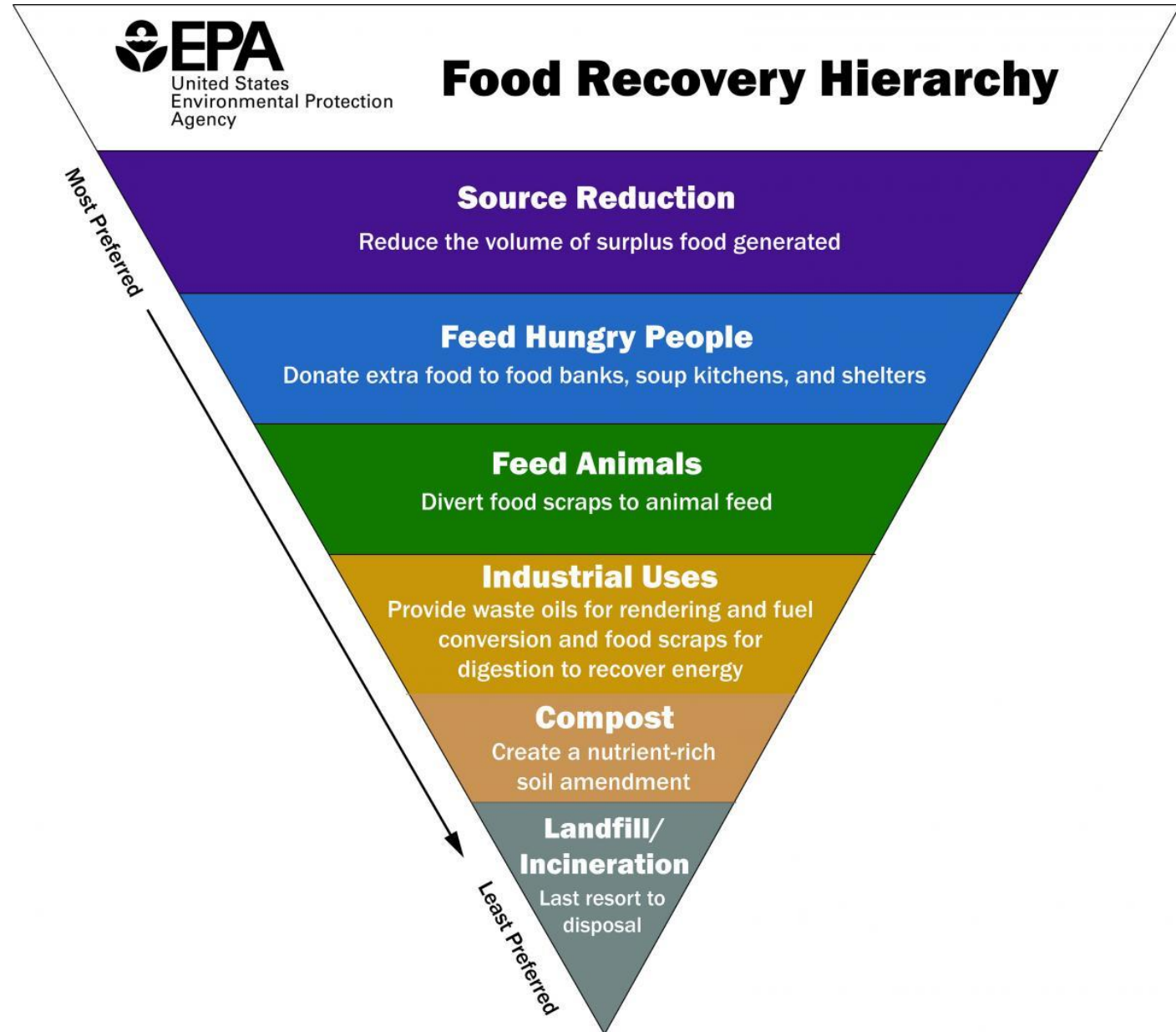
Commission for Environmental Cooperation  
(CEC).

168,000 tonnes/year

**US\$278** billion/year

# Food Recovery.

EPA's hierarchy.



