

Effects of Tailpipe Emissions on Air Pollution in Canada

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ABSTRACT

This paper examines the literature associated with air pollution research and links the increase of tailpipe emissions to likely health and environmental impacts within Canada. The authors explore the need for improvising clean vehicles as well as using enhanced fuel technologies because it results in an affordable transport mechanism and hence reducing transport-related air pollution and climate change emissions.

(Keywords: Canada air quality, tailpipe emissions, atmospheric pollution, smog, clean vehicle technology)

INTRODUCTION

Today, we are living in an era of rapid changes occurring due to technological developments that are revolutionizing modern life. Technology can be defined as the application of scientific knowledge into effective practices, and through technology, there has been the development of machinery and other devices. Technology is a result of the industrial revolution that has occurred in different parts of the world. However, new technologies have an impact on the environments in which we are living.

Technology is one of the root causes of both air and water pollution, where excessive and harmful compounds have been emitted into the atmosphere. These compounds include gases like carbon dioxide and carbon monoxide that are a result of tailpipe emissions. Moreover, tailpipe emissions are harmful pollutants that are produced into the atmosphere through exhaust pipes. These pollutants are a result of burning gasoline, natural gases, petrol, and other biodiesel blends.

LITERATURE REVIEW AND METHODOLOGY

Many studies have been done on the effects of tailpipe emissions on air pollution here in Canada as well as in other parts of the world. A journal from IOP Science reveals that emissions from the transportation sector are the primary contributor to air pollution (Anenberg, 2019). This journal has been useful in this research study in revealing the effects of air pollution on the surroundings resulting from burning fuels.

Southern Ontario Centre of Atmospheric and Aerosols research (SOCAAR) conducted a pilot study in Ontario and British Columbia. They reveal that one-third of Canadian citizens live within 250 meters of the significant roads. Hence, they are significantly exposed to tailpipe emissions. Moreover, according to SOCAAR (2019), vehicle emissions are the dominant roadside polluter in Canada.

A journal of exposure science and environmental technology also have been of much help in this study. This journal reveals that vehicle emissions continue to dominate air pollution. Light-duty and heavy-duty vehicles are responsible for producing volatile organic compounds, carbon monoxide, as well as nitrogen oxides (Sawyer, 2010). An article from Hindawi.com reveals that human health remains at risk due to air pollution caused by vehicle emissions. This journal has been of great help in this study in showing the effects of vehicle emissions on air pollution (Zhao et al., 2018).

According to Harris (2011), a journalist at NPR, who wrote an article on air pollution, revealing how it affects human health and how it has impacted the planet, aerosols that cause air pollution are responsible for reflecting sunlight resulting in cold environments.

A report from the Union of Concerned Scientist (2014) has also been helpful in this study revealing how vehicles lead to air pollution that later on affects human health.

According to Chung (2019), a writer at the CBC News, air pollution is high for those living in significant roadways in Canada. This article from the CBC news has helped this study reveal the effects of tailpipe emissions on Canada's air pollution.

Daley (2020) published a report to show the topmost Canadian cities that have been affected by air pollution. The article further reveals that tailpipe emissions have been the main contributor to air pollution in the cities.

RESEARCH RESULTS

This study's results indicate that almost one-third of Canadians live within urban/peri-urban areas, hence exposing many people to air pollution. The research results reveal that emissions from both heavy-duty and light-duty vehicles are the main contributors to air pollution in Canada. Tailpipe emission occurs when there is a combustion of gasoline and diesel that leads to the production of harmful substances into the atmosphere. Some of the toxic substances produced are carbon dioxide (CO₂), nitrogen oxides (NO_x), hydrocarbons (HC), Sulphur dioxide (SO₂), Particulate matter (PM10), and Ozone (O₃).

According to the studies, for every liter of diesel and gasoline that is burned, about 2.66 kg and 2.29 kg of CO₂ are produced. The results reveal that significant cities in Canada are being subjected to severe smog pollution resulting from tailpipe emissions. The primary composition of this smog is the particulate matter and nitrogen oxide. Moreover, tailpipe emissions and air pollution have been linked to causing health issues to both human beings and animals living in Canada. Air pollution has been considered the leading cause of cardiovascular diseases, decreased lung function, heart attacks, and other human-related disorders.

Carbon dioxide (CO₂) has been identified as the principal contributor to global warming leading to the greenhouse effect. Additionally, the results reveal that some of these tailpipe emissions, such as Sulphur dioxide (SO₂) and nitrogen oxide (NO₂), are very toxic. When they are released into

the atmosphere, they react with the water forming acid rain.

The results of this research study have revealed why it is essential to have quality air that is free from pollution. With clean air there the number of recorded diseases that result from air pollution will decrease. According to Harris (2011), aerosols produced are useful for reflecting sunlight into the atmosphere, thus stimulating the clouds that keeps us cool. Hence, reducing global warming. These pollutants impact the amount of carbon dioxide is withdrawn from the air by plants.

Moreover, the results indicate that reducing tailpipe emissions in Canada requires the development of clean vehicles and enhanced fuel technologies (SOCAAR, 2019). Clean vehicles with clean fuel technologies provide affordable and efficient means of transport, reducing transportation-related air pollution and climate change emissions in most Canadian cities. Also, the results reveal that federal regulations that have been set, such as the Canadian Environmental Protection Act 1999, have helped to reduce tailpipe emissions. Vehicle emission standards have been applied to reduce air pollution, and further improvements are coming from the Tier 3 standards (Union of Concerned Scientist, 2014).

CONCLUSION

Rapid changes that are occurring today are a result of the industrial revolution. This research study has identified that today's new technology is the root cause of both water and air pollution.

More than one-third of Canadians live within 250 meters of the significant roads, and hence they are significantly exposed to tailpipe emissions. The significant causes of air pollution in Canadian cities are the tailpipe emissions that occur when gasoline, diesel, and other oil-related gases are burned. When heavy-duty and light-duty vehicles burn gasoline and diesel, they produce volatile gases such as carbon dioxide, sulphur dioxide, nitrogen oxide, hydrocarbons, ozone, and other particulate matter. The effects of these gases have been revealed in this research study. Carbon dioxide is accountable for causing over 60% greenhouse effect, thus leading to climate change in Canada.

Moreover, hydrocarbons and particulate matter resulting from burning fuel lead to the formation of smog in major cities in Canada. Also, Sulphur dioxide and nitrogen oxides result in the creation of acid rain when it combines with the water vapor in the atmosphere. These tailpipe emissions have been overwhelming because air pollution has been considered the primary cause of cardiovascular diseases, decreased lung functioning, and even heart failure.

This research study states the need for improvising clean vehicles as well as using enhanced fuel technologies because it results in an affordable transport mechanism and hence reducing transport-related air pollution and climate change emissions. Also, it is essential to adhere to the set of federal regulations that deal with reducing air pollution. Vehicle emission standards have been used to cut pollution from light-duty and heavy-duty vehicles by 90%.

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