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THE EFFECTS OF TRAFFIC RELATED AIR POLLUTION AND PROPOSED LEGAL
REMEDIES

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Policymakers in Canada govern the actions of individuals and entities for the purpose of mitigating issues that are troublesome to the life, security, and well-being of Canadians. Legislators have taken a far too relaxed approach at regulating traffic related air pollutants (TRAP), with mere guidelines enacted to restrict the flow of pollutants into our atmosphere. TRAP can be defined as a “by-product of the combustion process that occurs in the majority of automobiles and trucks, producing a host of pollutants such as particulate matter, nitrogen oxides, volatile organic compounds, and more”, (Sider et al. 2016, 2). As TRAP is an all-encompassing issue, it calls for collective action, whereby major stakeholders and agencies work in unison to regulate this serious problem.

Fundamentally, TRAP presents an incumbent threat to air quality and personal health across Canada. Air pollution serves as a form of “non-point” pollution, as its emissions are difficult to trace with the naked eye (Boyd 2006). Furthermore, this paper will conduct an examination of the main contributors of pollution, as well as conduct a diagnosis of the legislation that is currently in effect. Lastly, an argument will be made for new legislation that may be prescribed to remedy the harm caused to humans and their environments from the traffic related air pollutants. Ambient air quality is an international issue, as it affects both developed and developing countries; and the intent of policies should be targeted towards corporate compliance, as well as incentive programs for consumers.

In order to examine the shortcomings of legislation, it is necessary to understand the scope of the problem, and how traffic related air pollution has become such a contentious issue across Canada. Primarily, TRAP exists as a by-product of urban

design, and is characterized by the emission of harmful pollutants into the atmosphere, as well as acute and chronic health complications.

It can be ascertained that the major cause of TRAP is derived from motor vehicles, and as the reliance on vehicles continues to grow, so has the plethora of environmental complications that accompany their use. Harrington and McConnell (2003) argue that of vehicle reliance is a result of urban density, and the trade-off of a skyrocketing housing market for a longer vehicle commute. In order to quantify this issue Zahabi et al. (2015) argues that, "Transportation makes up twenty-seven percent of Canada's total greenhouse gas emissions, and transport-related GHGs increased by nearly thirty-three percent between 1990 and 2005" (1).

While these figures certainly condemn consumers, urban infrastructure has also made vehicle use a double-edged sword, in the sense that travelling by car is often the most efficient method of transportation, and demographically the most accessible method to any given destination. In support of this claim, (Hystad et al.2015, 240), estimate that 10 million individuals, which is 32% of the population live within 100 meters of a major urban road or 500 meters of a highway. Pollutants concentrate towards areas of high population density, such as cities, urban centers, and create pollutant-dense geographic areas, which entail both health and environmental complications.

A major contributor to air quality degradation is hydrogen cyanide, a chemical particulate which is released throughout the internal-combustion process in vehicles. Hydrogen cyanide is "among one of the most resilient chemical compounds, with its ability to be present in the atmosphere and nearby environment long after it is initially

released” (Moussa et al. 2016, 7). Additionally, while hydrogen cyanide emissions are constantly emitted into the atmosphere twenty-four hours per day, there are notable peak timeframes due to the lengthy travel of commuters (Moussa et al. 2016). An emerging theme with chemical particulate emissions like hydrogen cyanide is that they are not federally regulated.

Traffic-related air pollution yields itself to yet another harmful emission, nitrogen dioxide, which receives far less attention than carbon dioxide, is no less of a threat to atmospheric equilibrium. Nitrogen dioxide concentration patterns are characterized by traffic routes, urban population density, and physical infrastructure design (Pinault et al. 2016). Predictably, ambient nitrogen dioxide emissions are correlated to major cities, roadways, and are particularly prominent in developed countries. Fields (2004) argues that nitrification from excess traffic is an industrial problem, but also condemns the pollutant as a contributor to acid rain, water acidification, coastal eutrophication, biodiversity destruction, and groundwater pollution. Like hydrogen cyanide, nitrogen dioxide is produced directly from traffic related combustion engines, and can singlehandedly destroy the ozone in the stratosphere, and can persist in the atmosphere for approximately 120 years (Fields 2004).