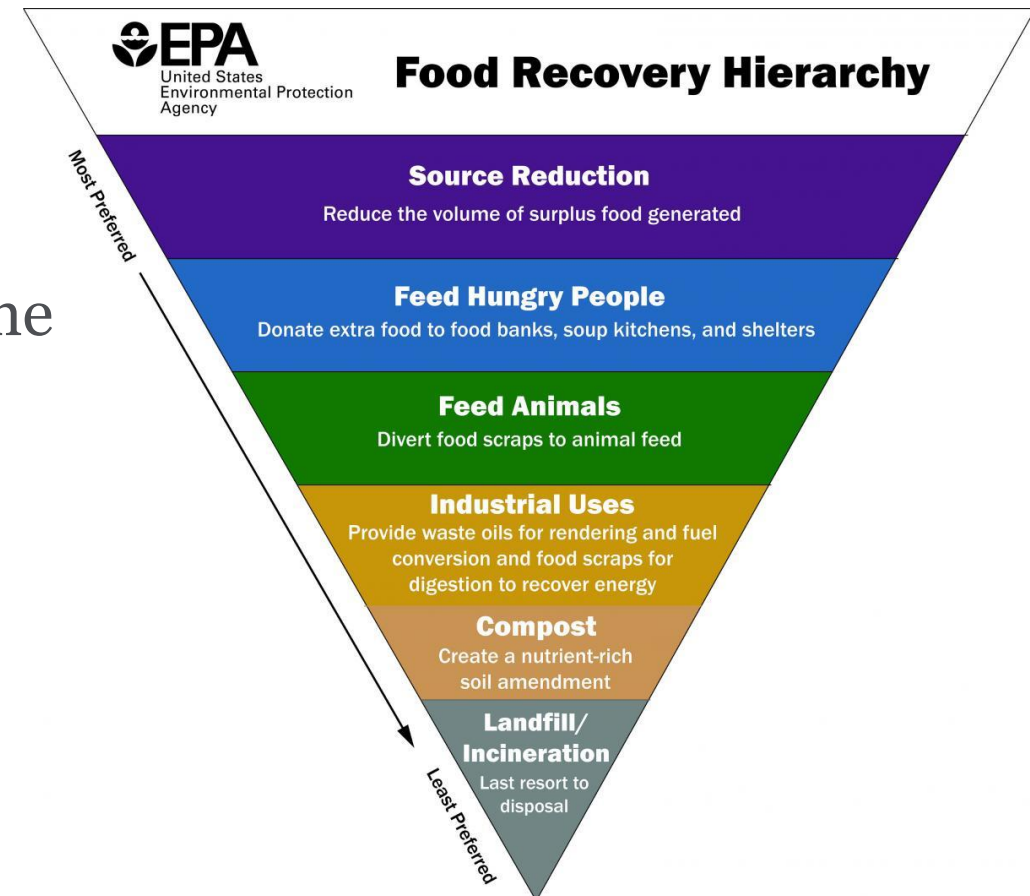


# Compost, bio-digestion.

EPA's hierarchy.

Is it really “net zero” waste?

- Diversion to bio-digestion is better than landfill, but doesn't address root causes of the food waste



## Quick example.

Campbell Company

*Campbell's*

- **\$706k**/year savings with 6-month payback
- **938** tonnes/year food saved
- **4,000** tonnes/year less embedded GHG emitted

2018  **Clean50**  
Outstanding Contributors to Clean Capitalism  
**PROJECT-OF-THE-YEAR**

