

Environmental Solutions for Volatile Organic Compounds: Beyond 'End of Pipe' Fixes

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BAC and Baking in ON

- The Baking Association of Canada is the national trade association representing the country's \$4 billion independent retail, in-store and commercial bakery operators.
- BAC's members produce a full range of bakery products including breads & rolls, sweet goods such as cakes and pastries along with frozen dough.
- The baking industry in Ontario is the largest food processing employer with more than 20,000 workers and is responsible for more than 55% of the nation's overall bakery production.
- Yeast raised products (bread & rolls) impacted by VOC review

ON and VOCs

- In October 2001, Ontario announced its intention to begin consultations on reducing provincial air pollutants that cause smog and acid rain. Consultation was first undertaken on the subjects of nitrogen oxides (NO_x) and sulphur dioxide (SO₂) emission limits for major industry sub-sectors in Ontario.
- Issue Drivers: Smog days, health implications, US Relations (50%+) emanating from US
- ON target of reducing overall VOCs – 45% by 2015, date may move forward to 2010. MOE wants 80% reduction in VOCs from all industries
- Based on an ON Industry VOC study conducted for the Ministry, 70 industry sub-sectors were identified with priority to be further studied for their output of VOC emissions.

Regulatory Environment

- No existing Volatile Organic Compounds (VOC) regulations specific to bakeries in Canada
- The US Environmental Protection Agency has for many years required states that are not in compliance with the ozone National Ambient Air Quality Standard submit State Implementation Plans for approval by the EPA.
- Many of the affected states have submitted SIPs that include the enactment of regulations that would require a reduction in VOC emissions from commercial bakeries as part of their strategy for meeting the ozone National Ambient Air Quality Standard.
- States have different criteria for compliance i.e. emission thresholds and exemptions.

ON Industry Sub Sectors under Review

Group A

- Printing – Publishing
- Printing – Packaging
- Automotive – Original Equipment Manufacturers (OEM)
- Wood Furniture
- Wood Flat Stock, Windows and Doors
- Cleaning
- Degreasing

ON Industry Sub Sectors under Review

Group B

- Adhesive & Sealant Applications
- Ship Building
- Aerospace
- Transportation Equipment
- Abrasive and Friction Products Manufacturing
- Portable Fuel Containers
- Cutback Asphalt

● Bakeries

Bakery VOC Contribution

- 2003 BAC approached by MOE to participate in Technical Study to reduce VOCs
- ON bakery contribution to annual provincial emissions are approximately 2,300 MT or 0.37% of the estimated 622,500 MT.
 - Large bakeries (+ 5 million loaves per annum) contribute about 1,600MT or 0.27% of the provinces overall VOC emissions.
- VOCs from baking is >97% ethanol
 - Very few studies and analytical measurements quantifying ethanol and its reactions in the atmosphere
 - Not considered a priority compound.

Ethanol from Bakeries

Ethanol:

- Held in water matrix of bread as a result of fermentation @ 170°- 175° ethanol is released and goes up stack.
- Only way to prevent is 'end of pipe' solution via catalytic oxidization – This converts ethanol into CO₂ (same process as bacteria)
- This process requires energy (to fuel oxidizer) and results in oxides of nitrogen and hazardous waste (heavy metals from catalyst such as platinum)

Emission Control Costs

- Cost of oxidizer systems significant
 - \$ 1.6 million capital investment in oxidizer and changes in plant configuration.
 - Annual operating costs of \$600,000
 - Average cost of reduction is estimated @ \$11,200 per tonne VOC removed
- May be applied to commercial bakeries emitting more than 10MT of VOC's per annum which is approximately 5 million loaves + per annum (equates to annual sales of \$7.5 million)

BAC Concerns with 'End of Pipe' Solutions

- Bakery VOCs are caused naturally, no opportunity for ingredient replacement or changes in process to reduced emissions.
- Cost implications of end of pipe solutions to VOC emissions are substantial -
 - Competitiveness:
 - ON only CAN jurisdiction current pursuing VOC reduction.
 - US state exemptions (emission volume, \$/MT reduction)
- Increased GHG emissions by + 60% & produces heavy metals

BAC Proposal to MOE Nov.06

- BAC recognizes that air quality issues are important and that our industry has a role to play.
- Proposed creation of a government-industry Working Group with the objective of researching means to reduce the baking industries overall VOC and GHG emissions.
- Role of the Working Group:
 - Establish the environmental footprint for the most commonly configured commercial bakery operations.
 - Identify and make recommendations on strategies that when implemented will reduce the environmental footprint of commercial bakery operations.
 - Identify and make recommendations on outreach strategies to communicate the findings of the Working Group to Ontario's commercial bakery operators.

BAC Proposal to MOE Nov.06

- Working Group would review:
 - Industry energy use, sources & existing efficiencies
 - Industry benchmarks (per commercial bakeries) including:
 - Energy per KG of bread produced
 - Energy per kg of bread distributed
 - Waste per kg of bread produced
 - Packaging per kg or MT
 - Water use both in production and waste
 - Industry greenhouse (GHG) gas footprint
 - Industry GHG life cycle and contribution to GHG
 - Technology opportunities to reduce GHG
 - Identify and quantify existing waste reduction initiatives
 - Econometric modeling of environmental footprint reduction strategies

Other Industries Applying the Environmental Footprint Approach

Grocery Industry Announces Environmental Sustainability Initiative

“The Canadian grocery industry's intent to adopt a common credible set of metrics to measure and benchmark the environmental footprint of the industry has been announced by the Canadian Council of Grocery Distributors (CCGD) and the Canadian Federation of Independent Grocers (CFIG). The two associations have formed a "committee" to identify and work on several industry initiatives that would provide a collective benefit and reduce the industry's footprint in a meaningful way.

Oct 15.2007 Canadian Grocer

Partnership Approach to Environmental Solutions

- Benefits of a collaborative government-industry approach to find solutions to industry emissions
 - Outcomes have the potential of exceeding current objectives as they have a broad focus and could be applied industry wide
 - Outcomes have the potential of secondary industry and public benefits i.e. reducing overall energy usage
 - Maintaining the competitiveness of ON industry

Partnership Approach to Environmental Solutions



***We are waiting to
hear back from MOE!***