

Air Quality

INTRODUCTION

Poor air quality impacts the health of communities. While air quality in Minnesota and across the nation improved significantly over the past few decades, pollution levels are still high enough to negatively impact health. Since 1997, total emissions dropped almost 50 percent while the economy continued to grow. Understanding that the economy can grow while air quality improves helps drive collaboration and partnerships to continue the trend towards lower emissions. This report will examine air quality trends and related health impacts, and the relationship between the transportation system and air quality.

AIR POLLUTION

Air is monitored for six criteria pollutants through the National Ambient Air Quality Standards: particulate matter, ground-level ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide and lead.¹ These pollutants are monitored throughout the state to measure compliance with federal and state ambient air quality standards. State and federal agencies also work in other ways to improve air quality because some pollutants can cause health concerns at levels below the standards. Some communities are particularly at risk related to higher levels of air pollution because of their proximity and exposure to poor air quality. Efforts to reduce ozone and fine-particle pollution are important in Minnesota because these pollutants are the closest to violating national standards. These two pollutants have been linked to health concerns, especially for those who are most vulnerable such as children and the elderly. Along with agriculture and construction, the transportation industry plays a role in minimizing these impacts on our communities.

Measurement

The Air Quality Index is a measure developed by the United States Environmental Protection Agency for reporting daily air quality conditions to the public. There are four categories: good, moderate, unhealthy for sensitive groups and unhealthy. The Minnesota Pollution Control Agency uses this index to report air quality at 30 stations across the state based on concentrations of four pollutants: particulate matter, ozone, sulfur dioxide and carbon monoxide. Measurements of the AQI index have shown a positive trend in Minnesota in recent years. In 2016, there were 238 good air quality days compared to a low of 73 in 2007 (Figure 2). In 2016, there were seven unhealthy air quality days compared to a high of 41 in 2003 (Figure 3). These categories in the AQI index refer to air quality that is good or unhealthy for the entire population of Minnesota, including those sensitive to air pollution.

¹ MCPA. [The Air We Breathe 2017](#)

Figure 2: Minnesota number of good days in Air Quality Index (ozone and fine particles)

