



# ON-SITE TECHNICAL ASSISTANCE PROGRAM FOR MANUFACTURERS

## » Pollution Prevention Case Study

# Meat Packing

## COMPANY OVERVIEW

The following shares the experience of an Ontario based food processor, and its participation in The Bloom Centre for Sustainability (BLOOM) On-site Technical Assistance Program for Manufacturers. The facility is a meat packing plant with six main process areas: barn, kill area, casing area, cutting area, utility services and wastewater treatment.

## P2/TR/E2 ASSESSMENT PROCESS

The meat packer is subject to Ontario's *Toxics Reduction Act, 2009* (TRA), and retained a pollution prevention consultant from BLOOM's consultant roster, to complete an integrated pollution prevention, toxics reduction and energy efficiency (P2/TR/E2) assessment of its facility. Company management is also driven to reduce pollution, conserve resources, and operate the company as a sustainable enterprise.

The assessment process involved an onsite training seminar for facility staff, in-plant studies, and an engineering assessment of alternatives. The detailed final report provided the facility with a clear road map outlining the findings and opportunities recommended for implementation.

## SUMMARY OF FINDINGS

The toxics substances of concern at the facility are ammonia ( $\text{NH}_3$ ) and nitrate ( $\text{NO}_3$ ), which are Phase II substances under the TRA and Regulation 455/09. The major sources of release of ammonia and nitrate are created from urine and manure in the barn prior to processing, blood from the kill area, and intestine contents from the casing area.

In the casing area, the intestines are transferred through pullers to a set of rollers, installed in series, to squeeze out the contents in them. Water is used to facilitate the cleaning process and therefore the intestine contents are mixed with water and discharged to sewer. The biological oxygen demand (BOD) load exerted by this

waste stream accounts for 60 percent of total BOD load of the wastewater treatment plant (WWTP). The consultant recommended that the intestine contents be collected separately and not brought into contact with water discharged to sewer. This approach will reduce the creation and subsequent release of ammonia and nitrate by 16,000 kg, process waste by 190 tonnes and associated proportion of BOD surcharge, and water use by 4,000 tonnes, annually. The wastewater treatment blower also will have reduced burden, thereby reducing electricity consumption by 300,000 KWh and greenhouse gases (GHGs) by 64 tonnes annually. These positive impacts combined equate to annual cost savings of \$43,000 with a payback of 7 months.



In the barn, two large make-up air units account for over 20 percent of the natural gas consumption at the facility. Approximately 90 percent of this natural gas can be conserved by employing air-to-air heat recovery. An air-to-air heat recovery system functions by transferring heat from the barn exhaust air stream to the supply air stream of the make-up air units. The resulting heat loss that is reduced due to ventilation means 298,950  $\text{m}^3$  of natural gas is saved every year, with associated reductions of 27 kg fine particulate matter, 480 kg CEPA toxics (nitrogen dioxide ( $\text{NO}_2$ )) and 570 tonnes GHGs. Annual cost savings are \$75,000 with return on investment in two years.

There were numerous recommendations provided by the consultant to reduce toxics, particulate, process waste, water, energy consumption, greenhouse gases and costs, which are highlighted in the table on the following page.



# P2/TR/E2 Solutions, Environmental Results and Related Cost Savings

The table below summarizes select P2/TR/E2 projects being undertaken by the meat packer from the list of recommendations outlined in the assessment report. When implementation is complete, the P2/TR/E2 measures are projected to reduce annually:

- 20 tonnes TRA/CEPA toxics
- 0.1 tonnes fine particulate
- 240 tonnes process waste
- 23,500 tonnes water
- 709 m<sup>3</sup> natural gas
- 2,587,000 kWh electricity
- 1,900 tonnes GHGs

Total quantified annual savings of **\$340,000** and an overall payback of **1.3 years**.