An underlying consequence of the environmental complications from traffic-related air pollution is the inequity experienced by victims exposed to the plethora of chemical pollutants emitted into the atmosphere. As Sider et al. (2016) states, “the spatial distribution of traffic related air pollution is not uniform across urban metropolitan regions, resulting in exposure disparities across different population groups” (p.3). New immigrants, low-income residents, and residents of government subsidized housing

units all find themselves in close proximity to the hotbeds of TRAP. These areas of high concentrated pollutants are identified as highways and city streets, urban centers, and alternative transportation routes. Cartier, Benmarinha, and Brouselle (2015) argue that traffic routing is not evenly distributed in cities, and this may pose a greater threat to individuals residing in certain geographic locations, as they can be subject to a high concentration of commercial transport trucks.

Air pollution has been a trending topic in Canadian law and politics of the twentieth and twenty-first century, as members of parliament have turned their attention to the silent killer. Traffic related air pollution is consistently elevated next to highways and major roadways, and can spread over larger metropolitan areas (Brugge et al. 2015). Coupled with an estimated 1.3 million deaths worldwide attributed to urban air pollution, it was time for a framework of laws to be established to mitigate the incumbent threat presented to humans, the environment, and biodiversity (Cartier, Benmarinha, and Brouselle 2015). In Canadian context, the inception of the *Canadian Environmental Protection Act* in 1999 was Canada's first federal legislative provision that targeted "pollution prevention and the protection of the environment and human health in order to contribute to sustainable development" (Canadian Environmental Protection Act 1999).

The *Canadian Environmental Protection Act* addresses legislating smog-producing pollutants such as "nitrogen oxides, sulphur dioxide, volatile organic compounds, and particulate matter" (Boyd 2006, 11). Armed with new legislation to combat the detrimental chronic and acute effects of air pollution, the act made twelve major divisions that each addressed an area of concern with respect to environmental integrity. The federal government now had the statutory and constitutional authority to

regulate the harmful substances emitted from traffic related sources (Boyd, 2006). In terms of addressing TRAP, three divisions were created with this in mind. Part three, division four concentrated its attention towards pollution prevention, part five addressed controlling toxic substances, and part seven divisions four and five addressed fuel, and vehicle emissions respectively (Canadian Environmental Protection Act 1999). The regulatory framework established an acceptable level of compliance with industry standards for both on-road and off-road vehicles. Namely, the use of fuels with specific concentrations of an element or additive, and the use of national emission marks to trademark standards established for vehicle emissions, fuel efficiency, and the creation of emission reports for vehicles (Canadian Environmental Protection Act, 1999).

A specific example pertains to fuel blends, and pursuant to section 139 of *The Canadian Environmental Protection Act*, the concentration of sulphur in gasoline was not to exceed eighty mg/kg, due to the propensity that an excess of sulphur in the combustion process of vehicles would contribute significantly to overall air pollution (The Canadian Environmental Protection Act, 1999). Furthermore, compliance protocol was introduced in the manufacturing realm of vehicles, with baseline standards established for aerodynamics, tires, weight reduction, engine idling, and speed reduction; all of which apply to passenger vehicles, light-duty and heavy-duty vehicles (Kodjak 2015).

In addition, the federal government created stringent provisions within the act to establish emission standards for both on and off road vehicles. They regulated standards for passenger vehicles, light-duty vehicles, and heavy-duty vehicles, as well as regulated off road vehicles such as watercrafts, snowmobiles, and other small engine machinery (The Canadian Environmental Protection Act, 1999). Legal intervention

pertaining to the enforcement section of the act includes inspections, investigation of violations, out of court compliance measures (ticketing, compliance orders, and prohibition orders), through-court actions (injunctions, prosecution, court orders upon conviction), and civil suits for cost recovery (Canadian Environmental Protection Act, 1999).

The *Canadian Environmental Protection Act* was the legislative cornerstone which spearheaded the regulation of traffic related air pollution, and two subsequent amendments have since been added to bolster the strength of the act as a whole. The successors of the act came as Bill C-30, and Bill C-33 respectively. Bill C-30 placed smog and particulate matter associated with traffic related sources on the schedule one level of the environmental protection act, in order to give federal regulatory agencies, the ability to control and enforce their regulation. In addition, Bill C-30 made a commitment to a national carbon budget, and recognized that air pollution, along with climate change, worked hand in hand to constitute one of the most serious threats to Canadians (Beauregard-Tellier 2006). A final provision amended in Bill C-30, was Canada's emission trading policy, which defined dollar values for carbon trading per tonne (Beauregard-Tellier 2006).