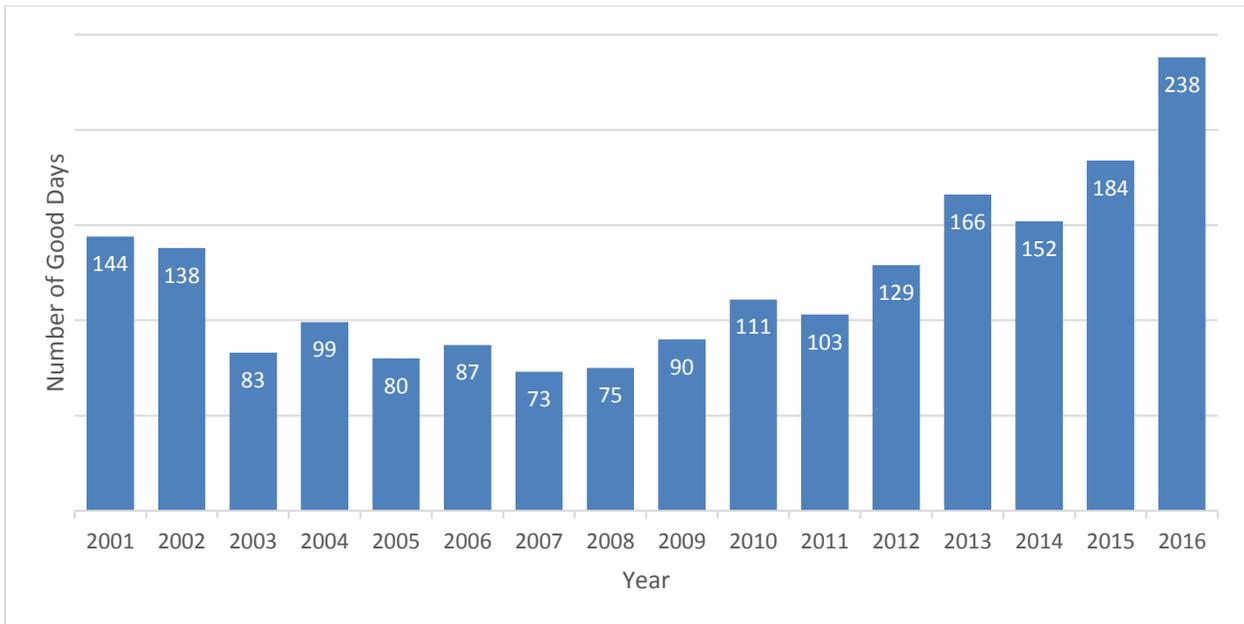
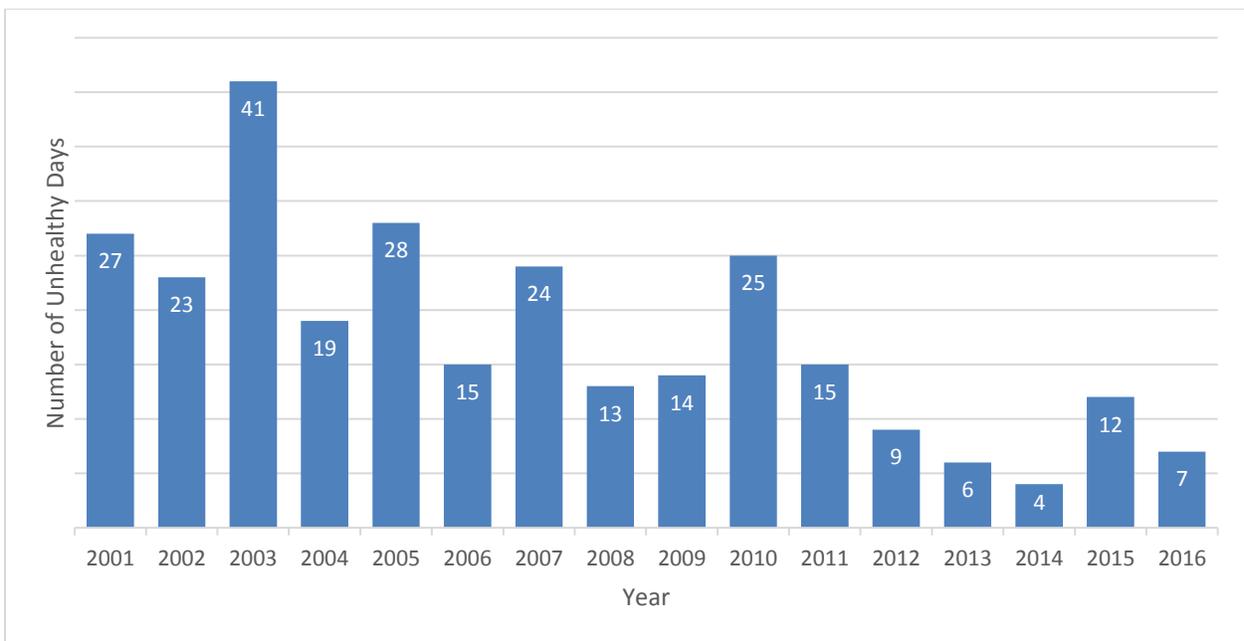


Figure 3: Minnesota number of unhealthy days in Air Quality Index (ozone and fine particles)