| PROCESS   | P2/TR/E2 SOLUTIONS   | ENVIRONMENTAL REDUCTIONS  | COST SAVINGS & PAYBACK  |
|---|--|---|---|
| <b>BARN</b><br><br>Targeted Pollutants/Waste:<br><b>Toxics (CEPA, TRA),<br/>                     Water, Energy, Process<br/>                     Waste, GHGs, Particulate</b>                   | Collect manure and urine prior to wet cleaning of the barn floor   | 1,680 kg/yr TRA and CEPA toxics (NH <sub>3</sub> )<br>20 kg/yr NO <sub>3</sub><br>20 tonnes/yr process waste<br>163 tonnes/yr water<br>32,000 KWh/yr electricity<br>7 tonnes/yr GHGs        | Annual savings TBD  |
|   | Air-to-air heat recovery in barn   | 27 kg/yr fine particulate<br>479 kg/yr CEPA toxics (NO <sub>2</sub> )<br>298,950 m <sup>3</sup> /yr natural gas<br>574 tonnes/yr GHGs   | ➔ Annual savings: \$75 K<br>Capital cost: \$150K<br>Payback: 2 years  |
| <b>PRODUCTION – KILL AREA</b><br><br>Targeted Pollutants/Waste:<br><b>Toxics (CEPA, TRA),<br/>                     Water, Energy, Process<br/>                     Waste, GHGs, Particulate</b> | Shutoff evisceration tray cleaning water lines during breaks   | 304 tonnes/yr water<br>10 kg/yr GHGs  | ➔ Annual savings: \$1.3 K<br>Capital cost: \$0<br>Payback: immediate  |
|   | Check the condition of cold water spray nozzles installed before carcass cooling and after evisceration and replace periodically | 887 tonnes/yr water<br>0.1 tonnes/yr GHGs   | ➔ Annual savings: \$4 K<br>Capital cost: \$1.5 K<br>Payback: 5 months |
|   | Close steam valve near gam tank  | 4.5 kg/yr fine particulate<br>80 kg/yr CEPA toxics (NO <sub>2</sub> )<br>50,000 m <sup>3</sup> /yr natural gas<br>96 tonnes/yr GHGs   | ➔ Annual savings: \$12.5 K<br>Capital cost: \$0<br>Payback: immediate |
|   | Singer Controls  | 2.4 kg/yr fine particulate<br>42 kg/yr CEPA toxics (NO <sub>2</sub> )<br>26,000 m <sup>3</sup> /yr natural gas<br>50 tonnes/year GHGs   | ➔ Annual savings: \$6.5 K<br>Capital cost: \$2 K<br>Payback: 4 months |
| <b>PRODUCTION – CASING AREA</b><br><br>Targeted Pollutants/Waste:<br><b>Toxics (CEPA, TRA),<br/>                     Water, Energy, Process<br/>                     Waste, GHGs</b>            | Collect intestine contents separately without mixing with water  | 15,640 kg/yr TRA and CEPA toxics (NH <sub>3</sub> )<br>210 kg/yr NO <sub>3</sub><br>190 tonnes/yr process waste<br>4,340 tonnes/yr water<br>300,000 KWh/yr electricity<br>64 tonnes/yr GHGs | ➔ Annual savings: \$43 K<br>Capital cost: \$24 K<br>Payback: 7 months |
|   | Minimize the discharge of roller effluent to sewer and send it back to the front-end   | 267 tonnes/yr water   | ➔ Annual savings: \$1.2 K<br>Capital cost: \$0<br>Payback: immediate  |
| <b>PRODUCTION – CARCASS COOLING</b><br><br>Targeted Pollutants/Waste:<br><b>Water, GHGS</b>   | Check the condition of carcass cooling spray nozzles and replace periodically  | 714 tonnes/yr water<br>0.1 tonnes/yr GHGs   | ➔ Annual savings: \$3 K<br>Capital cost: \$2 K<br>Payback: 8 months   |
| <b>PACKAGING – CUTTING</b><br><br>Targeted Pollutants/Waste:<br><b>Energy, GHGS</b>   | Use outside air in winter to provide free cooling in cut floor   | 72,200 KWh/yr electricity<br>15 tonnes/yr GHGs  | ➔ Annual savings: \$6 K<br>Capital cost: \$60K<br>Payback: 10 years   |

Program delivered by:



For more information, please contact:

**BLOOM**

2070 Hadwen Rd, Suite 101A, Mississauga, ON L5K 2C9

T: 905 822 4133 E: BLOOM@bloomcentre.com

[www.bloomcentre.com](http://www.bloomcentre.com)