



**Presentation to the Senate Committee on Energy, the Environment and Natural Resources: *Study on the effects of transitioning to a new low carbon economy***

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**PRESENTATION BY POLLUTION PROBE:  
OPPORTUNITIES TO DECARBONIZE  
THE TRANSPORTATION SECTOR**

***Presented by*  
Steve McCauley,  
A/CEO  
Pollution Probe**

Pollution Probe is pleased to be appearing today and I sincerely wish to thank the Committee for its invitation for us to appear and to make our submission. Our organization, a national not for profit environmental non-governmental organization, is very active in the area of transportation and efforts to decarbonize the sector and reduce its impacts on human health and the environment. Earlier this year, Pollution Probe launched the Pathways Initiative, a response to the significant GHG reduction emissions challenge faced by Canada's transportation sector today. Transportation, as I am sure you know, is a leading source of GHG emissions in Canada. The sector accounts for 23 per cent of national GHG emissions, and is second only to oil and gas production (26 per cent). In many provinces across Canada, transportation is the number one emitter by a significant margin over other sectors. Within the transportation sector, light-duty vehicles (passenger cars and light trucks) account for roughly 50% of emissions, while the on-road heavy-duty freight sector accounts for 30% and is the fastest growing source of transportation-related emissions in the country. Lower-carbon mobility options are becoming increasingly viable in Canada and the rest of the world. As many of these options are just beginning to mature, Pollution Probe feels that in order to achieve significant GHG reductions in the long term, policies and actions must be introduced in the near term to lay the groundwork for future successes. Pollution Probe's Pathways Initiative is a response to these opportunities for action that has focused on charting pathways to the decarbonization of Canada's transportation sector.

This initiative was launched with an international experts workshop earlier this year which included representatives from leading transportation companies and governments including the United States Environmental Protection Agency. The initiative reflects a partnership which includes a number of private and public sector organizations including Imperial, the Canadian Gas Association, Toyota, Ontario Trucking Association, the Railway Association of Canada, and Governments of Ontario and Canada.

The Pathways Workshop Report is included here at [www.pollutionprobe.org/pathways-initiative](http://www.pollutionprobe.org/pathways-initiative) for Members' consideration. In summary, technology pathways that were found to have substantial potential to reduce GHG emissions from transportation and which are highlighted in the report include:

- Aggressive efficiency enhancements in conventional light- and heavy-duty vehicles which could include improved powertrain efficiency, hybridization, vehicle lightweighting and enhanced aerodynamics
- The deployment of electric vehicles and the development of hydrogen fuel cell vehicles
- The use of autonomous vehicles for both human and freight movement as well as in resource sectors
- The development and use of low-carbon first generation and advanced biofuels
- Opportunities for the use of renewable natural gas in the heavy duty vehicle sector
- Emissions reduction opportunities in the rail sector including improvements to operational efficiencies

Within these low-carbon pathways, there are a number of options which offer great potential for reducing the environmental impacts of Canada's transportation system. I would like to provide a brief overview of those options and then brief you in detail on two areas which have very substantial opportunities for GHG reductions: electric vehicles and renewable natural gas.

## LIGHT-DUTY VEHICLES

- For light duty or passenger vehicles, it is important that the Government of Canada continue to enhance the stringency of federal emissions standards within the light-duty vehicle sector for vehicles produced in the 2017-2025 model years.
- There is also a need to develop a national policy framework to incorporate electric vehicle deployment into national and provincial policy. This framework should include the allocation of resources related to electric vehicle charging infrastructure, public education and awareness and incentives for automakers to increase electric vehicle sales. I will come back to the topic of electric vehicles and later in this submission

## FREIGHT TRANSPORT

- A priority area for GHG reductions from the transport of freight is the deployment of natural gas and renewable natural gas vehicles in the on-road and marine freight transport sectors. I will elaborate on this important opportunity in a few moments.
- Working through the International Maritime Organization, the Government of Canada should implement a ban on the use of bunker fuel by vessels operating in Canada's Arctic waterways to minimize climate forcing black carbon emissions and improve air quality.
- In addition to forthcoming emissions regulations on heavy-duty trucks manufactured in post-2020 model years, the federal government should take actions to reduce emissions from existing heavy-duty fleets, including the establishment of a national program harmonized with the U.S. EPA's SmartWay Program and would encourage the on-road freight transport sector to work with governments to reduce GHG emissions and air pollutants.

