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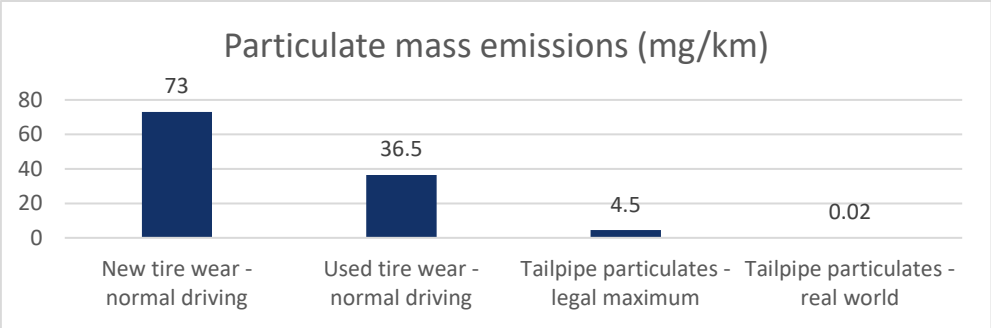
CARBON EMISSIONS AREN'T THE ONLY AIR POLLUTANTS GENERATED BY PERSONAL VEHICLES

Do vehicle emissions only come from the tailpipe? Not quite. A vehicle's tires and brakes generate other harmful pollutants and the transition to electric vehicles (EVs) may exacerbate those emissions.

The 18 million passenger vehicles on Canadian roads contribute to air pollution by emitting volatile organic compounds (VOCs), nitrogen oxides (NOx), particulate matter (PM), carbon monoxide (CO), and sulphur oxides (SOx). PM can be emitted from a vehicle's tailpipe as well as generated from the wear and tear of tires and brakes. Since 1971, the Canadian federal government has adopted increasingly stringent standards for smog-forming emissions from motor vehicles, but particles from tires and brakes have largely escaped regulation.

Comparing real-world emissions, particulate matter emissions from tire wear are approximately 1,850 times greater than those from vehicle tailpipes under normal driving conditions.



Remarkably, the latest gasoline particulate filters have reduced tailpipe mass emissions to just 0.02 mg/km. With gasoline vehicles the majority of new passenger cars, tire mass wear is now 16 times higher than the maximum allowed tailpipe emissions and a whopping 3,650 times greater than actual tailpipe emissions.

This highlights a risk with Battery EVs, as their greater mass and torque leads to faster tire wear and an increase in tire particulate emissions. On average, BEVs generate about 20% more tire pollution than competing internal combustion engine cars. The table below provides results from a comparison test of tailpipe and tire emissions from three versions of the Hyundai Kona: a 1.6T Gasoline Engine, 1.6D Diesel Engine, and an EV.

Hyundai Kona	1.6T Gasoline	1.6D Diesel	EV	Variance (Gasoline vs. EV)
Weight (kg)	1,370	1,395	1,665	22%
Torque (lb-ft)	195	207	290	49%
Tailpipe PM2.5 (mg/v.km)	1.0	0.4	0	
Tire wear PM10 (mg/v.km)	7.9	8.4	10.1	28%
Tire wear PM2.5 (mg/v.km)	1.3	1.3	1.6	23%

There is a significant variance in particulate matter emissions between the gasoline and EV models, with the EV exhibiting a 28% increase in tire wear PM10 and a 23% increase in tire wear PM2.5. This increase is closely associated with vehicle weight, as the Kona EV is 22% heavier than the equivalent gasoline model. Aside from the large amount of particulate matter, tire wear also releases chemical compounds such as synthetic rubber, heavy metals, and toxic additives like 6PPD, contributing further to the pollution.

The latest European "Euro 7" emissions standards will address both tailpipe and tire and brake emissions starting in 2025. Canadian policymakers should consider similar tire emissions regulations and environment conscious consumers should also consider purchasing lighter vehicles rather than heavy trucks and full-size SUVs. The move to EVs is important for Canada's climate goals, but we should not ignore other emission related consequences of this shift.

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