

Reducing Emissions: Vehicle Emission Types



Motor Vehicle Emissions

Motor vehicles are responsible for two types of emissions:

- Greenhouse gas emissions, which contribute to climate change; and
- Air toxic emissions, which impact community health and amenity.

Greenhouse Gas Emissions

Greenhouse gases include carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). In the case of motor vehicles, carbon dioxide emissions are the dominant greenhouse gas emissions (GGE).

All else being equal, more fuel use means more greenhouse gas emissions.

Greenhouse gas emissions contribute to climate change. South Australia's climate is projected to undergo a long-term warming and drying trend in the more populated areas, with the potential for increased rainfall in the north of the state.⁶⁹

South Australian transport-related GGE make up around 20% of the state's total greenhouse gas emissions.

Direct, or 'scope 1', greenhouse gas emissions are those produced by the

vehicle. Internal combustion engine vehicles produce direct emissions when they burn fuel. Most fuels – such as petrol, LPG, diesel and biofuels – produce direct GGE when combusted.

Full fuel cycle emissions also account for GGE associated with fuel production and distribution – the indirect emissions (scope 2 and scope 3 emissions). That is, full fuel cycle emissions are the sum of scope 1, scope 2 and scope 3 emissions, and represent the total greenhouse impact of using a particular fuel or energy source.

For fossil fuels such as petrol, LPG and diesel, as well as natural gas, full fuel cycle emissions are up to 10% higher than direct emissions alone.

For biofuels, biological growth of primary sources used to produce biofuels absorbs carbon dioxide from the atmosphere. This means indirect emissions are negative, offsetting the majority of direct emissions.

Non-combustion transport fuel types, such as electricity or hydrogen, typically have significant indirect emissions and no direct emissions. Indirect emissions, however, can

Further information:

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be regarded as near-zero if renewable electricity is used.

Greenhouse gas emissions can be reduced by using less fuel (through more efficient vehicles, driving, and travel behaviours), and by using fuels with lower full fuel cycle emissions.

Air Toxic Emissions

South Australia's urban air quality is generally good. Still, it is important we maintain and improve it as our transport task continues to grow.

One of the biggest sources of air toxic emissions in urban areas is motor vehicles.¹⁰

Motor vehicles are one of the major emitters of air pollutants in urban areas, contributing more than 80% of the carbon monoxide (CO) emissions, 60-70% of the oxides of nitrogen (NO_x) and up to 40% of the hydrocarbons.

These gases have direct impacts on human health, and may react to produce other harmful substances such as ozone.

Motor vehicles are also a significant source of particulate emissions – microscopic solid and/or liquid particles, up to about 10 µm in size, which may be inhaled.

Particulate emissions, especially those that are smaller than 2.5 µm, have human health impacts. Ultrafine particles are understood to have most impact on people with compromised respiratory or cardiopulmonary health.

Exposure to air toxic emissions can be higher in areas of high vehicle concentration or poor ventilation.

Unlike greenhouse gas emissions, air toxic emissions are not directly related to the level of fuel consumption. Rather, air toxic

emissions relate to the vehicle – the standards to which it was manufactured¹¹ and certified, and ongoing maintenance to ensure its performance doesn't deteriorate.¹²

Older, poorly-maintained vehicles are the biggest contributors to air toxic emissions. Newer vehicles have much lower air toxic emissions – in many cases, well under 10% of those of older vehicles.

Alternative fuels, typically, lead to reduced air toxic emissions for a given vehicle (provided the vehicle is compatible). Vehicles operating in an electric-only mode essentially emit no air toxics.

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See Also:

- [Reducing Emissions](#)
- [Reducing Emissions: Why Reduce Emissions?](#)
- [Reducing Emissions: Vehicle Selection](#)
- [Reducing Emissions: Vehicle Use and Operation](#)
- [Reducing Emissions: Refuelling / Recharging](#)
- [Reducing Emissions: Maintenance and Tyres](#)
- [Reducing Emissions: Aerodynamics and Loading](#)
- [Reducing Emissions: Low Emissions at Low Cost](#)
- [Reducing Emissions: Offsetting Emissions](#)

External Links:

- [Climate Change \(SA Government\)](#)
- [Climate Change \(Australian Government\)](#)
- [SA Environment Protection Authority](#)

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