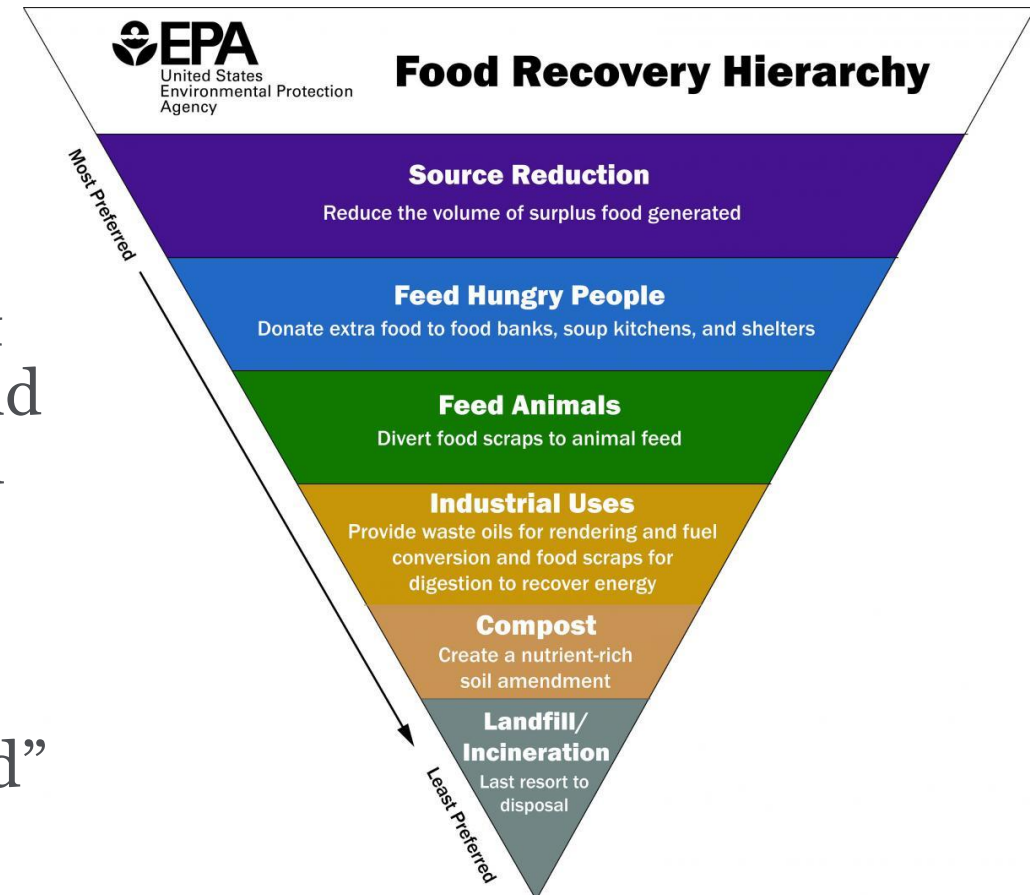


# Source Reduction.

EPA's hierarchy.

Is Source Reduction the most preferred option?

- **Yardsticks** that ignore loss of embedded & added resources underestimate total cost and hence skew decisions towards less preferred options
- **Reporting** without a reporting category (destination) for source reduction, it will be ignored: “What gets measured gets managed”

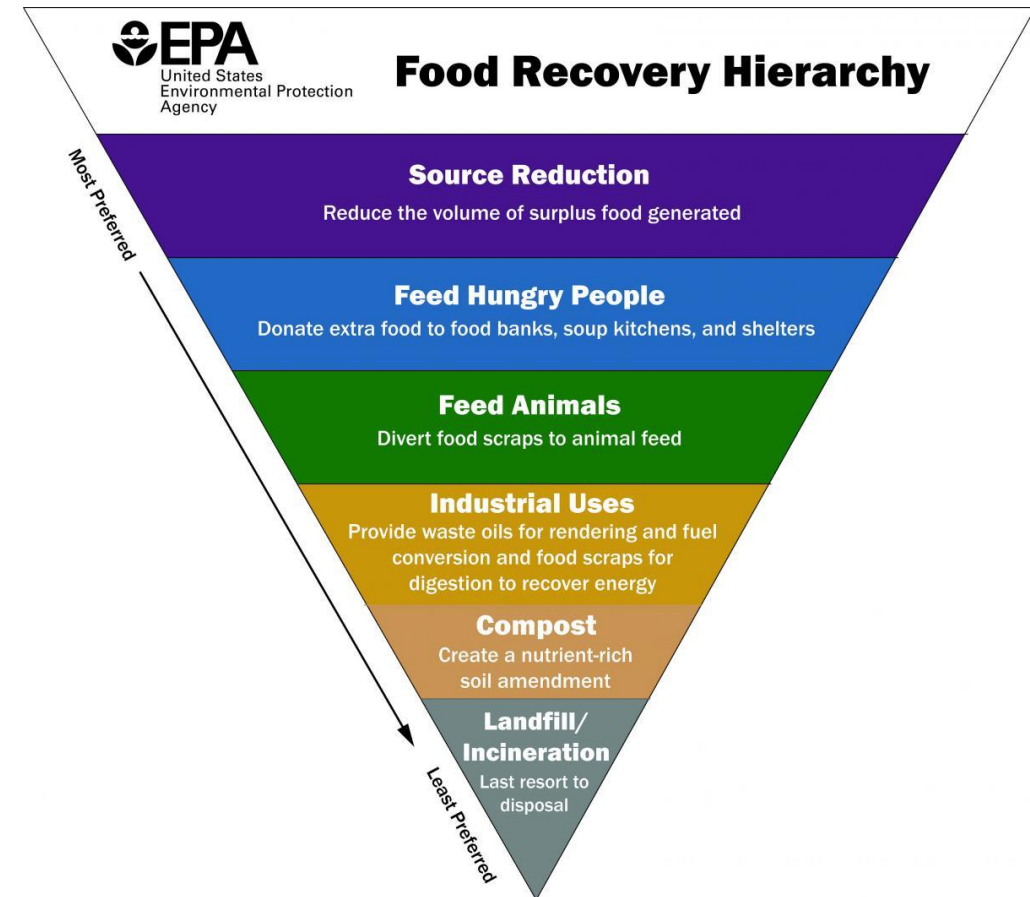


# Source Reduction.

EPA's hierarchy.

**Prevention** approach to Source Reduction is the most preferred option

- **Prevention** utilizes P2 principles to:
  - Measure food waste
  - Identify root cause(s)
  - Develop opportunities to eliminate or reduce waste at-source
- **Generates** economic, environmental, and social benefit





## Prevention.

Management vs Prevention.