## OFF-ROAD VEHICLES

- The off-road vehicle sector includes vehicles used in agriculture, forestry, mining and construction, and accounted for 5% of Canada's transportation-related GHG emissions in 2014. The share of emissions from off-road vehicles represents a growing contribution to the country's air pollutant inventory. The federal government should support research and development on off-road vehicle technologies such as hybridization, electrification and emissions control devices, as well as improving standards related to emissions compliance testing.
- There are also opportunities for the utilization of renewable natural gas as a low-carbon transportation fuel in the off-road sector. High horsepower and high emissions applications common in the mining, agricultural and construction sectors could realize significant GHG emission and air pollutant reductions through a shift to vehicles powered by fuels blended with renewable natural gas.

## ACTIVE AND PUBLIC TRANSPORTATION

- It is vital that Governments support the development of extensive active transportation infrastructure in municipalities across the country to make it a viable mobility option for the majority of Canadians. Safety is paramount with respect to bicycling infrastructure, and must be given priority by policy-makers and planners. Incidences in which cyclists are forced to share lanes with motor vehicles must be minimized.
- Another key priority is to enhance support to municipalities working to deploy accessible low-carbon public transit systems, and encourage increased collaboration between neighboring municipalities to facilitate the pooling of public transit research and development capacity, the harmonization of technologies and practices, and the sharing of knowledge and data.

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I would like to now brief you in further detail on electric vehicles and the significant opportunity that this technology pathway presents for reducing GHGs from light duty vehicle fleets. Last week, Pollution Probe, in partnership with Bruce Power, Plug'n Drive and the University of Waterloo, released the results of a study which examined the barriers and opportunities facing electric vehicle technology. The report [\*\*\*"Accelerating the Deployment of Electric Vehicles in Canada and Ontario"\*\*\*](#) concludes that electric vehicle or EV technology is a substantial opportunity for decarbonization. The report highlights ways to build on the ambitious programs being implemented by a number of governments in Canada to support EV production and use. Many governments are incorporating EVs within their broader climate change strategies, which will contribute to positioning Canada and its provinces as first-movers in the developing EV market and enhancing the competitiveness of the clean tech sector.

There were approximately 18,451 plug-in EVs on the road in Canada at the end of 2015. Although this represents a relatively small percentage of Canada's overall vehicle market, there have been significant increases in sales year-over-year since EVs entered the market in 2010. For example, in 2015, EV sales increased by 32 per cent from the previous year. The range of EVs available also continues to grow, with most major automakers currently offering at least one hybrid or electric model to appeal to all segments of the market. There were 23 EV models on the market in Canada by the end of 2015, and availability is certain to improve over the next few years. The increased variety of vehicle makes and models available signals a commitment on the part of automakers to address a key barrier to adoption.

Despite the broad-reaching opportunities presented by EVs, a number of other barriers must be addressed for their integration into sustainable transportation and energy systems, ensuring that potential gains are realized. Canadians currently experience long wait times for EVs based on limited availability and long production timelines. Consumers may experience a number of additional challenges when visiting the automotive dealership. There are often few, if any, EVs available for purchase and sales staff may not suggest one as an option.

The ability of the electricity distribution system to respond to the power demand for EV charging will play a critical role in the adoption of the technology, particularly in the broader market. The prevailing trend in EV technology is towards larger batteries and faster charging, as automakers respond to market demand for greater driving range, convenience and overall utility. The compounding effect of these two

factors means that, in the absence of proactive measures, the ability of local utilities to accommodate the demand for electricity could eventually be exceeded. In the coming years, it will be imperative that the demand for power to charge EVs is actively managed so that such risks can be effectively mitigated and expensive investment in new distribution infrastructure can be avoided. The location of public EV charging stations plays a critical role in the personal mobility patterns of EV owners, such as the routes they travel and where they choose to shop. Even though most EV drivers charge at home at night, the lack of public infrastructure is a deterrent to significant uptake of EVs.

Addressing common misconceptions about EV technology will also be important to ensuring the technology appeals to a broad cross-section of the population. In order to determine if an EV would be a good fit for them, many consumers want better information about how electrified transportation technologies work and what makes and models of EVs are available, including their associated price points.

