

EMISSIONS

The substances measured at monitoring stations are released into the air by both human activity and through natural processes. Emission sources can be grouped into the following four categories:

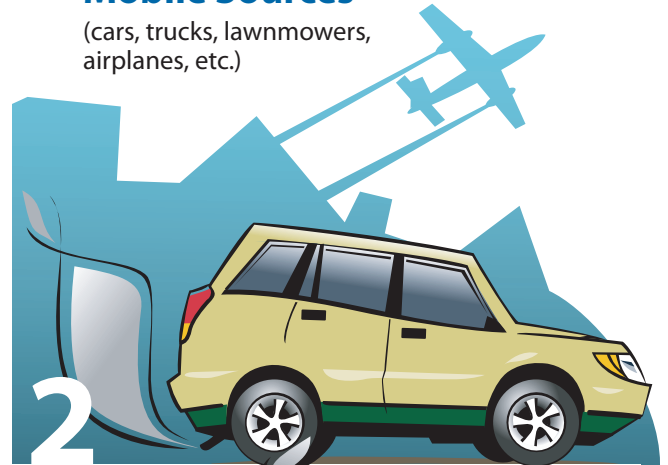
Point Sources

(factories, industry, electric power plants, etc.)



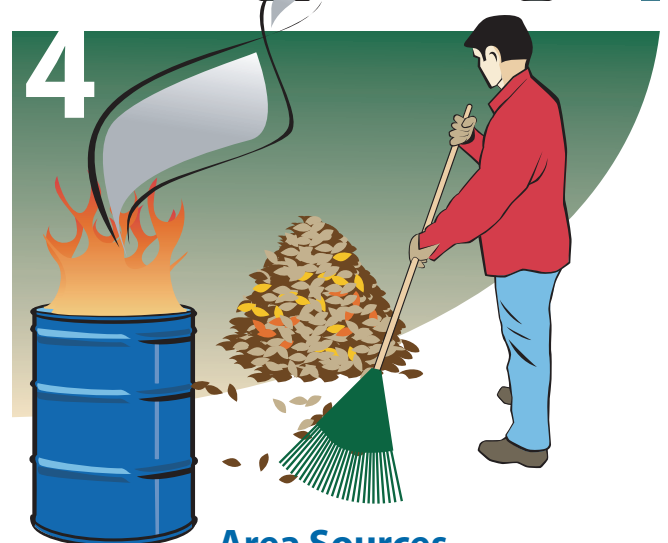
Mobile Sources

(cars, trucks, lawnmowers, airplanes, etc.)



Natural Sources

(trees, vegetation, gas seeps, wetlands, etc.)



Area Sources

(smaller sources such as dry cleaners, pesticide use, fires)

Regulated and Non Regulated Emissions

REGULATED EMISSIONS

In Alberta, the sources of industrial air emissions are regulated to minimize emissions and ensure air quality is maintained within established government objectives. Alberta Environment is the department that regulates emissions either directly or with other agencies based on the type of industry.

Under the *Environmental Protection and Enhancement Act (EPEA)* and its regulations, **regulatory approvals** are required for specific activities (refer to *Regulating Air Quality in Alberta* factsheet). A regulatory approval issued by Alberta Environment covers all phases of an industrial operation including construction, operation and reclamation.

Emissions are minimized through pollution prevention, the installation of air pollution control equipment or both. Determining the maximum amount of pollution a facility is allowed to emit depends on several factors; in some cases, computer simulations (models) are used to help evaluate the environmental impact (refer to *Air Quality Dispersion Models* factsheet). Monitoring and reporting requirements are set to ensure that emissions are kept below approved limits. Monitoring may be done through an airshed (air quality monitoring zone), or the industry may conduct its own monitoring which must meet pre-set standards.



NON REGULATED EMISSIONS

Some emissions, such as those from vehicles and home heating/cooling, are not easily regulated by the traditional approval methods. Managing emissions from these sources is done at the manufacturing stage and also through public awareness efforts. Much of the responsibility for controlling these non regulated emissions falls to the general public.

Impacts of Emissions on the Environment

Common environmental issues such as smog, acid deposition and climate change are due to emissions.

SMOG

The two primary pollutants in smog are ground-level ozone (O_3) and particulate matter. Summer time smog is produced as oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) react in the presence of sunlight to form O_3 . **Winter time smog** is likely to occur in cities during temperature inversions, when particulate matter and NO_x accumulate in a stagnant air.

In humans, smog is linked to respiratory and heart problems, as well as allergies. The severity and type of symptoms depend on the pollutant, the concentration in the air, the length of exposure and the sensitivity of the person to the substance. Smog can make plants grow more slowly and be more vulnerable to disease, pests and stressful environmental conditions such as drought and cold.

