Smoke and Mirrors

"My Model Can Beat Up Your Model"

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MY MODEL CAN BEAT UP YOUR MODEL

EXECUTIVE SUMMARY

On March 5, 2024, a Committee of the Ottawa City Council met to decide whether the City should approve the recommendations of its staff to prohibit advertising on City property by oil and gas companies. Activists who spoke in favour of this proposition claimed that harmful pollution from fossil fuels caused 34,000 deaths annually in Canada.

The source of this claim was an article entitled *Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from GEOS-Chem* and published in the Journal Environmental Research in April, 2023. The article stated that the burning of fossil fuels – especially coal, oil and natural gas – is a major source of fine particulate matter (PM2.5) and "a key contributor to the global burden of mortality and disease". Using a concentration-response function from the literature and the GEOS-Chem model to estimate global exposure levels to fossil-fuel related PM2.5 emissions in 2012, the risks to mortality were estimated. The estimates were that there are 10.2 million "premature deaths" annually attributable to the fossil-fuel component of PM2.5, 34,000 of which were in Canada.

The study focused on fine particulates, the airborne pollutants so small that they can lodge in the lungs. In 2021 emissions of fine particulates in Canada totaled 1,500,000 tonnes. Dust (mostly from road construction) constituted sixty-two percent of these emissions, agriculture twenty-four percent, and commercial and residential buildings six percent. Only two percent are from energy consumption.

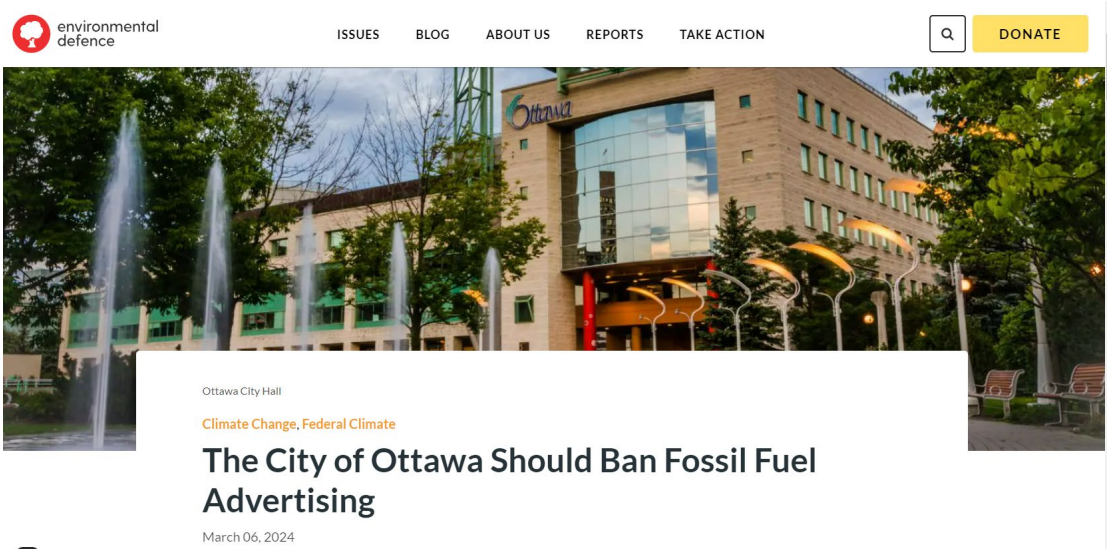
People tend to assume that the estimates of deaths from pollution or any other sources are made by counting dead bodies. That's not true. Despite decades of testing, clinical investigations have not found experimental support for the idea that current ambient air pollution levels cause lung disease or mortality.

Mckitrick, Koop and Tole carried out their own study using a different model. They did not find any evidence that increases in air pollution levels are associated with increased rates of hospital admissions. That's *all* air pollution, not just emissions of particulates. Another study by Stanley Young et al published in *Radiology Toxicology and Pharmacology* in 2017 compared PM2.5 levels in California with daily death counts during the 13 years between 2002 and 2012. Of those 4,745 days, no association could be found between PM2.5 levels and the over two million deaths included in the analysis. Different models, entirely different results.

Environment and Climate Change Canada reports that almost all emissions of air pollutants have been declining since 2000. For example, emissions of fine particulates were 1.5 million tonnes in 2021, 30% lower than 2005 levels. In short, the claim that the consumption of fossil fuels is causing the deaths of 34,000 people per year in Canada is based on models of doubtful methodology, with no explicit linkages between the causes and alleged effects.

