



AIR QUALITY AND OUR VEHICLES

All vehicles, even new and well-maintained vehicles, emit pollution into the air. But when vehicles are not in good working order or when they are driven inefficiently, more pollution is emitted into the surrounding air.

Vehicle exhaust consists of many pollutants, such as:

- **Carbon Monoxide (CO)**

An invisible, odorless, poisonous gas emitted when engines burn fuel inefficiently and when cars are idling or moving slowly in traffic. Levels are highest in urban areas just after morning and afternoon rush hours.

- **Carbon Dioxide (CO₂)**

Humans and animals inhale oxygen and exhale carbon dioxide; plants absorb carbon dioxide and release oxygen. Large scale burning of coal, oil and gasoline also emit CO₂ into the air.

- **Ozone (O₃)**

“Good up high, but bad nearby.” Ozone found high in the atmosphere forms our ozone layer, which helps protect us from the sun’s harmful UV (ultraviolet) rays. Ozone is a pollutant formed in the air at ground level from exhaust pollutants. It is a harmful pollutant that can trigger breathing difficulties in children, older adults, and people with respiratory ailments such as asthma.

- **Particulate Pollution**

Tiny particles of solids and liquids suspended in the air. Burning any fuel—gasoline in a car, diesel in a truck, leaves in a pile, or coal at a power plant—releases particles. Particles may also be released on dry days while driving over gravel roads. Many particles are so small, they cannot be seen with the naked eye but can be inhaled and travel deep into the lungs, causing coughing, shortness of breath and cardiac and respiratory episodes.



This guide is designed to give you some tips on how to care for a vehicle and drive it most efficiently, as well as explain new transportation choices in the vehicle market. Visit dnr.wi.gov keyword: ‘vehicles’ for more information.



VEHICLE MAINTENANCE

Properly maintained vehicles run cleaner and generally last longer than poorly maintained vehicles. The vehicle owner's manual lists when inspection and maintenance are due.

Since the 1980s, new vehicles have been equipped with on-board computers to alert the driver when something may be wrong with the vehicle. Today, most vehicles are equipped with OBD II (the second generation of On-Board Diagnostic systems). The *check engine* or *maintenance required* light illuminates to inform the driver when it is time for vehicle service or scheduled maintenance. If the *check engine* light comes on in a vehicle, it should be brought in for service as soon as possible. The technician will be given a code from the OBD II system indicating what the malfunction is and where service is needed.

Oil

Low engine oil levels or dirty oil can hinder an engine's performance. Changing the oil in a vehicle is one of the most cost efficient ways to maintain it. The vehicle owner's manual has recommendations on how often to change the oil and the recommended grade of motor oil to use; using the proper oil can result in a 2 percent improvement in miles per gallon (mpg). Used oil should be disposed of properly. According to the US EPA, Americans improperly dispose of 200 million gallons of motor oil each year (in lakes, streams, backyards, storm sewers, open fields and roadsides). One single gallon of improperly disposed oil can potentially contaminate one million gallons of drinking water.



Battery

The battery is another very important part of a vehicle. It turns the car on, runs the headlights, heat, radio, and more. Checking the battery with regularly scheduled vehicle maintenance will help determine when a replacement is needed. Old batteries should be recycled. Visit dnr.wi.gov keyword: '*recycling batteries*' for more information.

Tires

Tire inspections are an important step in vehicle maintenance. According to the US Department of Energy, "Under-inflated tires can lower gas mileage by 0.3 percent for every 1 pound per square inch (psi) drop in pressure of all four tires." Properly inflated tires will last longer and are safer to drive on. The vehicle manufacturer lists the proper tire pressure for the vehicle in the owner's manual and on the sticker affixed to the inside of the driver's door. This is based on the optimum combination of load carrying capacity, ride, handling, wear and fuel economy.



It is important **not** to inflate the tires to the maximum psi listed on the sidewall of the tire by the tire manufacturer. Over inflating the tires can reduce traction, cause uneven wearing of the tires and increase the possibility of a tire 'blow-out' after hitting a road obstruction, such as a pothole.



TECHNOLOGY CHOICES

Gasoline-powered engines are no longer the only option in vehicles. Cleaner burning fuels such as propane and natural gas are already used in vehicles. Electric as well as hybrid vehicles from several manufactures are in the market.

Hybrid

A hybrid vehicle uses two or more power sources to move the vehicle. Many hybrids use gasoline and battery combined engines. While the vehicle is idling or coasting, the gasoline engine turns off and the battery takes over. When the accelerator is pressed to move the vehicle forward, the gasoline engine turns on and propels



the vehicle forward while recharging the battery. The benefits of hybrid vehicles include better gas mileage and less tailpipe emissions than their all-gasoline engine counterparts.



Electric

An all-electric vehicle uses an electric power charge (either through an electric outlet, or through alternative power, such as solar panels designed to charge the engine) to run the vehicle. There are no emissions from the fueling site or the vehicle itself.

Fuel Cell

The most common fuel cell for vehicles is the hydrogen fuel cell that uses a chemical reaction to create electricity to run the vehicles. The fuel source, pure hydrogen, is passed through the cell separating the electrons from the hydrogen atom. While passing through the cell, electricity is produced and used as the vehicle's fuel. The only byproducts created in the process are heat and water.



For more information on transportation choices, visit www.eXtraordinaryRoadTrip.org.



FUEL CHOICES

Vehicles use many different fuels including gasoline, diesel and alternatives. Reformulated gasoline, known as RFG, is used in certain areas of Wisconsin and is a gasoline blended to burn cleaner by reducing smog-forming toxic pollutants.