ACID DEPOSITION

Acid deposition refers to the transfer of acidic substances in the air onto surfaces such as soils, lakes, rivers and vegetation. Acid deposition may be in the form of wet deposition such as rain or snow, or dry deposition which settles onto land, vegetation and water surfaces. Two common air pollutants, sulphur dioxide (SO_2) and nitrogen oxides (NO_x), are the primary components of acid rain.

In Alberta, the main sources of SO_2 and NO_x are the oil and gas industry, coal-fired power plants and motor vehicles. In the air, these substances can form acids such as nitric acid and sulphuric acid. When precipitation washes these acids out of the atmosphere, virtually anything they contact can be affected including lakes, rivers, forests, soils, plants, fish/wildlife and buildings.

CLIMATE CHANGE

Climate change is the result of an excess of **greenhouse gases** (GHGs) in the atmosphere. GHGs maintain the earth's temperature. Without naturally occurring GHGs, the earth's average temperature would be too cold to support life. Too much greenhouse gas, on the other hand, also causes problems. As a result of increased GHGs in the atmosphere, the earth's temperature can increase beyond normal climate fluctuations. The burning of **fossil fuels** is the primary source of man-made GHGs. Motor vehicles, industrial activity, wood-burning stoves and power generation all produce carbon dioxide. Landfills, natural gas and oil use, agriculture and coal mining produce methane, which is a more potent GHG than carbon dioxide.

A future with changing climate could mean:

- Drought and rapidly shrinking glaciers. This will result in changes to the amount and timing of water availability during the growing season, and can result in a decrease in the quality and quantity of drinking water
- Changes in plant species and growth patterns and growing seasons, as well as compromised food production
- More severe and frequent extreme weather events such as heat waves, storms, floods and tornadoes
- A reduction in **biodiversity**. While humans can adapt to a changing climate, plants and animals in some **ecosystems** may not be resilient enough to survive
- Increased threat of forest fires and insect invasions on forested areas and agricultural crops
- A rise in sea level

What Is Being Done

POLLUTION PREVENTION

Pollution prevention is the most effective means of protecting the environment. It focuses on avoiding the creation of pollutants rather than trying to manage them after they have been created.

Industrial and manufacturing businesses can do their part by adopting pollution prevention measures such as improving energy efficiency, switching to renewable energy sources and using cleaner fuels. Conservation, along with a more efficient use of energy, will lead to a reduction of pollutants being released.

Renewable energy sources can be used to produce power such as electricity. These sources are derived from energy resources such as the sun, wind, water, biomass and heat from the Earth's interior (geothermal). When low-emitting forms of renewable energy are used instead of fossil fuel energy, air pollution is reduced.

POLLUTION CONTROL

Pollution control technology, such as catalytic converters are used to reduce the amount of harmful emissions from automobiles. These technologies reduce the amount of pollution released into the air by capturing or transforming substances that are generated.

What Can We Do

Individuals can take action at the local level to reduce energy use at home, on the road, at work and at play. The following is a short list of tips that you can use to reduce your energy consumption and the amount of pollution that you emit into the air.

- Take public transportation or car pool
- Walk or ride your bike
- Keep your car tuned up and reduce vehicle idling time
- Turn off lights and other electrical devices when not in use
- Replace incandescent bulbs with compact fluorescents
- Have your furnace cleaned and change furnace filters at least once every two months
- Turn your thermostat down at night and when you are away during the day
- Choose energy efficient appliances



VOC + NO_x + Sunlight = SMOG

Definitions

Biodiversity (biological diversity) - the variety of organisms (plants and animals) found within a specified geographic region.

Ecosystem - a biological community of interacting organisms and their physical environment.

Fossil fuels - these fuels are formed from dead plants and animals, coal, oil and natural gas.

Greenhouse gases - gases in the earth's atmosphere that work to maintain the earth's temperature; water vapour, carbon dioxide, methane, and nitrogen oxide are all greenhouse gases.

Regulatory approval - an approval defines the emission levels, required pollution control equipment, monitoring and reporting practices. The Environmental Protection and Enhancement Act and its regulations that govern these approvals can be viewed on the Queen's Printer website.

Winter time smog - is usually caused by wood heating and vehicle use as pollutants emitted accumulate in stagnant air. The severity of winter time smog depends on how well the pollutants are dispersed in the atmosphere.

Making it Clear is a series of fact sheets on air quality in Alberta developed for Fort Air Partnership with support provided by Alberta Environment. To obtain the series visit www.fortair.org or call 1-800-718-0471