The second amendment added to *The Canadian Environmental Protection Act* was Bill C-33 in 2008, and it entailed provisions which regulated the minimum content level of biofuel in gasoline and diesel, as well as inspection and enforcement to ensure fuels have been properly blended (Banks, 2008). The new requirement to include the use of renewable fuels including ethanol made from grains altered the overall emission level of pure gasoline, lowering the overall carbon imprint it made compared to previous

blends of fuel. This amendment made specific reference to the prohibited use of certain unregulated fuels, in addition to their unlawful import, and production for the purpose of export. Furthermore, under the enforcement of Bill C-33, enforcement officers were now permitted to search areas where they reasonably believe fuels may be found (Banks 2008).

While Canada's Environmental Protection Act has garnered much praise for being Canada's first legislative agreement to regulate air pollution, it is not without its shortcomings. It is worth noting that the implications of chronic exposure to traffic related air pollution is far from a new discovery, and that science discipline has wholeheartedly done its part to inform policymakers of the ramifications of air pollution. The capacity to understand the spatial distribution of TRAP can be established through the use of transportation model simulations, which estimate traffic flow and produce quantifiable emission predictions over an entire metropolitan region, even to the detail of individual roads (Shekarizzfard et al. 2015).

The laws and policies governing air pollution are long overdue for a re-tooling to say the least. The existing legislation is a safety net that intends to mitigate the threats to the natural environment, biodiversity, and ecosystems. A glaring gap in federal legislation appears to be the underuse of penalties applied to individuals and corporations. Furthermore, the lack of legally binding regulations makes for an overall lax enforcement initiative. Furthermore, according to an internal audit conducted by the Office of the Auditor General in 2011, despite the legislative tools the Environmental Protection Act has at its disposal, it has performed dismally in enforcing these options (Office of the Auditor General 2011). Specifically, with the warnings, directions, tickets,

finer, compliance orders, injunctions, and prosecution orders the act entails as suitable enforcement actions, it only issued 606 total written warnings, and prosecuted twice for the entire calendar year of 2011 (Office of the Auditor General 2011).

The lack of enforcement measures applied to culpable corporations makes enforcement at the individual level seem even further from a possibility. In addition, the audit found that forty-one percent of the regulations found in the act have legal weaknesses that inhibit enforcement (Office of the Auditor General 2011). The legislation was found to contain evasive language, problematic or insufficient definitions, an absence of testing methods, an unreasonable burden of proof, a multitude of compliance concerns, and several vague omissions within legislation (Office of the Auditor General, 2002). A glaring exclusion in the act is the absence of consistent idling bylaws, which is already scarcely enforced.

With regards to Bill C-30, which governs motor vehicle emission standards, there is a delay in vehicle fleet turnover with every new generation of cars on the market, and thus, it poses a legislative challenge in managing emission standards. Generally, government mandated emission standards are much lower than what new vehicle fleets can achieve, which allows inefficient vehicles to be deemed road worthy. The challenge pertains to consistent emission testing, and namely the issue of catalytic converter deterioration throughout the lifespan of a vehicle, which causes pollutant increases by a significant magnitude (Brauer, Reynolds, and Hystad 2013). Inspection of these emission control devices is absent in Bill C-30, and thus presents itself as an issue which must be addressed in new legislation.

With respect to Bill-C33, the legislative piece concerns itself with fuel quality standards, and has seen much success with its initiative to prescribe fuel content requirements, and fuel blend standards. Federal regulation of national fuel blends upon import or export should be more stringent, and should require additional inspection to ensure accountability. While Bill C-33 strives for the use of renewable content in a federally recognized amount of five percent, it is not without its flaws. It has been criticized for subsequently putting pressure on the agriculture industry to produce the raw material for the biofuel production, and can cause consumers to use more fuel because ethanol blended fuels have a lower energy output than pure gasoline (Canadian Biotechnology Action Network, 2016). Furthermore, it has been criticized as a legislative agreement for the short-term, as opposed to a long-term strategy, and that “the land conversion issue means that this renewable fuel legislation will not decrease GHG emissions” (Samson, 2008, p. 6). This legislation fails to mitigate the greenhouse gases produced by the land used in the biofuel generation process. Secondly, the legislation is not a “made in Canada” solution, as it primarily supports U.S. based markets through imports of corn (Samson, 2008). The final criticism for this regulatory bill is that it does not demonstrate “fiscal responsibility” in the sense that it does not adequately incentivize biofuel production in Canada (Samson, 2008).