MY MODEL CAN BEAT UP YOUR MODEL

I remember as a child getting into debates with my friends about which of our favourite super-heroes was the strongest and toughest. Could Superman beat up the Incredible Hulk? Nobody could prove his point, so the arguments went on endlessly.



https://environmentaldefence.ca/2024/03/06/the-city-of-ottawa-should-ban-fossil-fuel-advertising/

I was reminded of that experience this week when I gave testimony before a Committee of the Ottawa City Council about whether the City should approve the recommendations of its staff and several environmentalist organizations on whether, in effect, to prohibit advertising on City property by oil and gas companies. The alleged reason for this policy would be to send a message to the public that the consumption of fossil fuels was a threat to the health of the world's people, and that a prohibition was just as warranted as the banning of cigarette ads. **Fifteen activists spoke in favour of this proposition while I alone spoke to challenge the premises and the logic of their case**. Three of the speakers referred to a "recent study" by modelers showing that harmful pollution from fossil fuels caused major adverse effects across the world, including 34,000 deaths annually in Canada. That was actually the only real data that the environmentalists offered to support their case.

Where, I wondered, did they get that number from? Was there any validity to it?

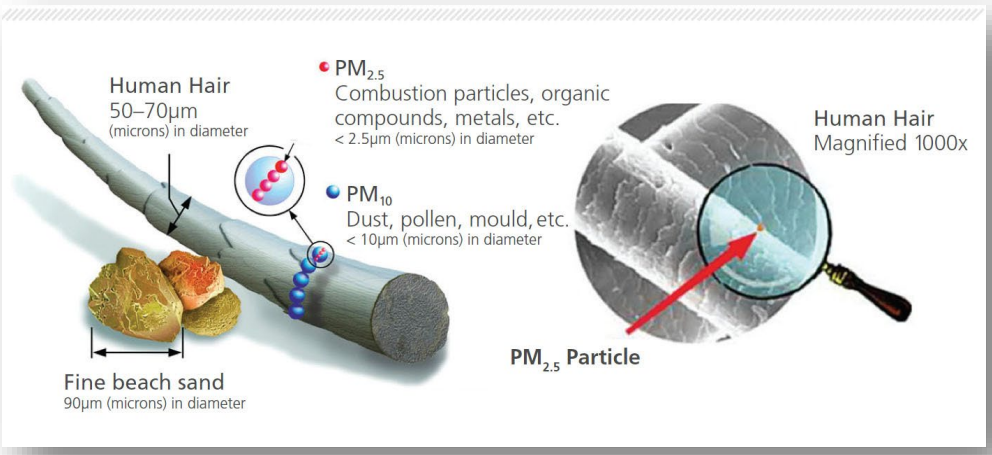
After a short search, I found the answer. The source of this claim was an article entitled *Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from GEOS-Chem* and published in the Journal Environmental Research in April, 2023. The article stated that the burning of fossil fuels – especially coal, oil and natural gas – is a major source of fine particulate matter (PM2.5) and "a key contributor to the global

burden of mortality and disease". Using a concentration-response function from the literature and the GEOS-Chem model to estimate global exposure levels to fossil-fuel related PM2.5 emissions in 2012, the risks to mortality were estimated. The estimates were that there are 10.2 million "premature deaths" annually attributable to the fossil-fuel component of PM2.5, 34,000 of which were in Canada.

DISSECTING THE CLAIM

What causes fine particulate emissions?

It is useful to break the report's finding down into its component parts. First, the focus was entirely on fine particulates, the airborne pollutants so small that they can lodge in the lungs. The fossil fuels listed vary considerably in terms of their emissions of fine particulates, with coal being the most emissions-intensive source, followed by oil and with natural gas contributing almost nothing at all. Further, Environment and Climate Change Canada reports that in Canada in 2021 emissions of fine particulates totaled 1,500,000 tonnes. Dust (mostly from road construction) constituted sixty-two percent of these emissions, agriculture twenty-four percent, and commercial and residential buildings six percent. **Transportation and electricity generation combined (i.e. the main energy sources) accounted for less than 2% of fine particulate emissions. So how did researchers distinguish the effects of fossil fuel combustion from the other sources of particulate emissions?**



What are the links between air pollution and health?