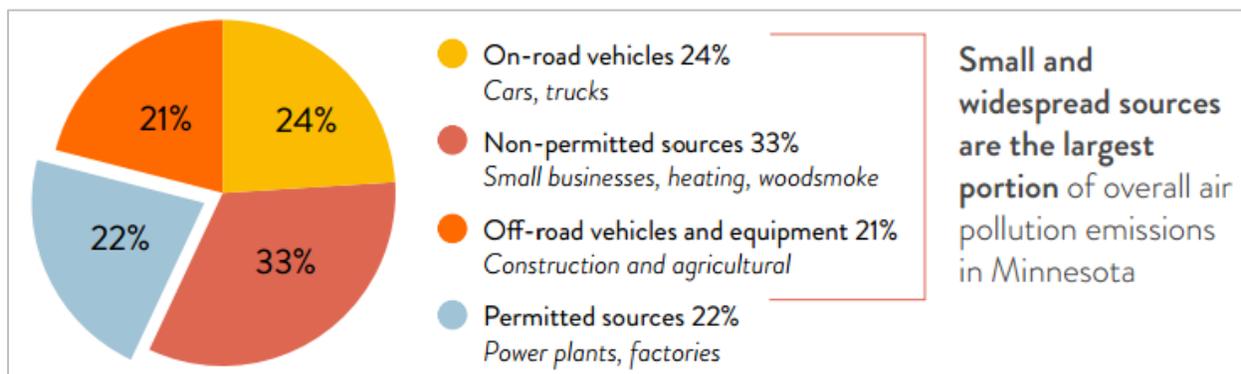
Achieving Attainment in Minnesota

The U.S. EPA monitors air quality through the Ambient Air Monitoring Program.² Several areas in Minnesota failed to meet air quality standards during the 1980s and 1990s. Since standards weren't met, some areas in Minnesota fell into a status called nonattainment and were required to demonstrate progress toward achieving federal air quality requirements. The MPCA submitted an updated plan to go back into attainment and the state went into a limited maintenance plan in 2009. New roadway monitors were installed to ensure the state is meeting federal requirements and stays on track to achieve attainment again in 2019. Once attainment is achieved, the state will no longer need the same level of stringent control measures.

Air Quality Today

The Federal Clean Air Act resulted in a large reduction of air pollution from factories and power plants but did not lead to a large reduction in pollution from vehicles, small businesses, heating and cooling, and recreational equipment. Seventy-five percent of air pollution in Minnesota comes from smaller, widespread sources in neighborhoods.³ Gas stations, dry cleaners, auto body shops, construction and agricultural equipment, homes, vehicles and recreational equipment can cause pollution near where people live and work (Figure 4). These sources may not cause much pollution on their own, but in total and also when in close proximity, they can cause many health concerns.

Figure 4: Sources of Air Pollution in Minnesota⁴



VEHICLE IMPACTS

Vehicles, construction and agricultural equipment emit more air pollution in Minnesota than all factories and power plants combined.⁵ Federal regulations on fuel efficiency and emissions reduced pollution, especially in diesel vehicles. Air pollution reduced significantly over recent decades while fuel efficiency improved for both cars and trucks. The trend towards improved vehicle efficiency and reduced pollution is forecasted to continue⁶. Despite these improvements, vehicles represent a majority of the air pollution in Minnesota and will continue to be a large contributor to poor health.

Vehicle type has a big impact on air pollution. Consumers' preference for less fuel efficient vehicles like SUV's, trucks and crossovers increased recently. Trucks and SUVs continue to be popular with the Ford pickup truck being the most popular

² [U.S. EPA](#)

³ MPCA. [The Air We Breathe 2017](#)

⁴ MPCA. [The Air We Breathe 2017](#)

⁵ MPCA. [The Air We Breathe 2017](#)

⁶ [Environmental Protection Agency](#)

vehicle purchased in 2016 in Minnesota. In 2011, the number of SUVs, trucks and crossovers surpassed the number of cars on the road in Minnesota and became the majority of the passenger fleet. Today, these heavier vehicles make up over 53 percent of all passenger vehicles and emit 70 percent of the passenger-vehicle related pollution.⁷

Diesel Engines

Diesel engines power equipment essential to food production, construction and the supply chain. Diesel accounts for more than half of the harmful particulate matter emissions from vehicles. According to the EPA, diesel emissions contain 40 toxic chemical including 15 carcinogens. Diesel vehicles also last 20 years or more and may drive up to a million miles.

