

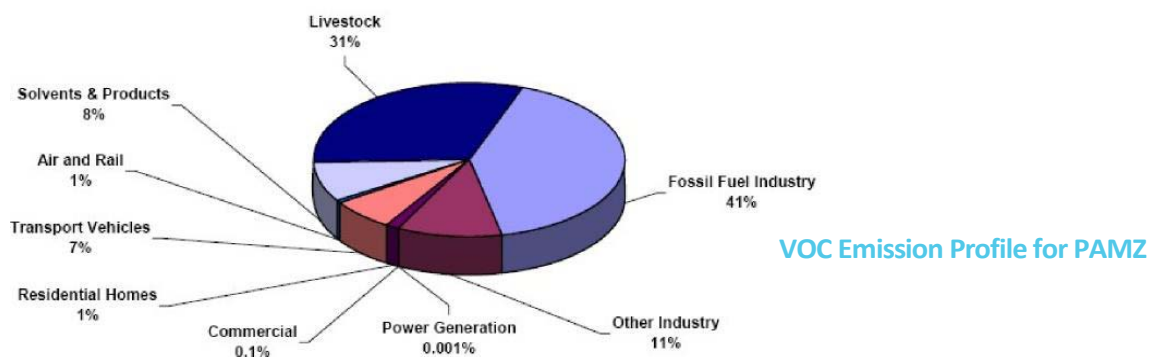
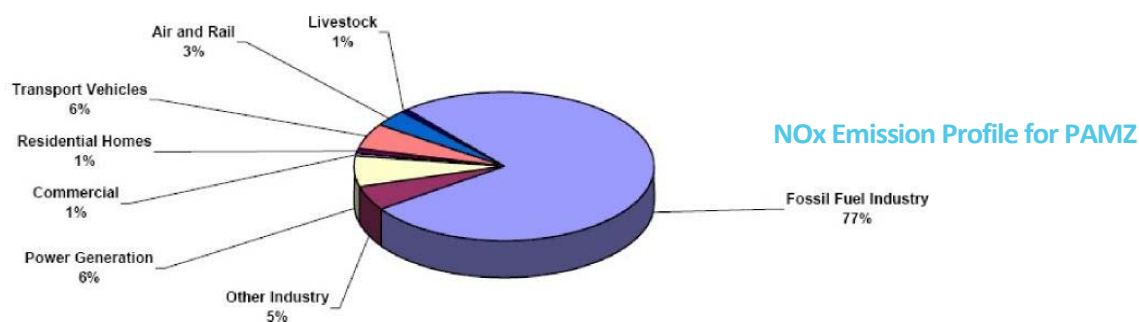
## Precursor Pollutants Creating Ground Level Ozone

Ground level ozone is different from other pollutants in that it is not always emitted directly into the air. Frequently, it is a "secondary" pollutant produced when two primary precursor pollutants, nitrogen oxides (NO<sub>x</sub>) and volatile organic compounds (VOCs) react in the presence of heat and sunlight under stagnant weather conditions. VOCs are emitted from a variety of sources, including motor vehicles, chemical plants, refineries, factories and other industrial sources, consumer and commercial products (such as solvents, paints and pesticide products) and livestock operations. Nitrogen oxide emissions are produced by transportation sources (automobiles, trucks and trains), industrial sources (such as oil and gas industries) and power generation plants. Other sources of nitrogen oxides include natural gas combustion (e.g. home heating), heating fuel combustion and forest fires.

### Emission Inventory in the PAMZ Area

The primary sources for precursor pollutants, creating ozone in the Parkland Airshed Management Zone (PAMZ), were inventoried in 2008 and provide the most up to date information available. The information is based on the 2006 Environment Canada emissions trends, which used the most current emission estimation methodologies and statistics available at the time, and represents the most comprehensive emissions inventory available for Canada. The 2008 inventory provides the baseline data through which future PAMZ emissions inventories will be measured, to determine increases or decreases in emissions. The emissions inventory considered point sources, such as stack emissions; area sources, such as residential fuel use; and volume sources, such as on-road transportation. The PAMZ emission profiles for NO<sub>x</sub> and VOCs show that:

- Fossil fuel industries are the predominant emission source for NO<sub>x</sub> and VOCs
- Livestock operations are second for VOCs
- Power generation and transport vehicles are the second largest contributors to NO<sub>x</sub>



## What can we do?

Every sector of our society has a role to play in reducing ozone, including major contributors of precursor pollutants.

### **Petroleum Industry**

The petroleum industry contributes 77% of the nitrogen oxides and 41% of the VOCs in the PAMZ area. The industry has initiated several actions already that can be used by other petroleum companies. These actions and other ideas include:

- Developing co-generation or independent energy generation (Shell and Talisman)
- Using alternative renewable energy sources such as solar (Petro Canada - now Suncor)
- Reducing flaring, developing fugitive emission programs (several companies)
- Using new technologies like infrared cameras to find, assess and eliminate fugitive gases (ConocoPhillips, 2006)
- Educating and motivating staff and the community towards energy efficiency (EnCana and BP, 2007)
- Reducing stack top temperature at gas plants
- Doing yearly environmental assessments
- Establishing idling reduction policies within companies
- Maximizing the use of teleconferencing to avoid unnecessary driving
- Retiring fleet vehicles early, when in still good running condition (100,000 kilometres)
- Purchasing hybrid vehicles when replacing fleet vehicles

### **Livestock Operations** (cattle, dairy, hogs, etc.)

Livestock emit volatile organic compounds such as alcohols, ketones, aldehydes and volatile fatty acids. Livestock operations contribute 31% of the VOCs in the PAMZ area. Actions that can be taken include:

- Finding new approaches for storage and management of manure
- Effective land application of manure through injection into the soil
- Adopting new precision pesticide spray application to address site specific management of various pest populations
- Increasing the digestibility of forages and feeds by making feed digestion in livestock more efficient
- Developing wind breaks/shelter belts around confined livestock operations
- Replacing non-mobile diesel engines with new certified lower emission diesel technology or electric motors
- Avoiding vehicle or equipment idling; reducing the use of motorized equipment

### **Transportation Fleets**

Transport vehicles contribute 6% of the nitrogen oxides and 7% of the VOCs in the PAMZ area. Possible actions include:

- Retrofitting diesel vehicles to reduce pollution
- Encouraging practices that reduce air pollution when performing work.
- Establishing anti-idling policies
- Using low-emitting equipment
- Purchasing more fuel-efficient vehicles when adding to or replacing fleet vehicles
- Using alternative fuel vehicles: gas-electric hybrids, diesel-electric hybrids, biodiesel or compressed natural gas
- Retiring old vehicles to the federally funded "Retire Your Ride," Canada's vehicle recycling program which recycles parts of the vehicle in a safe and environmentally sound manner

### **Power Plants**

Power plants contribute 6% of the nitrogen oxide emissions. Possible actions that can be taken include:

- Installation of emission controls
- Retrofitting boilers, installing new boilers or enhancing production processes to drive further efficiencies
- Optimizing overall plant operations which can include boiler design, cooling water conditions, burner type, design steam conditions and environmental controls that capture and remove pollutants.