People tend to assume that the estimates of deaths from pollution or any other sources are made by counting dead bodies. That's not true. As Professor Ross McKitrick has written:

"The estimates are derived by taking correlations in the epidemiological literature between observed pollution levels and health indicators, and then extrapolating across populations to estimate how many deaths and illness diagnoses can, in theory, be attributed to pollution. In other words, the numbers come from statistical models, not from direct observations…There are some common weaknesses in the literature. First, the results are not consistent across studies…These kinds of inconsistencies should not occur if the health effect is based on real physiological response. Second, despite decades of testing, clinical investigations have not found experimental support for the idea that current ambient air pollution levels cause lung disease or mortality."

Many anti-fossil fuel activist groups are funded by big green philanthropies. Some of this foreign-funding reaches Canadian environmental groups; some is funded by domestic big green philanthropies.

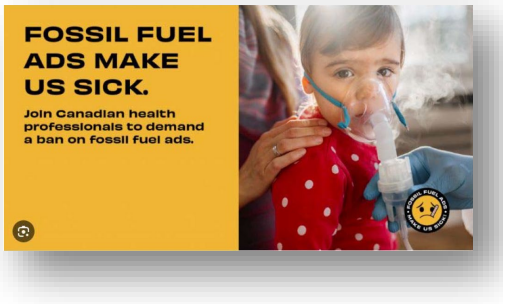
Another weakness is that few studies control for important factors like smoking, income levels and weather. Another is that researchers need to make dozens of choices about which variables could potentially be included in a statistical model, and which model to use. Many of those choices can be both subjective and hidden in poorly documented methodologies.

Mckitrick, Koop and Tole carried out their own study, trying to avoid most of these problems. McKitrick summarized the results of the study in an article in the Financial Post in March 2010. After collecting an enormous amount of data from different sources on hospital admissions for all lung-related ailments in eleven Canadian cities from 1974 to 1994, the levels of urban air contaminants and many other factors, they analyzed the data. Rather than picking one statistical model and relying on it, they used a technique called Bayesian Model Averaging that evaluates all possible model specifications, assesses the support each one gets in the data, and then constructs parameter and uncertainty estimates based on the whole distribution.

In case I lost you at that point, they used an approach that minimized the risks of relying on one, potentially subjective, model and used one that seemed more likely to produce a higher quality result. It's still a model (actually, a series of models), but it includes less bias.

They did not find any evidence that increases in air pollution levels are associated with increased rates of hospital admissions. That's all air pollution, not just emissions of particulates. To illustrate the implications of the findings, if all pollution observed in Toronto in 2010 were to disappear, Toronto Public Health claimed that about 6,000 fewer hospitalization would occur. That claim gets no support in the data. McKitrick et al found that there would be no reduction in lung-related hospitalizations.

Of course, terminology is important. The McKitrick et al study focused on lung-related hospitalizations whereas the April 2023 study based on the GEOS-Chem model projected the number of "premature deaths" from particulates produced by fossil fossil-fuel combustion. What are premature deaths? The concept is important to almost all environmental regulation but the way to calculate it is controversial. If one million people live one hour fewer than they would have otherwise, does that equate to 114 premature deaths? What is the statistical value of a human life? The range of values varies considerably in different countries. In Canada, the figure typically used is $6.5 million but, in the US, some agencies use $10 million as the estimate. These values rarely distinguish between the value of a 70-year-old and a five-year-old. Yet, the terms are tossed around in the public debate with little attention paid to the underlying methodologies or assumptions. **The key point, perhaps, is that these are inputs to a computer-based projection. They do not demonstrate any connection between real cause and effect.**