Fuel efficiency for large diesel trucks has improved greatly over recent years. A new diesel truck can produce 97 percent less fine particulate matter than a similar older truck.⁸ Regardless, there are still health risks for people living near diesel exhaust. In 2012, the World Health Organization linked diesel particles with lung cancer. The MPCA found that risk is higher near urban areas and highways where there is a higher concentration of vehicles, construction equipment, boilers and generators.

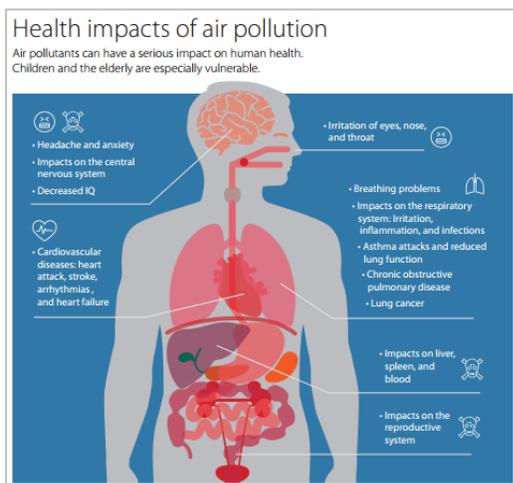
In 2015, the EPA found that Volkswagen was intentionally cheating standards on emissions from its diesel engines. Harmful pollutants were emitted 40 times more than the permitted level from approximately 482,000 Volkswagen vehicles in the U.S.⁹ The State of Minnesota expects to receive \$47 million of the \$15 billion settlement. This money will fund strategies to improve air quality such as replacing old diesel engines, installing electric car chargers or other programs to reduce emissions.

IMPACTS TO HEALTH

The amount and type of air pollution people are exposed to determines the extent of health impacts. If air quality is poor enough, it can have a negative impact on the cardiovascular and respiratory system, cause irritation or have potential toxic effects.

Examples of these effects are detailed in Figure 5.

Figure 5: MPCA report on health impacts of air pollution⁷



⁷ MPCA. [The Air We Breathe 2017](#)

⁸ MPCA. [The Air We Breathe 2017](#)

⁹ [the guardian. 2015](#)

Another major health risk of air pollution is from air toxics. There are more than 100 air pollutants that have been found to cause serious health effects including cancer, reproductive effects or birth defects, or adverse environmental effects.¹⁰ Since these pollutants aren't federally regulated, the MPCA works to ensure the level of these pollutants is lower than health benchmarks.

ENVIRONMENTAL JUSTICE

Air pollution impacts those that live near it the most. Many communities of color and lower income bear a disproportionate burden of traffic-related health impacts while contributing less to vehicle pollution.¹¹ A 2015 study found that while communities of color and lower income tend to own fewer vehicles, do less driving and use public transit more often than other groups, they are also exposed to higher levels of traffic-related pollution. The transportation network was built to allow easier and quicker routes to and from the urban core. This network was largely built through low-income, non-white neighborhoods resulting in the removal of communities and in persistent air pollution for those that remained.¹²

AIR QUALITY IMPROVEMENTS

In the transportation sector, behavior and street design changes provide a different approach to improving air quality:

- Transit ridership is growing
 - Ridership in the Twin Cities was 82.6 million trips and grew in nine of the past 11 years leading up to 2017¹³
 - Demand for transit in Greater Minnesota is projected to increase from 14.5 million trips in 2016 to 20.1 million trips in 2030.¹⁴
- Congestion and idling is improving through design and transportation demand management
 - Streets include roundabouts and improved signal timing
 - Bicycle and pedestrian facilities are built to accommodate active transportation
 - Minnesota roads now have 72.6 miles of MnPASS carpool and toll lanes (Figure 6)

Local governments are also taking steps to improve air quality through land use decisions that allow people to choose how to go from A to B and enhance quality of life. Vehicles with lower levels of pollution are becoming popular. Electric vehicles have a smaller amount of harmful emissions like nitrogen oxide and particulate matter (Figure 7). Local private companies are working to improve their emissions through efficient supply chains, fleets of hybrid vehicles and programs to encourage employee to commute by bike, transit or carpool. Non-profits are driving change by convening stakeholders to pursue air quality goals.