### Food waste management

- A **cost** item
- - \$70/ton
- - \$100/ton

### Food waste prevention

- A **revenue** stream
- + \$1,000/ton
- + \$8,000/ton

## **Food waste prevention.**

The costs embedded in food waste.



## Food waste prevention.

The costs embedded in food waste.

- Environmental
- Economic



Cooking  
(BTU)

Labour  
(\$/hr)

Chilling  
(kWh)

Processing  
(kWh, gallons)



Thawing  
(gallons)

Ingredients  
(\$)



Greenhouse gases  
(cows, transportation,  
processing)

Animal feed  
(\$)



Irrigation  
(gallons)

Fertilizers

## Food waste prevention.

The costs embedded in food waste.

- Environmental
- Economic
- **Social**



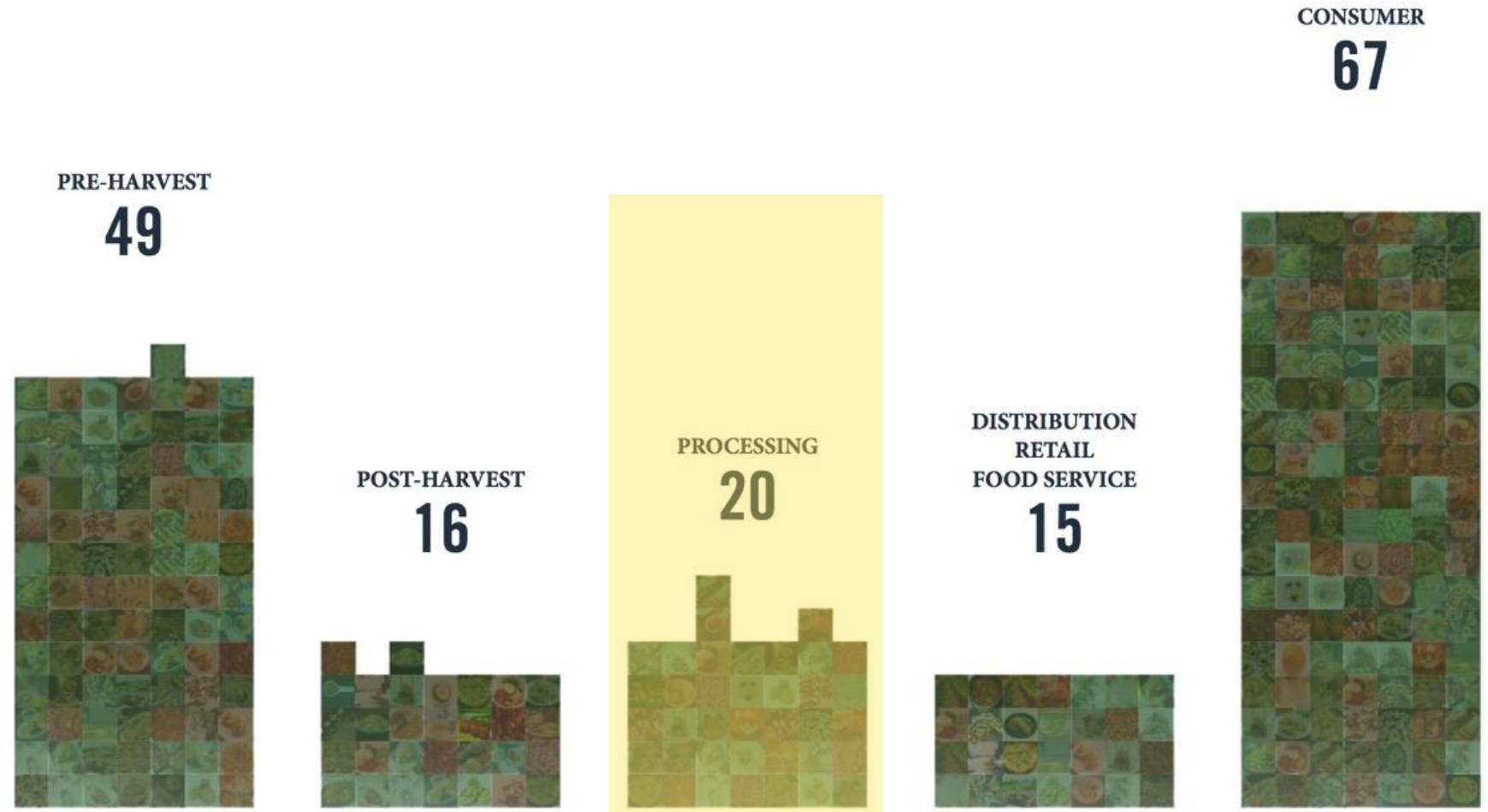
## Food waste prevention.

What's being done?



