Energy conservation, air quality and climate change

The world's climate is changing due to increasing levels of greenhouse gases, especially carbon dioxide, in the atmosphere. Like windows in a greenhouse, carbon dioxide in the earth's atmosphere traps the sun's heat and insulates the planet. So, increasing levels of carbon dioxide in the atmosphere are warming the planet. Carbon dioxide comes primarily from the burning of fossil fuels, such as exhaust from vehicles and coal burned to generate electricity. Changes in the climate pose significant environmental and economic threats to communities in Minnesota and throughout the world.

In addition to greenhouse gases and climate change, Minnesota's air quality is impacted by a variety of air pollutants. Air pollution comes from many different sources that result from the combustion of coal, gasoline, diesel, wood and other fuels to run our vehicles and power our homes and businesses. Air pollution can have a variety of health impacts, with the biggest concern being impacts on respiratory and cardiovascular systems. Although Minnesota's air quality is generally good and has been improving for most pollutants, more can be done to reduce emissions and improve air quality.

Climate change

Shifts in climate have happened throughout Earth's history due to natural factors. Changes occur in temperature, precipitation patterns, snow and ice cover, and sea level. But what's different now is how fast these changes are happening. Almost all climate scientists agree that recent changes are primarily caused by human activities, with levels of carbon dioxide emissions having risen dramatically since late 1800s. Minnesota's carbon dioxide emissions have increased 37 percent over the past 20 years, according to the Minnesota Pollution Control Agency (MPCA).

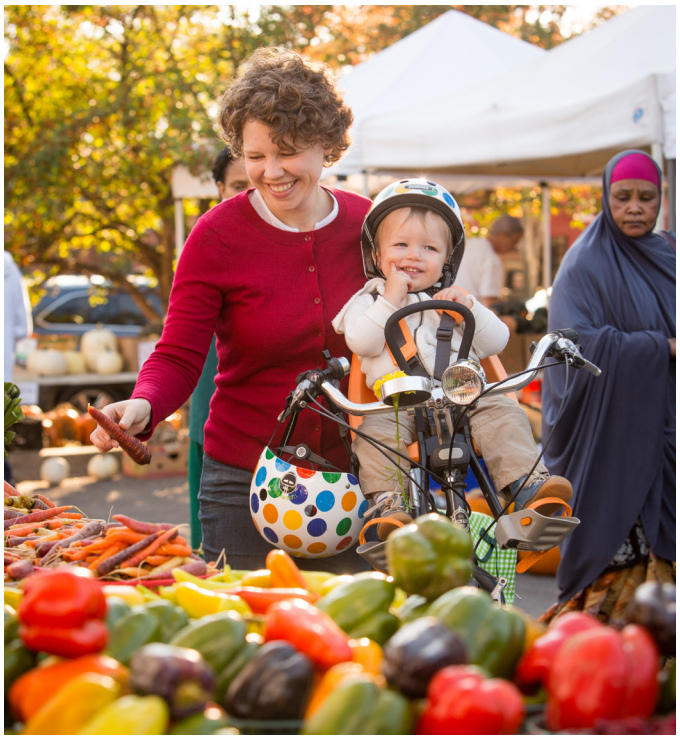
Climate change is already observable. Animal and plant habitats are shifting, weather patterns are changing and severe storms and droughts are becoming more common. Minnesota has warmed an average of one degree Fahrenheit during the past century, according to the MPCA. Additionally, from 1958 to 2011 the Midwest region, including Minnesota, experienced an increase of heavy precipitation by 45 percent. If temperature readings and precipitation continue to increase over the next century, Minnesota might soon feel and look more like Missouri. Other impacts of climate change in Minnesota include the following:

- Changes in ecosystems and decline of forested areas by as much as 50 to 70 percent. This is concerning because temperature and moisture patterns will change faster than plant and animal communities can adapt.
- Groundwater resources, a major source of drinking water, may be reduced due to a drop in stream flow and lake levels.
- Weather patterns will become more extreme. The overall frequency of both flooding and droughts will increase.
- Changes in seasonal conditions, including frequency of poor air quality (smoggy) days in summer and less snow in the winter, which will decrease opportunities for winter recreation. Milder winters will also affect animal hibernation patterns, stressing food supplies and habitats.

Despite these changes, Minnesota will be less negatively impacted by climate change than many other areas of the country and the world. Minnesota may actually see some potential benefits, such as warmer nighttime temperatures in winter that would reduce heating costs and a longer growing season that would increase agricultural production (in years without drought).

What can you do?