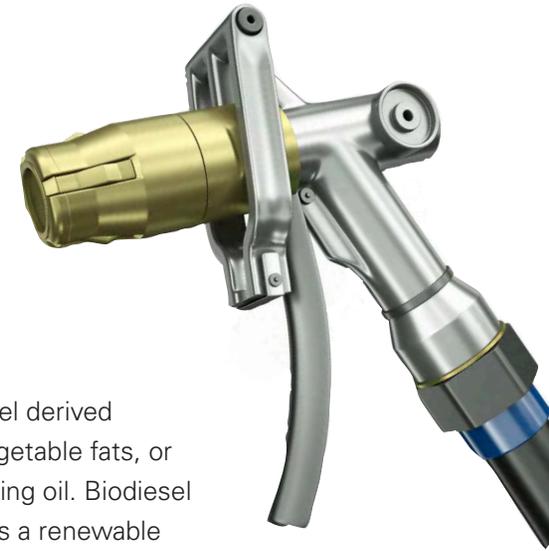
Gasoline

Gasoline is the most readily available vehicle fuel choice for most consumers. Available at gas stations everywhere, it is reliable, easy to find, and the choice most drivers make for their vehicles. However, when gasoline burns, byproducts such as carbon monoxide, carbon dioxide, nitrogen oxides and hydrocarbons are emitted.



Diesel

Another fuel readily available at fueling stations around the country is diesel. Many light duty trucks and some cars use diesel fuel in their engines. Though diesel combustion does not emit as much carbon monoxide, carbon dioxide, and hydrocarbons as gasoline combustion, it does emit more nitrogen oxides and particulate matter than gasoline combustion.



Biodiesel

Biodiesel is a form of diesel fuel derived from plant material such as vegetable fats, or animal fats, or even used cooking oil. Biodiesel is produced domestically and is a renewable resource. It can be used in most diesel engines and when combusted, emits less air pollutants than regular diesel or gasoline, according to the U.S. Department of Energy.

Compressed Natural Gas

Compressed natural gas, or CNG, is a naturally occurring fossil fuel used to power specific CNG vehicles. CNG is not available in all fueling locations, but when it is available it is an excellent fuel choice. It burns 60 to 90 percent cleaner than gasoline and diesel, and 87 percent of the CNG used in the United States is produced domestically, according to the US Department of Energy.



To learn more about fuel choices, visit dnr.wi.gov keyword: 'vehicles'



ECO DRIVING

Eco-driving can be done with any vehicle. Purchasing the most fuel efficient vehicle on the market, or using alternative fuels, may not be possible for all vehicle owners, but eco-driving is. **Eco-driving is using a vehicle in the most energy efficient way possible—reducing fuel use while increasing fuel economy.** Use the list below to start eco-driving today.

- **Reduce Idling**

Idling wastes fuel and achieves zero mpg in fuel economy. Waiting at train crossings, at traffic lights, or in a drive through lane are all examples of idling. According to the Consumer Energy Center, “If you are going to be parked for more than 30 seconds, turn off the engine. Ten seconds of idling can use more fuel than turning off the engine and restarting it.”

- **Reduce jack-rabbit starts and stops**

Accelerating and decelerating slowly and smoothly can save up to 2 mpg.

- **Drive the speed limit**

Most vehicles reach their optimal mpg around 50 miles per hour. When driving over 50 mph, fuel economy begins to decrease.

- **Cruise Control**

Setting the cruise control keeps the vehicle speed consistent. The less the accelerator is pushed, the better the vehicle’s fuel economy will be. Note: In mountainous or hilly regions, cruise control should not be used and instead keeping the driving foot at a steady angle on the accelerator works better to reduce fuel use.

- **Tires**

Tires inflated to the proper pressure can improve gas mileage up to 3.3 percent (according to the Department of Energy). Underinflated tires increase drag and vehicle emissions.

- **De-junk the trunk**

Removing all the extra items that have collected in a vehicle’s trunk or back seat can increase fuel economy. Carrying around extra weight, such as golf clubs, clothing, sports equipment and picnic chairs in a vehicle, increases its weight and increases the amount of fuel needed to drive it.

- **Tune-up**

According to the Department of Energy, a tune-up or the repair of vehicle emissions issues can improve gas mileage by 4 percent on average, but fixing a serious maintenance problem, such as a faulty oxygen sensor, can result in a 40 percent mpg gain.

- **Fueling**

VOCs, or volatile organic compounds, are released into the air when a vehicle’s fuel tank is filled. Filling up the fuel tank in the evening generates fewer hydrocarbons due to cooler outdoor temperatures. Also, tighten the gas cap to prevent vapors from escaping into the atmosphere. On newer vehicles, not tightening the gas cap may trigger the *service engine soon* light to turn on.

- **Carpool**

Carpooling reduces vehicle emissions, parking and fuel costs, and rush hour traffic congestion. The more people sharing a ride, the fewer cars will be on the road, reducing overall traffic congestion and vehicle emissions.

- **Trip-Chain**

Combining errands into as few trips as possible reduces vehicle emissions; once the engine is warmed up it uses less fuel.

- **A/C**

While traveling at highway speeds rolling up the windows and turning on the vehicle’s fresh air vents or air conditioning reduce fuel use. At speeds over 40 mph, the drag caused by open windows uses more fuel than running the air conditioner.

- **Bike/walk**

Biking or walking to work or school is good for our air and for our bodies. No vehicle emissions are released when biking or walking.