# Food waste by supply chain.

Million tonnes/year



CEC Infographic. Retrieved from <http://www.cec.org/sites/default/fwinteractive/index-en.html>



# Reducing Food waste.

Source reduction approach



## APPROACH #1

**Source Reduction** involves actions to minimize production of surplus food and prevent avoidable FLW generation.

- ✓ Reducing Portion Sizes ⊕
  - ✓ Increasing Marketability of Produce ⊕
  - ✓ Standardizing Date Labels ⊕
  - ✓ Implementing Packaging Adjustments ⊕
  - ✓ Improving Cold-Chain Management ⊕
  - ✓ Expanding Value-added Processing ⊕
- ✓ Prevention (using P2 principles)!

## Food waste prevention programs.

### Provision Coalition Food Loss + Waste Cost-Share Program.

- Onsite technical assessments
- Eliminate or reduce waste at-source
- Addresses root causes

Canadian Food Loss + Waste Cost-Share Program - Supported by the Walmart Foundation

On March 5th, 2018 the Canadian Centre for Food Integrity and Provision Coalition launched a new one-year program to tackle food loss + waste in Canadian manufacturing facilities and raise awareness of the issue.



#### Program Details

- This cost-share program is available for 50 Canadian food and beverage manufacturers and will provide measurable solutions for the prevention and reduction of food loss + waste.
- Public trust research will explore consumer perceptions and attitudes towards food waste and lead an education and outreach campaign sharing research results, best practices, facility case studies, business tools and populating <https://www.bestfoodfacts.org>

FIND OUT MORE

**PROVISION  
COALITION**  
MAKING FOOD SUSTAINABLY

**Walmart**  **Foundation**

  
THE CANADIAN CENTRE FOR  
FOOD INTEGRITY

# Case Studies

## The P2 process.

Multimedia assessment

# P2

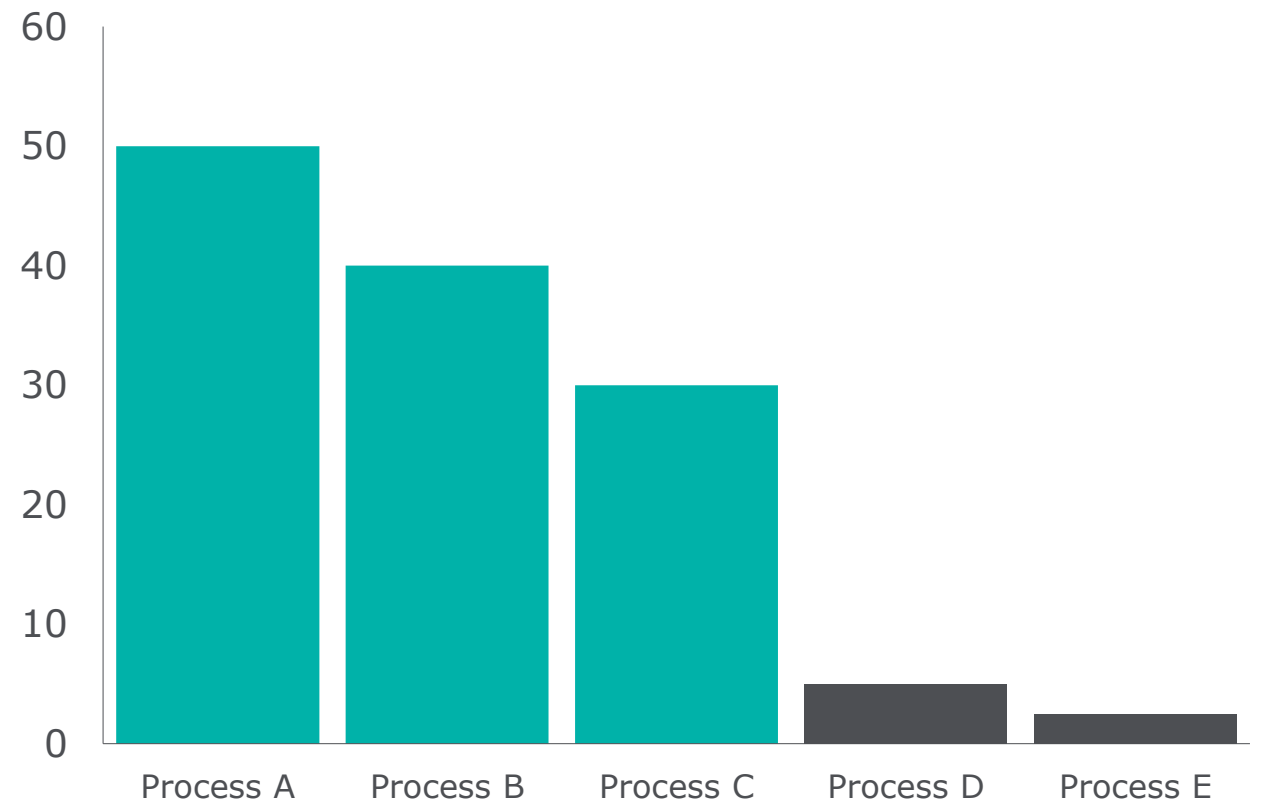
Food waste

Energy (electricity,  
thermal)

