Food Waste Reduction Strategies in the Manufacturing Sector
Agenda.

1. Introduction to Enviro-Stewards
2. The case for food waste prevention
3. Approach
4. Industry examples
Enviro-Stewards.

We cultivate resilient businesses and improve lives in extraordinary ways

- We help our clients:
  - Reduce energy use
  - Reduce water use
  - Increase yield
  - Reduce wastewater loading
  - Reduce maintenance costs
  - Understand and increase capacity of systems (steam, refrigeration, air, etc.)
  - Develop strategic sustainability roadmaps
The Safe Water Project.

**SAFEWATER + PROJECT**

**Diffuser** – Protects the top of the sand and the biofilter from being disturbed when water is passed into the filter.

**Biofilter** – A community of microorganisms that live in the top 0.5 cm of the sand. The microorganisms and some pathogens in the water help the filter treat the water better.

**Filtration Sand** – Removes pathogens and suspended solids from the water. The filtration sand is specifically selected and prepared to treat the water well.

**Separation Gravel** – Supports the filtration sand and prevents it from going into the drainage gravel and outlet tube.

**Drainage Gravel** – Supports the separation gravel and prevents it from going into the outlet tube.

**Lid** – A spray fitting is included to prevent contamination and pests in the filter.

**Outlet Tube** – After the water flows down through the sand and gravel, it collects in the outlet tube. Gravity pulls the water up the tube, and it flows out the end of the tube on the outside of the filter.

**Safe Water Storage** – A water container with a lid and stop protects the water from being contaminated again.
The Safe Water Project.

William Easterly, "Can Foreign Aid Buy Growth?"
Relevant experience.
Food waste.

- According to the BCG
  - 1.6 billion tons of food is lost or goes to waste
  - $1.2 trillion worth
  - One third of total food produced globally
  - Causes 8% of global greenhouse gas emissions
Food waste in manufacturing.

40% of Food in North America is wasted
Of this, 18% is lost in the manufacturing process
Food waste prevention hierarchy.
The case for food waste prevention.

Food Waste Management is a cost item:
• -$70/tonne, -$80/tonne or -$100/tonne

Food Waste Prevention is a revenue stream:
• +$1,000/tonne, +$2,000/tonne, +$8,000/tonne

Do not manage your food waste, prevent it!
Organics management is low cost but it isn’t cheap.

Problem:
• Re-occurring losses of frozen beef and chicken

Management Cost:
• 13 tonnes * $100 = $1,300/yr

Ingredient Cost:
• 13 tonnes * $10,000 = $130,000/yr
Holistic assessment.

Case study: Fruition Fruits & Fills.

Problem

- Biochemical oxygen demand (BOD) in effluent exceeded by-law limits
Holistic assessment.
Case study: Fruition Fruits & Fills.

- Production level: 66%
- Wastewater volume: 61%
- BOD in effluent: 82%
## Assessment results.

<table>
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<tr>
<th>CATEGORY</th>
<th>ANNUAL SAVINGS</th>
<th>Quantity</th>
<th>Units</th>
<th>Canadian $</th>
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<td>Electricity</td>
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</table>

**Total:** 490,432.00

*Expenditure $187,500, 260% ROI, 0.4 years*
Approach.
Preventing root causes.

1. Team Engagement
2. Assessment
3. Identify Causes and Opportunities
4. Report Findings and Recommendations
5. Implement and Execute
Team Engagement.

Gaining buy-in.

• To facilitate change, a multi-disciplinary team participates in kick-off training and progress meetings
• We engage representation from management, engineering, maintenance, operations, QA/QC, etc.
Assessment.
Collecting reliable data.

• A detailed and systematic assessment of utility consumption and waste generation
Assessment.

Where in the process to intervene.

- The Pareto principle: 80% of the contribution is frequently generated by 20% of the population.
Root cause analysis.

22 L/min of 190 F water
Centrifuge

Tank

Processed lard

22 LPM of 190°F water

Lard with solids

Drain

Waste hauling

DAF (compressed air, chemicals, operator)

22 LPM of 190°F water

Waste hauling

DAF (compressed air, chemicals, operator)
Centrifuge
Lard with solids

Processed lard
Heat tank, reprocess lard, clean out solids from tank daily

Tank

$100,000/year in water, natural gas, and saleable lard (excludes DAF chemical savings + hauling)
Report Findings and Recommendations.

Vetting concepts.

- Each idea is vetted to ensure robust, practical solutions are retained
Implement and Execute.
Implementation planning.

- Business cases are developed in the language of facility’s capital approval process.
Examples in manufacturing.

- Campbell Soup
- Saputo Cheese
- Calgary Italian Bakery
- Byblos
- CCFI and Provision Coalition Food Waste Program examples
Cheese manufacturing.

**Problem:**
- Product loss from edge on cheese blocks (75% to process, 25% to landfill)

**Root Cause:**
- Misaligned conveyors

**Remedy:**
- Quantified loss justified conveyor modification (2.5 g/block, $74,000/yr)

20,600 kg/yr of cheese
Campbell Soup.

Problem:
• Collateral (good product) loss from optical sorter

Root Cause:
• Processing rate results in air purge rejecting adjacent good product

Remedy:
• Adjust rate and/or reprocess ($225,000/yr)

500 tonnes/yr of vegetables
Bakery waste.

Problem:
• “baseball” bagels with no holes being produced

Root Cause:
• inconsistent mixing and proofing times before baking

Solution:
• time stamp batches, employee training

7,500 kg/year, $25,000/year, project cost: $0, payback: immediate
Food Waste Prevention
Case study: Protein Processing Facility

- Total opportunities identified:
  - 56,000 kg/yr, $286K/yr
- Opportunity highlight: breading augers
  - Metal casing that covers breading auger has gaps which lets breading fall out
  - Breading on floor must be cleaned up after shift, often ends up in wastewater treatment
  - Adjusting the auger casing and/or adding a seal to the gaps would prevent breading loss
- Savings: 25,000 L/year, $90,000/year, 40 tonnes/yr embedded GHG
Food Waste Prevention

Case study: Protein Processing Facility

- Total opportunities identified:
  - 75,000 kg/yr, $135K/yr
- Opportunity highlight: scraping totes
  - Operator scrapes sides of tote during dumping process
  - Meat sticks to bottom of tote and is discarded during sanitation
  - Adjust process to scrape bottoms of totes into hopper
- Savings: 31,000 kg/year, $55,000/year,
Energy conservation.

Case study: Southbrook Vineyards

• Southbrook is a LEED Gold certified winery and wanted to install solar panels to offset electricity consumption

• In 2016, Enviro-Stewards identified and helped implement projects that reduced electricity and natural gas by 35% with a 4 month payback
Key takeaways.

• Prevention using root cause analysis is the best way to reduce waste
• Food waste prevention is extremely lucrative for companies, and often reduces additional downstream costs
• This way of thinking is applicable to many things:
  • Energy example
  • Safe water work in Africa
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