- Drive less. Walk, bike, carpool or take public transit instead of driving.
- Understand your energy use by reviewing and tracking your energy bills.
- Reduce energy in home heating and cooling by sealing air leaks around windows and doors, turning down your thermostat in the winter and up in the summer, and installing a programmable thermostat.
- Install energy-efficient lighting.
- Turn off and unplug appliances and electronics when they are not in use.
- Use your refrigerator efficiently. Recommended temperatures are 30 to 40 degrees Fahrenheit for the refrigerator and five degrees Fahrenheit for the freezer.
- Switch to a low-flow showerhead and take shorter showers.
- Wash clothes in cold water. Line-dry clothing instead of using a dryer.
- Reduce, reuse and recycle.
- Purchase food grown locally to reduce the distance food travels.
- Purchase renewable energy. Many utility providers offer customers an option to purchase renewable energy.



Air quality

Although Minnesota is fortunate to have generally good air quality that has improved over the last decade for most pollutants, there is still a lot we can do to reduce air pollution.

The Minnesota Pollution Control Agency maintains the Air Quality Index, which reports daily air quality conditions. The Air Quality Index measures five air pollutants that are good indicators of daily air quality: fine particles (PM2.5), ground-level ozone (O3), sulfur dioxide (SO2), nitrogen dioxide (NO2), and carbon monoxide (CO).

An air pollution health advisory is issued when air pollution reaches levels that are considered unhealthy for sensitive groups, such as those with pre-existing respiratory or cardiovascular conditions, elderly, children, and people who are physically active.

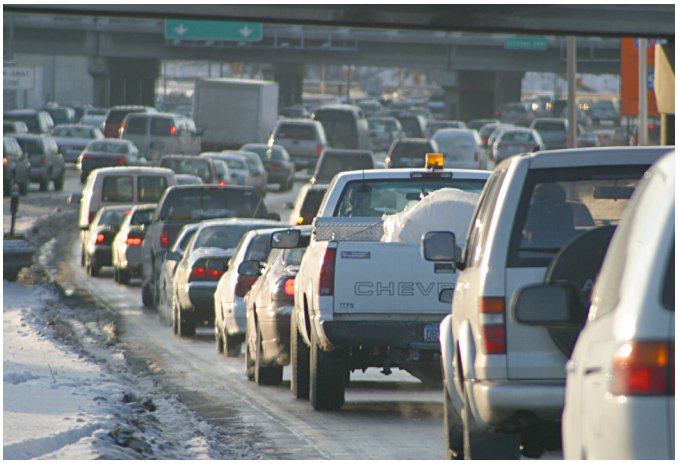
Many factors can lead to poor air quality days. Air pollution in Minnesota come from many sources, including emissions from cars, equipment, homes, buildings and industries as well as pollution that is blown into Minnesota from surrounding areas.

Most poor air quality days are driven by changing weather conditions that increase the rate at which air pollutants are formed or accumulate in the air. For example, ozone pollution levels tend to rise on very hot and sunny days with little wind. Fine particle pollution can be elevated in weather conditions with high humidity, high pressure, strong overnight temperature inversions, or low wind speeds. This often occurs in Minnesota from November through March.

With more days topping 100 degrees Fahrenheit due to climate change, Minnesotans could experience more days with poor air quality.

Take the following actions to reduce air pollution, especially during air quality alert days:

- **Drive easy.** You can improve fuel efficiency by 10 percent or more by driving the speed limit, accelerating slowly and maintaining your vehicle.
- **Fuel up in the evening** when it's cooler, and don't top off the fuel tank beyond where the automatic nozzle clicks off. This forces vapors out of the tank and potentially leads to spills.
- **Take the bus** or check out rideshare or telework options at your work place.
- **Reduce small engine use.** Mow your grass less often, try an electric mower or push mower, or reduce total lawn area by planting native plants, rain gardens, or a vegetable garden.
- **Use less electricity.** Burning coal or natural gas for energy results in air emissions, so reducing energy use is an important way to improve air quality.
- **Reconsider the campfire.** Wood smoke contains toxins and harmful microscopic particles. Even an outdoor fire can impact the indoor air quality in your home. Always consider those living around you and the direction of the wind. If you decide to have a fire, be sure to burn dry wood. Don't burn wood during air pollution health alerts.
- **Sign up for air quality alerts** from the Minnesota Pollution Control Agency to find out when air quality is poor in Minnesota.



Resources:

- MPCA climate change factsheet: *www.pca.state.mn.us/index.php/view-document.html?gid=11394*
- MPCA climate change info: *www.pca.state.mn.us/index.php/topics/climate-change/index.html*
- Be Air Aware MN: *www.beairawaremn.org*
- Minnesota Pollution Control Agency's air quality index *www.pca.state.mn.us/index.php/air/air-quality-and-pollutants/general-air-quality/air-quality-index/current-air-quality-index.html*
- Minnesota Pollution Control Agency's wood smoke information *www.pca.state.mn.us/index.php/air/air-quality-and-pollutants/general-air-quality/wood-smoke/index.html*