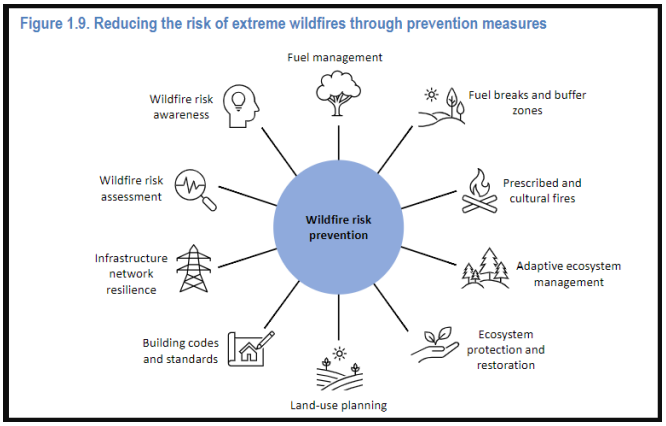
OTHER MODELS, OTHER CONCLUSIONS

Claims that fine particles emitted from smokestacks kill people and warrant highly restrictive regulation are not new. In 1996 the U.S. Environmental Protection Agency (EPA) used its models to find that fine particulate emissions from smokestacks and tailpipes caused 15,000 Americans to "die prematurely" every year. In 2011, under the Obama Administration, EPA Administrator Lisa Jackson testified to Congress that PM2.5 emissions killed 570,000 Americans every year (almost one in four deaths). The United Nations adopted EPA's PM2.5 claims and extrapolated from them into a global claim of 6.5 million deaths annually – essentially killed by soot.

It is no surprise that other modelers challenged these findings. A study by Stanley Young et al published in *Radiology Toxicology and Pharmacology* in 2017 compared PM2.5 levels in California with daily death counts during the 13 years between 2002 and 2012. **Of those 4,745 days, no association could be found between PM2.5 levels and the over two million deaths included in the analysis.** Up to that point in time, that was the largest epidemiological study ever on PM2.5. The abstract of the study states: "*The daily death variability was mostly explained by time of year or weather variables; Neither PM 2.5 nor ozone added appreciably to the prediction of daily deaths. These results call into question the widespread belief that association between air quality and acute deaths is causal/near-universal.*"

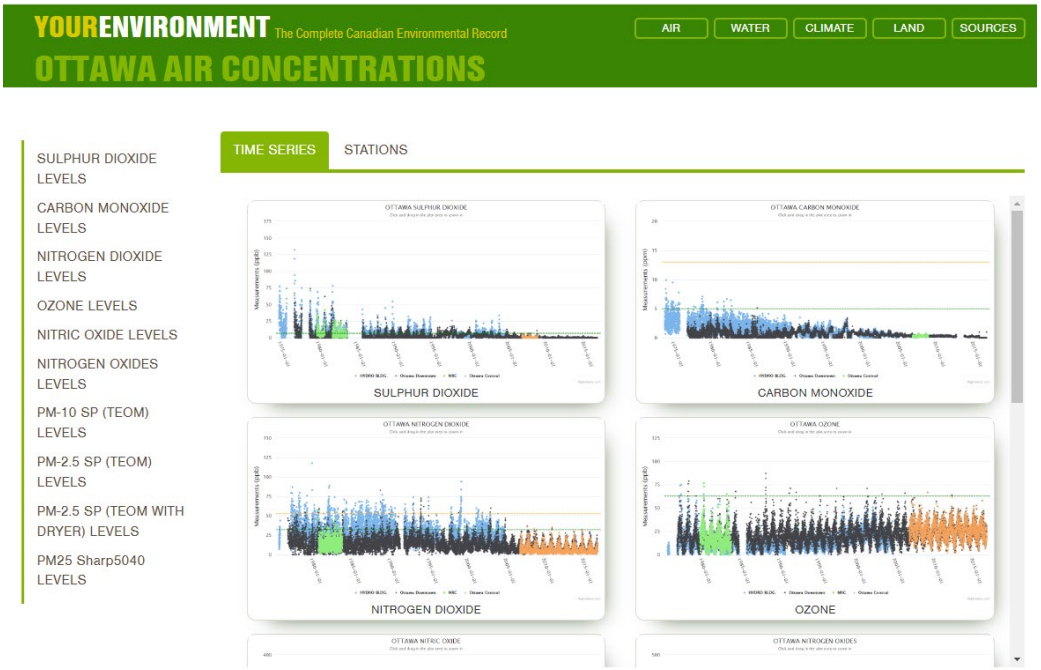
Efforts to find out the reasons for such contradictory findings have so far proven fruitless. A key part of the scientific method is independent replication of scientific claims. But EPA kept the raw data underlying its studies secret for 23 years until Congress finally subpoenaed it to obtain the data.