Water & wastewater

## The P2 process.

Measure & prioritize





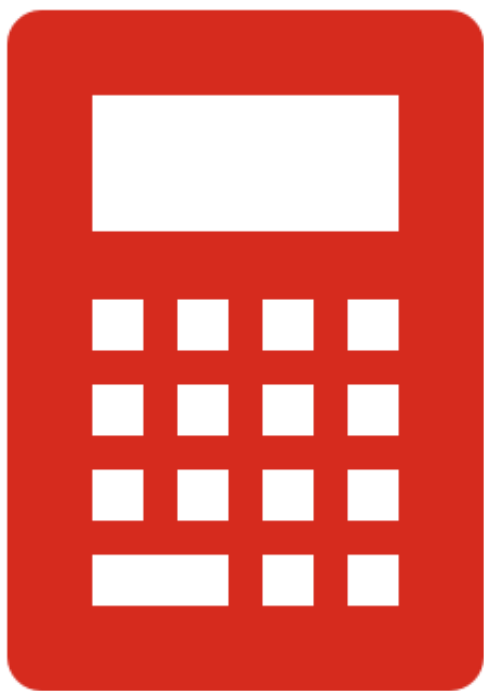
## The P2 process.

Root cause analysis & opportunities



## The P2 process.

Quantify savings & business case



\$

Ibs.

