IMPROVING THE BOTTOM LINE THROUGH INTEGRATED WASTE MANAGEMENT IN FOOD PROCESSING OPERATIONS

Nov 19, 2012
Drivers of Waste Management

**Top Reasons** F&B industry is integrating sustainability:

1. Operational Efficiencies
2. Stakeholder Demand
3. Risk Management
The “New Way”: Prevention First

Old Way

- Operational Efficiencies
- Stakeholder Demand
- Risk Management

New Way

- Prevention
- Control
- Clean Up

- Operational Efficiencies
- Stakeholder Demand
- Risk Management

Enviro-Stewards

Guelph Food Technology Centre
The “New Way”: Multi-faceted

Integrated Approach to Waste Reduction

- Increased product yield
- Increased resource efficiency
- Reduced waste handling & disposal costs

- Ingredients/Organic Waste
- Water/Wastewater
- Energy/Emissions
- Materials/Solid Waste
- Toxics
Approach

1. **Who** are Your Champions?

2. **What** are Your Wastes?

3. **Why** are Your Wastes Generated?

4. **Where** can they be Improved?

5. **When** should they be Implemented?
Who Has an Impact on Waste Management?

• Valuable input into investigation
• Soundboard for opportunities
• Early buy-in and preparation to facilitate change
• Multi-disciplinary team
  o Management, engineering, maintenance, operations, QA/QC, finance
What Are the Wastes?

Focusing on Processes A, B, and C will realize greater savings than Processes D to H.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Final Effluent Reported Range (mg/L)</th>
<th>By-Law Limit (mg/L)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Oxygen Demand (BOD)</td>
<td>500 to 1500</td>
<td>300</td>
<td>Non-Compliant</td>
</tr>
<tr>
<td>Total Phosphorus (P)</td>
<td>10 to 50</td>
<td>10</td>
<td>Non-Compliant</td>
</tr>
<tr>
<td>Total Kjeldahl Nitrogen (TKN)</td>
<td>50 to 500</td>
<td>100</td>
<td>Non-Compliant</td>
</tr>
<tr>
<td>Oil and Grease (O&amp;G)</td>
<td>50 to 350</td>
<td>150</td>
<td>Non-Compliant</td>
</tr>
<tr>
<td>Total Suspended Solids (TSS)</td>
<td>500 to 1000</td>
<td>350</td>
<td>Non-Compliant</td>
</tr>
</tbody>
</table>
Why are They Generated and Where Can They Be Improved?

- **PEOPLE**
  - Cause “A”
- **METHODS**
  - Cause “B”
- **MATERIALS**
  - Cause “C”
- **MACHINES**
  - Cause “D”
When Should They Be Implemented?

- **Operational Efficiencies**
  - Ingredient costs / lost margins
  - Treatment O&M / surcharges
  - Shipping & disposal
  - Lost water rebate / offsets
  - Payback / NPV / IRR

- **Stakeholder Demand**
  - Product discard rates
  - Organic waste / kg product
  - Wastewater / kg product
  - Wastewater loading / kg product

- **Risk Management**
  - Fines / violations / rates
  - Community relations / reputation
Case Study: Tim Hortons

Revenue

Compliance

Responsibility
Results: Fondant Cleaning Process

**THEN**
- Cleaned fondant every 16 hours
- Batch process
- No colour sequencing
- 100 kg x 8 times/week to LF & sewer

**NOW**
- Cleaned once per week
- Continuous process
- Run colours light to dark
- First 100 kg to animal feed
Results:

- Production up 66%
- Wastewater down 61%
- BOD load down 82%
Multimedia Footprint:
### Cost Savings:

<table>
<thead>
<tr>
<th>Category</th>
<th>Annual Savings</th>
<th>Canadian/US ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Quantity)</td>
<td>(Units)</td>
</tr>
<tr>
<td>Electricity</td>
<td>852,277</td>
<td>kWh</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>164,294</td>
<td>m³</td>
</tr>
<tr>
<td>Wastewater volume</td>
<td>36,748</td>
<td>m³</td>
</tr>
<tr>
<td>Wastewater organic loading</td>
<td>240,024</td>
<td>kg</td>
</tr>
<tr>
<td>Greenhouse gas emissions</td>
<td>560</td>
<td>tonnes</td>
</tr>
<tr>
<td>Solid waste to landfill</td>
<td>510</td>
<td>tonnes</td>
</tr>
<tr>
<td>Sewer surcharge</td>
<td>140,285</td>
<td>$</td>
</tr>
<tr>
<td><strong>Total savings</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. Employee Bonus Structure
2. Job security (thriving employer)
3. Worker engagement
4. Working environment (dust, water)
## Company Perspective

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenditure</td>
<td>$187,500</td>
</tr>
<tr>
<td>Return</td>
<td>$490,000 per year</td>
</tr>
<tr>
<td>Payback</td>
<td>0.4 years (20 weeks)</td>
</tr>
<tr>
<td>ROI</td>
<td>261%</td>
</tr>
<tr>
<td>20 Year NPV</td>
<td>$ 5,918,983</td>
</tr>
</tbody>
</table>
South Sudanese Solar Mango Project:

Solar dryer (based on a design by ECHO)
Since 2010, our Fruition Fruits and Fills facility has purchased BioSand filters to help offset some of its water use. These filters have provided 800,000 L per year of clean drinking water to the people of South Sudan, which helps prevent water-related illnesses such as typhoid, cholera, and dysentery.

Locally constructed BioSand filters (BSFs) sponsored by Tim Hortons Fruition Fruit & Fills waiting to be installed to purify water in homes in Kajo Keji County, South Sudan.

Enviro-Stewards Inc. is pleased to present the following Sustainability Credit:

Sustainability Credit

To Fruition Fruits & Fills, for providing 800,000 L per year of clean drinking water to the people of South Sudan, which will avoid approximately 120 tonnes per year of greenhouse gas emissions resulting from deforestation associated with boiling a portion of this water to make it safe to drink.

February 15, 2012
Date of Issue

This Sustainability Credit sponsors the construction and installation of 40 BioSand Filters in Kajo Keji County, South Sudan. The filters purify water to prevent water-related illnesses such as typhoid, cholera, and dysentery, which account for over 50% of hospital visits in Kajo Keji.

- Constructed using locally available materials
- Provides local employment
- Improves the health & productivity of the community

For more information, please visit: www.enviro-stewards.com
Phase 1: Conservation at Source

- In plant measures reduced

  Organics by 67%

  Water by 50%
Case Study: Jackson Triggs, BC

- Capital projections on the new design basis were $1.5 million less than the original basis.

Design basis after preventative approach

VS.

Original design basis

$1.5 million
Case Study: Jackson Triggs, BC

Phase 2: Effluent Pre-treatment

• High rate anaerobic
  o Achieving 95% reduction
  o Eliminated sewer surcharge
  o Recovers biogas for boiler

• Received co-funding based on avoided electrical consumption based on aerobic design

• Provides compelling sustainability story