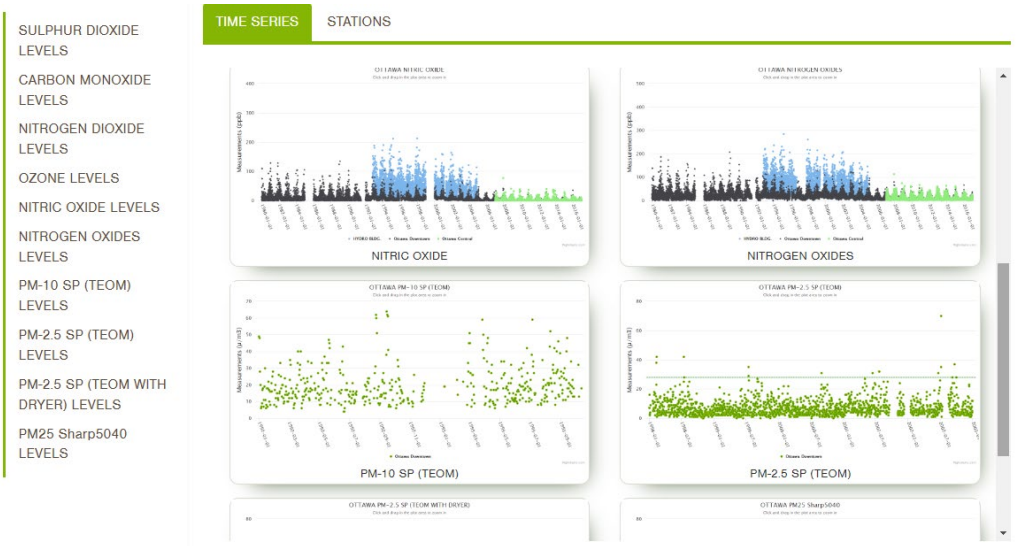
Fine particulates, incidentally, are not greenhouse gases. The gases that some people claim are changing earth's climate are carbon dioxide, methane and nitrous oxide. These are not health hazards at ambient levels.

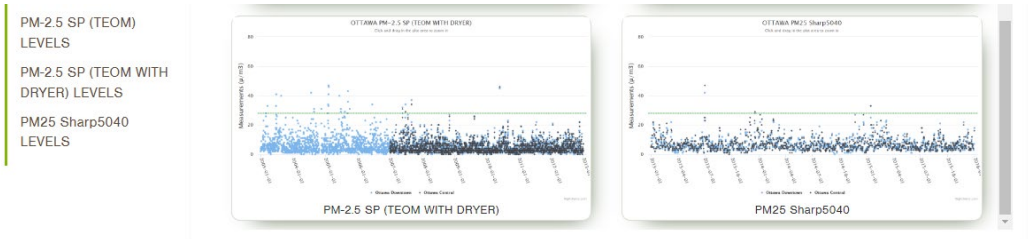


"In short, the IPCC does not provide a basis for strong claims of detection or attribution of "fire weather" to climate change. The IPCC is silent on trends in fire numbers and area burned. These conclusions are contrary to almost all media reporting." -Roger Pielke, Jr., Climate Policy Analyst https://open.substack.com/pub/rogerpielkejr/p/what-the-media-wont-tell-you-about-783?r=f96qu&utm_campaign=post&utm_medium=email

The claim made by CAPE in their ads against fossil fuels, *"Choking on wildfire smoke, brought to you by oil and gas"* is not supported by the Intergovernmental Panel on Climate Change. Their statements are examples of false and misleading advertising. Modern medicine would not exist without fossil fuels.







Canadians can check local air quality history and trends by city at “YourEnvironment.ca” – here are the Ottawa data. Go to the “YourEnvironment.ca” website and click on the individual frames to get higher resolution images and to see the data points. https://www.yourenvironment.ca/pollutant%20concentrations/ontario/ottawa