Gal

GhGs

## Byblos Bakery.



**BYBLOS**  
**BAKERY**

*A World of Taste*



# Byblos Bakery.

## Problem

- “Baseball” bagels with no holes being produced

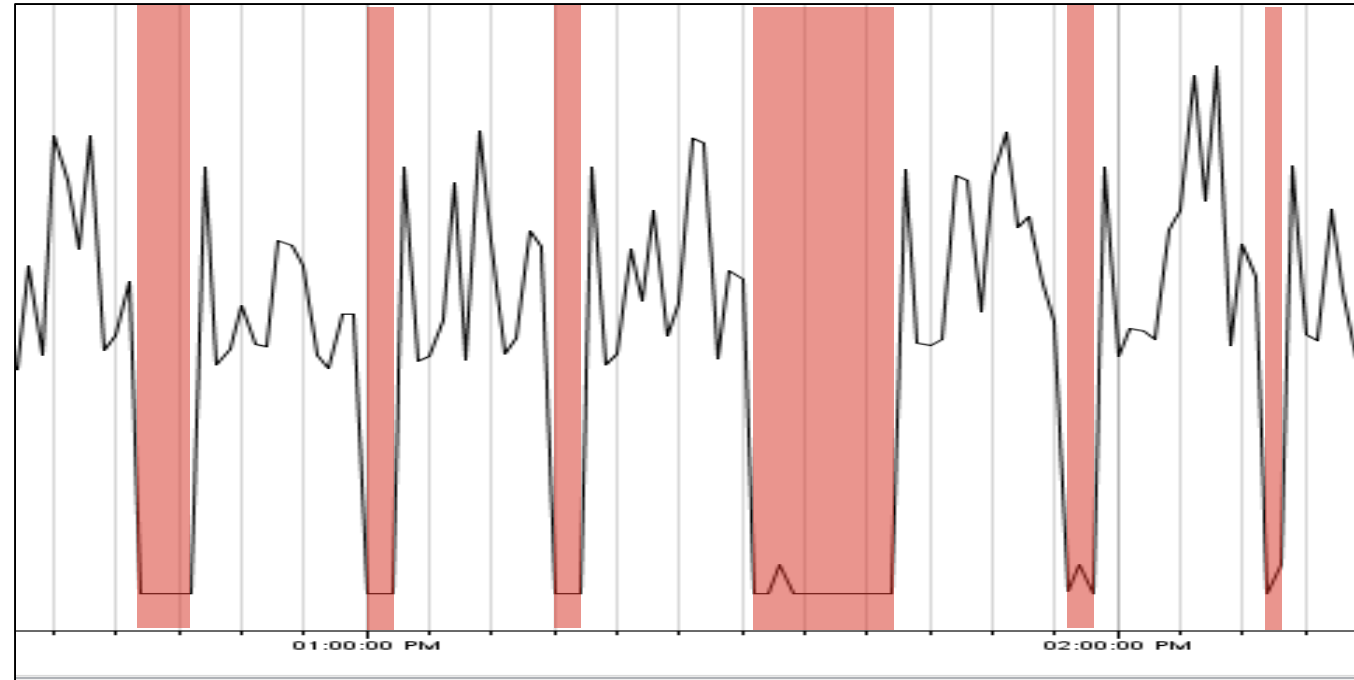
## Root Cause

- Inconsistent mixing and proofing times before baking



## Byblos Bakery.

Bagel mixer amperage draw





# Byblos Bakery.

## Problem

- “Baseball” bagels with no holes being produced

## Root Cause

- Inconsistent mixing and proofing times before baking

## Solution

- Time stamp batches
- Employee training



## Byblos Bakery.

### Savings

- **7,500** kg/year
- **\$25,000**/year
- **\$0** project cost
- **Immediate** payback



## Commercial bakery.

### Problem

- Asymmetric product with undesirable slope and/or height

### Root Cause

- Shaker tries to move dough from back of cell to centre, but dough often ends up at front edge of cell

### Solution

- Modify shaker table operation to optimize bun position in cell





## Commercial bakery.

### Savings

- **110,000** kg/year
- **\$110,000**/year
- **< 1 month** payback
- **168** tonnes/year embedded GHGs



# Protein processing facility.

## Problem

- Breeding wasted on floor must be cleaned up after shift (and often ends up in wastewater treatment)

## Root Cause

- Metal casing that covers breeding auger has gaps, which lets breeding fall out

## Solution

- Adjust auger casing and/or add seal to the gaps to prevent breeding loss





## Protein processing facility.

### Savings

- **26,500** kg/year
- **\$89,000**/year
- **0.1** year payback
- **40** tonnes/year GHGs



## Additional resources & case studies.

[provisioncoalition.com/programs/tacklingfoodlosswaste](https://provisioncoalition.com/programs/tacklingfoodlosswaste)

### Canadian Food Loss + Waste Cost-Share Program - Supported by the Walmart Foundation

On March 5th, 2018 the Canadian Centre for Food Integrity and Provision Coalition launched a new one-year program to tackle food loss + waste in Canadian manufacturing facilities and raise awareness of the issue.



#### Program Details

- This cost-share program is available for 50 Canadian food and beverage manufacturers and will provide measurable solutions for the prevention and reduction of food loss + waste.
- Public trust research will explore consumer perceptions and attitudes towards food waste and lead an education and outreach campaign sharing research results, best practices, facility case studies, business tools and populating <https://www.bestfoodfacts.org>

[FIND OUT MORE](#)

**PROVISION  
COALITION**  
MAKING FOOD SUSTAINABLY

**Walmart**  **Foundation**

  
THE CANADIAN CENTRE FOR  
FOOD INTEGRITY



### Food Loss + Waste Reduction & Toolkit Application

*Case Study Series*

**HANS**  
DAIRY

By participating in Provision Coalition's Onsite Sustainability Management System (SMS) Support Program, Hans Dairy realized the opportunity to save resources and costs

**PROVISION  
COALITION**  
MAKING FOOD SUSTAINABLY



About Hans Dairy

## Summary.

- Food waste **management** is a **cost** item; food waste **prevention** is a **revenue** stream
- Most solutions focus on diversion (landfill, bio-digestion, compost etc.) to achieve “net zero” waste
- Diversion is easy to understand and lucrative for vendors
- **P2** solution focuses on **source reduction** by addressing **root causes**

## Summary.

- P2 approach to sustainable food manufacturing provides the most beneficial impacts:



Economic

Environmental

Social

*engineering*  
*change*

Lloyd Hipel

[lhipel@enviro-stewards.com](mailto:lhipel@enviro-stewards.com)

[enviro-stewards.com](http://enviro-stewards.com)