¹⁰ [United States Environmental Protection Agency](#)

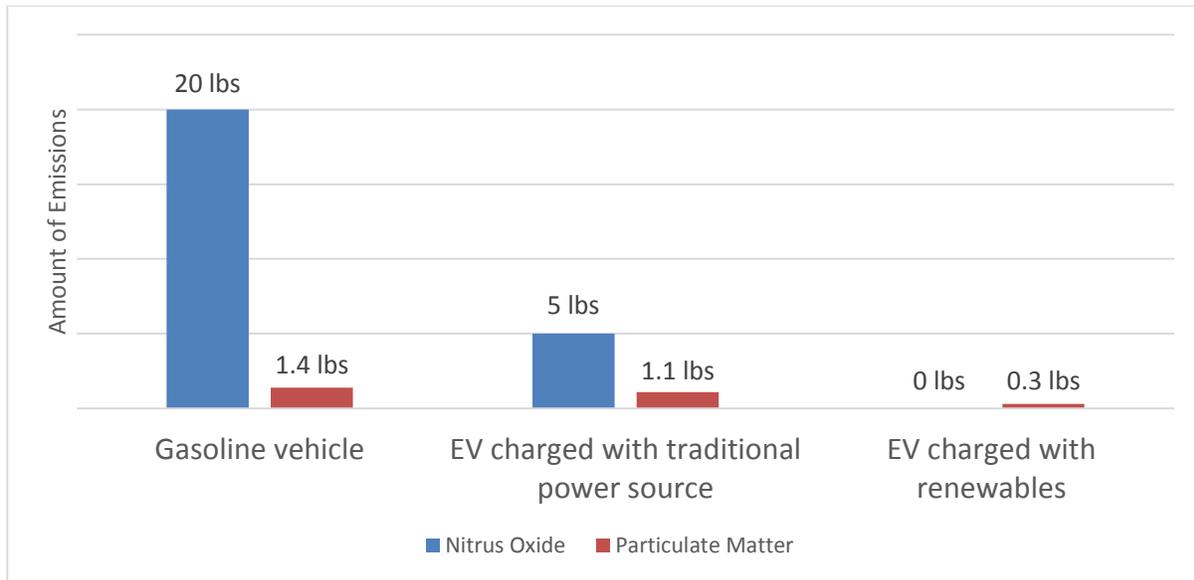
¹¹ MPCA. [The Air We Breathe 2 017](#)

¹² Pratt, Gregory C., et al. "Traffic, air pollution, minority and socio-economic status: addressing inequities in exposure and risk." *International journal of environmental research and public health* 12.5 (2015): 5355-5372.

¹³ [Metro Transit](#)

¹⁴ [MnDOT 2016 Transit Report](#)

Figure 7: Annual gasoline and electric vehicle emissions (12,000 miles) of nitrogen oxide (NOx) and particulate matter (PM)¹⁵



Since 2005, the EPA has given grants to projects that reduce emissions from existing diesel engines. Almost 3,200 school buses were retrofitted nationally, which reduced children’s exposure to harmful particulates by 20 to 25 percent. These types of programs will need to be funded in the future in order to mitigate and clean up the out of date and inefficient diesel vehicles on Minnesota roads.

Air quality continues to be a concern for communities across the country. Improvements were made through regulation, technological improvements and behavior changes, but there is still work to be done. The transportation sector is a contributor to air pollution and can be a leader in air quality improvement.

RELATED TRENDS

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- Water Quality
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¹⁵ MCPA. [The Air We Breathe 2017](#)