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Air pollution: Diesel is now better than gas, emitting fewer carbonaceous particulates

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Source: University of Montreal

Summary: Regulators, take note: a new international study shows that modern diesel passenger cars emit fewer carbonaceous particulates than gasoline-powered vehicles.

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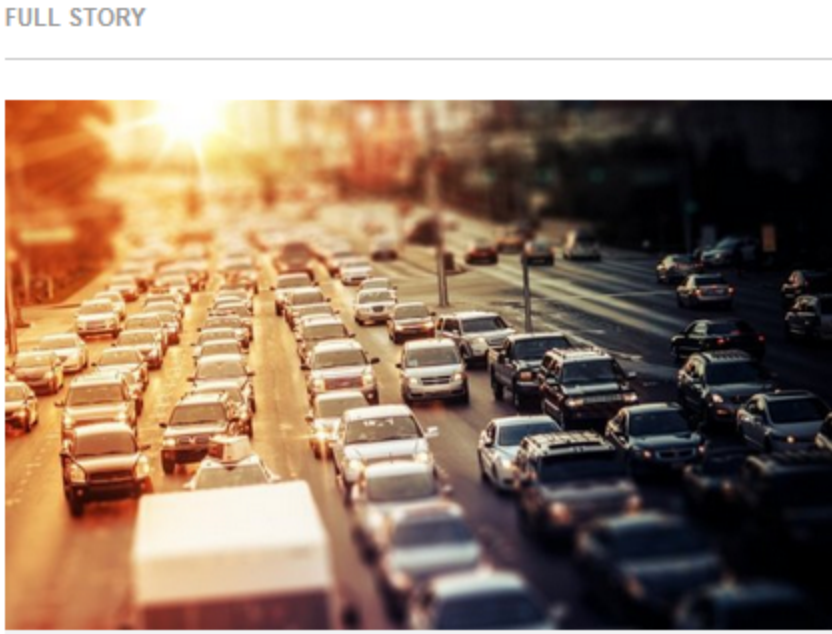
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New results challenge the existing paradigm that late model diesel cars are associated, in general, with far higher PM

Modern diesel cars emit less pollution generally than cars that run on gasoline, says a new six-nation study published today in *Scientific Reports* whose groundwork was laid in part by an American chemist now working at Université de Montréal.

And since diesel is so much cleaner than before, environmental regulators should increasingly shift their focus to dirtier gasoline-powered cars and other sources of air pollution, says the UdeM scientist, Patrick Hayes.

"Diesel has a bad reputation because you can see the pollution, but it's actually the invisible pollution that comes from gasoline in cars that's worse," said Hayes, 36, an assistant professor at UdeM.

"The next step should be to focus on gasoline or removing old diesel vehicles from the road. Modern diesel vehicles have adopted new standards and are now very clean, so attention needs to now turn to regulating on-road and off-road gasoline engines more. That's really the next target."

The study, led by researchers in Switzerland and Norway with help from Hayes and colleagues in Italy, France and the U.S., looked at carbonaceous particulate matter (PM) emitted from the tailpipes of cars.

Carbonaceous PM is made up of black carbon, primary organic aerosol (POA) and, especially, secondary organic aerosol (SOA), which is known to contain harmful reactive oxygen species and can damage lung tissue.

In recent years, newer diesel cars in Europe and North America have been required to be equipped with diesel particle filters (DPFs), which significantly cut down on the pollution they emit.

In the lab (at the Paul Scherrer Institute, near Zurich in Switzerland), "gasoline cars emitted on average 10 times more carbonaceous PM at 22°C and 62 times more at -7°C compared to diesel cars," the researchers noted in their study.

"The increase in emissions at lower temperatures is related to a more pronounced cold-start effect," when a gasoline engine is less efficient because it's not yet warmed up and its catalytic con

cluded. "These results challenge the existing paradigm that diesel cars are associated, in general, with far higher PM emission rates, reflecting the effectiveness" of engine add-ons like DPFs to stem pollution.

That said, it is true that older diesel cars do pollute more than gasoline cars, because they don't have DPFs, and diesel cars in general emit far more nitrogen oxides, which cause smog and acid rain, the study also noted.

For their investigation, the researchers utilized field work on air pollution that Hayes carried out in California in 2010 and published in 2013 when he was a researcher at the University of Colorado working with Jose-Luis Jimenez (also a co-author of the new study).

Over four weeks in a parking lot of the California Institute of Technology, in Pasadena, Hayes analyzed air coming from nearby traffic-heavy Los Angeles, drawn through a tube in the roof of a modified construction trailer.

Now he's doing something similar up in Canada's Far North, "the final resting place of atmospheric pollution," said Hayes, a New Yorker from Albany who has lived in Montreal since 2013.

He's interested in whether the carbonaceous PM up North exacerbates climate change.

Soot that settles on snow makes the snow darker and, warmed by the sun, the snow melts faster, for example. To better understand the origins of PM in the Arctic, for the past two years Hayes has been taking measurements at Eureka, Nunavut on Ellesmere Island.

He plans to publish his findings next year.

Story Source:

Materials provided by **University of Montreal**. Note: Content may be edited for style and length.

Journal Reference:

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emit more carbonaceous particulate matter than modern filter-equipped diesel cars. *Scientific Reports*, 2017; 7 (1) DOI: 10.1038/s41598-017-03714-9

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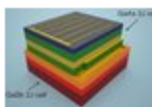


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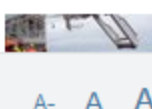


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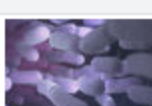
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