The following are highlights of potential options for addressing these barriers to EV deployment, which I put forward for the consideration of the Committee. Additional details can be found in the report.

## **GOVERNMENTS**

- Look for opportunities to further support EVs within existing regulatory frameworks and government programs. This could include consideration of incorporating more informative EV data into existing fuel consumption and environmental information within Natural Resource Canada's EnerGuide Label for Vehicles. Another option would be to investigate enhanced incentives for EVs under the Government of Canada's light-duty vehicle regulations.
- Invest in additional public charging networks in collaboration with provinces and territories. The location of public charging stations plays a critical role in the personal mobility patterns of EV owners and can reduce drivers' "range anxiety".
- Support effective awareness and education campaigns to reinforce and expand the information currently available about EVs. The provision of relevant, reliable and easily accessible information is crucial to successful uptake of EVs and the corresponding emissions reduction potential.

## **INDUSTRY**

- Explore options for increasing EV supply and consumer demand for EVs in collaboration with government and other stakeholders.
- Provide increased support for dealerships to support EV sales. This could include increasing the knowledge of sales staff through dealer training.

## **UTILITIES**

- Monitor the progression of the EV market and build knowledge and capacity around advances in technologies, operating standards, regulations and general market adoption. Collaborate on research initiatives that support monitoring and evaluation of the evolving impacts of EV charging on the local distribution system.
- Promote and facilitate EV charging habits that reduce daily peaks in demand for power and that optimize use of the distribution system's existing assets. Managing optimal EV charging will mean

that prevailing design standards for neighborhood-level infrastructure can be maintained while accommodating increased demand for EV charging.

- Engage the system regulator and governments in dialogue about super off-peak electricity service rates for EV owners, as is proposed in Ontario's Climate Change Action Plan. This will constitute a financial reward for customers who charge their EVs in a time frame that helps to optimize system utilization.

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I would now like to turn to the subject of renewable natural gas (or RNG) and present some initial policy options for moving forward on this important low carbon transportation fuel, which draws on data and information collected from leading industry associations including the Canadian Gas Association (CGA) and the Canadian Natural Gas Vehicle Alliance (CNGVA). Further, it builds on findings of Pollution Probe's Pathways Initiative workshop, which concluded that one of the priority technology/fuel pathways with substantial potential to reduce GHG emissions from transportation is through the use of natural gas and RNG.

RNG is natural gas produced from organic waste from farms, forests, landfills and water treatment plants. The gas is captured, cleaned, and injected into pipelines to be used in the same way as natural gas by homes, businesses, institutions and industry. RNG can be produced in two ways. The first is through a process of anaerobic digestion, whereby organic waste (from landfills, farms or waste water treatment plants) is converted into methane and carbon dioxide in a digester or holding tank. The gas produced is then cleaned or purified to meet utility pipeline specifications. The digesters can be located at wastewater treatment plants, landfills, source separated organics waste facilities or on farms. The second way RNG can be produced is through a process of gasification, which uses high temperatures to thermally break down biomass into synthesis gas, a mixture of simple gaseous compounds. This syngas is then reformed into methane to produce RNG. RNG can be mixed or used interchangeably with conventional natural gas. It can reduce GHG emissions (including capturing methane emissions from landfills), reduce air pollutants, eliminate waste products, create new revenue streams via new investments and products, create new jobs, and support green industry development. Currently, in the provinces of British Columbia, Ontario and Quebec, natural gas distribution utilities are putting RNG into the pipeline distribution system. By the end of 2016, utilities will have brought eleven RNG projects online which will be producing enough renewable fuel for 51,000 homes or the equivalent to approximately 132 million litres of renewable fuel for transportation markets.

While natural gas is well suited for all transportation applications, the biggest GHG reduction benefits are in the freight and medium-heavy duty transportation sectors, which represent more than one million on-road vehicles. Freight transportation emissions are increasing rapidly and high horsepower applications such as long haul trucks carrying heavy loads represent one of the biggest and fastest growing emitters in the on-road transportation sector.

Across North America, current efforts to reduce heavy duty vehicle emissions are focused on improving the efficiency of internal combustion engines, among other measures, and on lowering the carbon content of transportation fuels. The adoption of natural gas engines is the first step to advancing the use of RNG. Natural gas and blending of RNG can play a significant role in responding to the emissions challenge presented by the transportation sector in particular return to base vehicles (e.g., waste haulers, transit), heavy duty trucking and marine vessels.