Traffic related air pollution is a spatial distribution problem as much as it is an environmental problem, and it will continue to get exponentially worse if the inherent gaps in legislation are not amended. While Canada should be commended for their initial start to regulate TRAP, there are a number of improvements that can be made that are progressive, and can mitigate overall air pollution levels.

Seeing as traffic related air pollution is a pervasive problem with many contributing factors, comprehensive legislation is needed in order to specifically mitigate the existing risks. There are four major areas of interest for policymakers looking to address TRAP: vehicle emissions, modifying infrastructure, land-use planning, and behavioural change (Brauer, Reynolds, and Hystad 2013). Vehicle emissions can be targeted through the elimination of high emission vehicles, and by expanding infrastructure to accommodate renewable energy vehicles. Infrastructure can be better managed by working to strengthen municipal bylaws, and by establishing specific routes for slower/heavier vehicles to reduce traffic congestion. In addition, long-term infrastructure development should be required to build at least 150 meters away from traffic-dense zones. Thirdly, land-use planning can create safety standards which prohibit development in areas that are already incredibly dense. Fourthly, by incentivizing alternative transportation, commuters will be encouraged to reduce traffic congestion through the travel choices they make. Furthermore, in order to address pollution that is concentrated in particular areas due to geographic vulnerabilities, policies should include anti-idling and low emission zones to restrict careless ambient pollution generation (Brauer, Reynolds, and Hystad 2013).

Municipalities have a particular advantage when it comes to developing legislation, as the impact can be viewed on a smaller scale, and can be tailored to particular communities, and environmental zones. Monitoring high-risk areas is vital for providing policymakers with the information they need to mitigate the environmental damage of these pollutant-dense areas. For example, buffer zones can be mandated in these high risk areas, which can restrict infrastructure development, and land

development, both of which can heighten the environmental damage caused by traffic related air pollution (Brugge et al. 2015). In addition, these areas can be bolstered with tolls, parking restrictions, car share programs, and public transit routes to reduce overall pollutant output (Brauer, Reynolds, and Hystad 2013).

An additional policy proposal which is tied to the urban zoning concept, is the implementation of “low emission zones”, which imposes charges on high emission vehicles, and is known to assist in the elimination of nitrogen dioxide emissions (Cartier, Benmarinha, and Brouselle 2015). This policy rests solely on the spatial distribution of geographic areas, and would be well suited to municipal implementation. Low emission zones pair exceptionally well with incentives to use alternative transportation, such as public transit, walking and cycling. Even in larger cities such as Toronto, “fifty-five percent of trips are less than seven kilometers, and over twenty percent are less than two kilometers”, making these trips conducive to transit, cycling, or walking (Gower et al. 2014, 6).

Lastly, and perhaps most progressive of all policy recommendations currently trending in the realm of environmental law, is the implementation of charges to each unit of pollution produced, which has shown much promise thus far (Boyd, 2006). In addition to this concept, tax policies have been proposed to mitigate the damages incurred by traffic related air pollution. Harrington and McConnell (2003) stated that “Polluters would respond efficiently to the direct signal about the external costs of the pollution they cause” (47). Optimal taxation would likely need to account for each individual vehicle, including its size, type, age, condition, maintenance, fuel type, and distance driven

(Harrington and McConnell 2003). While this policy may be incredibly complex, it can be refined over time.

Traffic related air pollution is a twenty-first century problem, and should be met with twenty-first century legislation. As it was discussed in this research paper, TRAP presents an incumbent threat to the livelihood of human beings and the environment, and must be mitigated in order to sustain the quality of life we currently have. The list of environmental problems that stem from traffic related air pollution are tenfold, and clearly exemplify the gaps that exist in current legislation, which simply are not performing up to standard. Legislation must be strengthened, implemented, and enforced; and must serve as a backbone for environmental change. Canadians have a right to breathe clean air, as set out in the life, liberty, and security of the person *Charter* right. Environmental rights must be recognized in order to protect the quality of human lives, environmental integrity, and biodiversity.

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