CANADA'S AIR POLLUTION TRENDS 1990 TO 2021

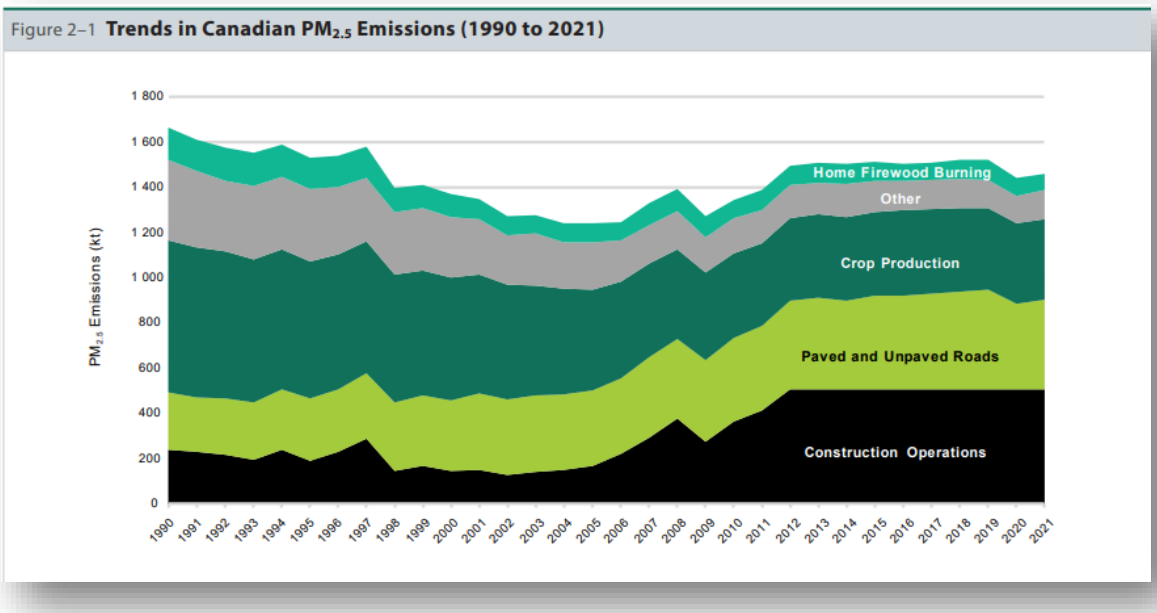
In any case, are air pollutants and particulate emissions in Canada getting better or worse?

Last year, Environment and Climate Change Canada issued *Canada's Air Pollutant Emissions Inventory Report 2023*.

Here are the key statistics:

- Emissions of Sulphur Oxide (SOx) in 2021 were 0.6 million tonnes, 56% below the 2010 emissions ceiling under the 1999 Gothenburg Protocol and 69% below 2005 levels;
- Emissions of Nitrogen Oxide (NOx) in 2021 were 1.3 million tonnes, 42% below 2005 levels.
- Emissions of non-methane Volatile Organic Compounds VOCs) were 1.4 million tonnes in 2020, 33% below the 2010 emission ceiling under the Gothenburg Protocol.
- **Emissions of fine particulates were 1.5 million tonnes in 2021, 30% lower than 2005 levels;**
- Emissions of Cadmium, Lead, and Mercury in 2021 were 89%, 81% and 25% below the ceilings established in the 1998 Aarhus Protocol on Heavy Metals.

Contrary to the general public impression promoted by environmentalist organizations, almost all air pollutants are steadily declining in Canada.



Source: https://publications.gc.ca/collections/collection_2023/eccc/En81-30-2021-eng.pdf

The Fraser Institute, in a 2017 study, examined the extent to which Canadians are actually exposed to fine particulate matter and measured average levels of fine particulate matter weighted by the population exposed to it. On this measure, Canada ranks 9th out of 33 high-income OECD countries. In general, Canadians enjoy excellent air quality. You will never get Environment and Climate Change Canada to admit it, though.

CONCLUSION

The claim that the consumption of fossil fuels is causing the deaths of 34,000 people per year in Canada is based on models of doubtful methodology, with no explicit linkages between the causes and alleged effects.

ABOUT THE AUTHOR

Robert Lyman is an economist with 27 years' experience as an analyst, policy advisor and manager in the Canadian federal government, primarily in the areas of energy, transportation, and environmental policy. He was also a diplomat for 10 years. Subsequently he has worked as a private consultant conducting policy research and analysis on energy and transportation issues as a principal for Entrans Policy Research Group. He is a frequent contributor of articles and reports for Friends of Science, a Calgary-based independent organization concerned about climate change-related issues. He resides in Ottawa, Canada. Full bio.

ABOUT FRIENDS OF SCIENCE SOCIETY

Friends of Science Society is an independent group of earth, atmospheric and solar scientists, engineers, and citizens that is celebrating its 21st year of offering climate science insights. After a thorough review of a broad spectrum of literature on climate change, Friends of Science Society has concluded that the sun is the main driver of climate change, not carbon dioxide (CO2).

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