In 2014, natural gas provided more than 30% of Canadian domestic energy needs. Natural gas is the largest source of energy for Canadian homes and industry, and it is a growing source of fuel for the generation of electricity. However, natural gas provides less than 0.5 per cent of the energy requirements for the Canadian transportation market. Therefore, the opportunity to harness lower GHG emissions by using natural gas and RNG is significant in Canada. In fact, the combination of natural gas affordability (20-40 per cent cheaper than gasoline), advances in fuel production and engine technology and the absence of ready-made electric solutions for high horse power engines, position natural gas as the fuel of choice for the heavy-duty trucking and marine markets.

Natural gas vehicles offer GHG emission reductions of 15-25 per cent relative to diesel vehicles, and these savings grow with increased RNG blending rates. Depending on the RNG supply and production technique, the GHG emission reduction benefits of RNG use can be in the range of 50 to 125 per cent. In addition to GHG reduction benefits of natural gas/RNG, the use of methane results in particulate matter reductions in excess of 90 per cent, and nitrous oxide reductions of roughly 50 per cent, relative to diesel use in heavy duty vehicles.

Significant advances on RNG use in transportation have been made in the United States and Europe, and there is an opportunity for Canada to take advantage of this progress. Policy options that could help level the playing field and/or lower barriers to increased natural gas engines and RNG use in the transportation sector include:

- Canadian governmental support, through cost sharing with industry, for the construction of LNG and CNG refueling stations across Canada's major highway systems. An initial investment by the Government of Canada was announced in Budget 2016 to support approximately 6 new natural gas refueling stations. More can be done to build on this initial investment.
- Support the development of a 15L high-horsepower engine to serve the heavy, long-haul trucking market. This segment represents one of the highest and fastest growing emitters in the on-road transportation sector and needs an engine that can use natural gas and consequently RNG.
- Environment and Climate Change Canada could recognize RNG as a compliance option for reducing GHG emissions in the transportation sector by amending the *Canadian Renewable Fuels Regulation* to align with the US EPA Renewable Fuel Standard (RFS).
- Investment tax credits or program support could be provided for RNG projects, and direct program support could be provided to offset higher RNG costs. For example, the Canadian Gas Association is seeking federal matching for provincial RNG programs (i.e. \$100 million announced by the Government of Ontario to support RNG projects that inject into the pipeline network and \$20 million to support RNG transportation fuel pilot projects).
- RNG research and demonstration to support industry in de-risking biomass to gasification technology solutions that can unlock the 85% of RNG potential from biomass sources.
- Canada could collaborate with U.S. state and federal governments on RNG development. In particular, Canada could partner with the California Energy Commission and University of

California, Davis on the development and implementation of an RNG Technology Roadmap for the transportation sector.

In summary, natural gas and renewable natural gas as well as electric vehicle technology offer enormous opportunity for Canada to reduce greenhouse gas emissions from the transportation sector, while promoting economic growth for the country. Pollution Probe will be continuing to work with its partners to advance these technologies and other opportunities for decarbonizing the transportation sector and supporting the transition to a low carbon economy. Pollution Probe will also leverage the significant work of its Energy Exchange division, mobilizing tools and initiatives geared towards progressing decarbonization efforts including the second edition Primer on Energy Systems in Canada, online engagement tools, targeted forums and research on Canadian perceptions and understanding of energy issues.

#### **CONTACT**

Steve McCauley, A/CEO  
Pollution Probe  
smccauley@pollutionprobe.org  
Office: 416-926-1907 ext. 252  
Cell: 647-965-3985

#### **ABOUT POLLUTION PROBE**

Pollution Probe is a national, not-for-profit, charitable organization that exists to improve the health and well-being of Canadians by advancing policy that achieves positive, tangible environmental change. Pollution Probe has a proven track record of working in successful partnership with industry and government to develop practical solutions for shared environmental challenges.

#### **ABOUT ENERGY EXCHANGE**

Energy Exchange is a division of Pollution Probe dedicated to advancing energy and climate literacy in Canada. It aspires to a future in which Canadians are united in their energy prosperity, rather than divided by their energy options. Energy Exchange is committed to fostering an energy culture that will ensure that Canada's immense and varied energy wealth is used to build a rich and diversified economy and a vibrant and prosperous society.