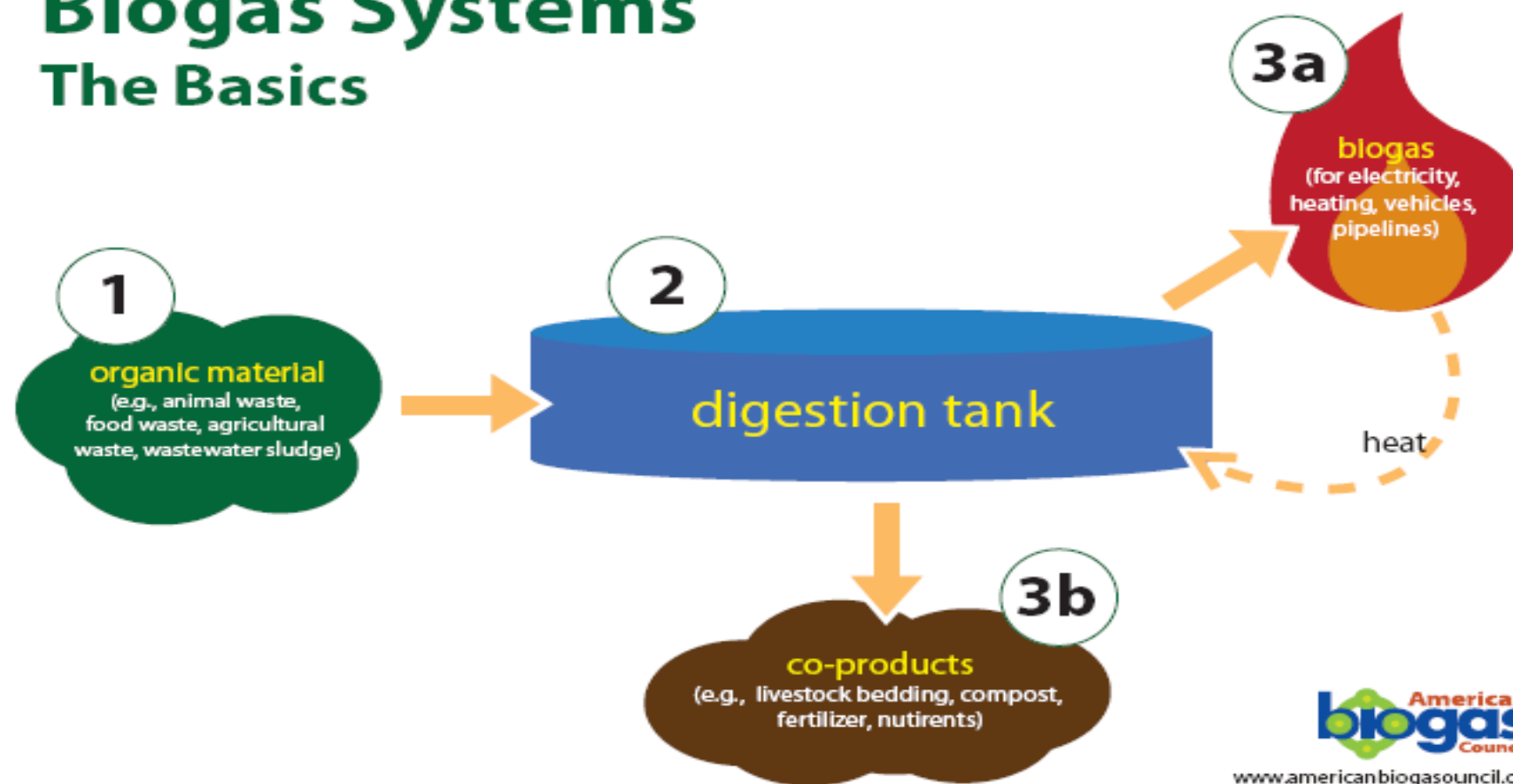


Extra slides.

# Bio-digestion.

EPA's hierarchy.

## Biogas Systems The Basics



# Food waste per capita.

Kilograms/capita/year

CANADA  
**396**

Canada and the United States each produce roughly twice the quantity of food loss and waste of Mexico.

UNITED STATES  
**415**

KILOGRAMS / CAPITA / YEAR



MEXICO  
**249**



# Protein processing facility.

## Problem

- Ground meat hits production floor

## Root Cause

- Poor interface between processes and different machine speeds

## Solution

- Capture lost ground beef before it hits the floor and reprocess
- Adjust grinder speed and replace gaskets





## Protein processing facility.

### Savings

- **7,000** kg/year
- **\$42,000**/year
- **0.2** year payback
- **57** tonnes/year GHGs



# Protein processing facility #1.

## Problem

- Meat sticks to the bottom of tote and is discarded during sanitation

## Root Cause

- Operator only scrapes sides of tote during dumping process

## Solution

- Adjust process to scrape bottoms of totes into hopper



## Protein processing facility #1.

### Savings

- **31,000** kg/year
- **\$55,000**/year
- **Immediate** payback
- **249** tonnes/year GHGs





# Cheese production facility.

## Problem

- Cheese block extends during transport (gets squished)

## Root Cause

- Cheese block does not fit into wire cutter frame and must be cut

## Solution

- Extension of wire cutter to accommodate larger blocks would mitigate losses



## Cheese production facility.

### Savings

- 500 kg/year
- \$12,000/year





# Poultry processing facility.

## Problem

- A portion of butter/brine is wasted during injection process

## Root Cause

- Some butter/brine is recaptured and reused, but there are still substantial losses

## Solution

- Install larger catch trays and barriers to capture more butter/brine



## Poultry processing facility.



## Poultry processing facility.

### Savings

- **75,000** kg/year
- **\$100,000**/year
- **0.1 year** payback

