

Trucking fleets leverage technology for a safer climate

Canadian companies adopt telematics systems to reduce emissions and improve the bottom line

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Introduction

Trucking is a vital part of Canada's economy. 90% of Canada's freight shipments are hauled by truck, including minerals, fuel oils, crude petroleum, base metals and forest products.¹ As Canada moves into its third year of the COVID-19 pandemic, trucking continues to ensure the smooth functioning of society and our economy — hauling essentials including facial tissues, toilet paper and hand sanitizer.

Trucking is also a significant contributor to Canada's greenhouse gas emissions. Freight trucks currently account for nearly 35% of Canada's transport sector emissions, and nearly 10% of Canada's overall emissions. This share has grown since 1990, when these figures were at 16% and 3% respectively.² For Canada to meet its target of net-zero greenhouse gas emissions as of 2050, it must address increasing emissions from its trucking sector.

¹ Statistics Canada, "Commodity flows by mode in Canada: Canadian Freight Analysis Framework, 2017." <https://www150.statcan.gc.ca/n1/daily-quotidien/200514/dq200514c-eng.htm>

² Government of Canada, "Greenhouse gas emissions by economic sector." <https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gas-emissions.html>

Part of the puzzle are telematics systems. Telematics systems are one of a number of potential fuel-saving devices that can be used to reduce fuel use and emissions from traditional internal combustion engine heavy-duty vehicles. In early 2021, Pembina Institute research examined rates of adoption of fuel-saving devices in the on-road freight sector³ and provided case studies of emissions reduction solutions used by a selection of companies.⁴ The case studies provided in this document build on this research through providing examples of Canadian companies employing telematics devices to accomplish a number of goals, including emissions reductions and savings on fuel. Due to recent regulatory changes, elaborated below, telematics systems are expected to become much more widely used in Canada, increasing the need for information on their current and potential use.

What are telematics devices?

Telematics overview

Telematics devices are usually utilized for the monitoring of mobile assets.⁵ They can be installed in the cab of a truck's tractor, or on a truck's trailer, and track various operational metrics.⁶ Their foundational technologies are global positioning systems (GPS) and on-board diagnostics. As such, telematics systems combine telecommunications and information processing.⁷

Three main types of data are generated or collected by telematics systems: data on vehicle systems; data on the driver; and other operational data:⁸

- *Vehicle systems data:* The on-board diagnostics part of telematics systems can extract data on various vehicle systems, including the engine, the transmission and driveline, the emissions aftertreatment system and other body and chassis systems. This can provide important data and feedback on automobile diagnostics, repair needs and maintenance needs.⁹

³ Pembina Institute, "Costs, benefits and uptake of trailer fuel-saving devices." <https://www.pembina.org/pub/costs-benefits-and-uptake-trailer-fuel-saving-devices>

⁴ Maddy Ewing, *Long-haul trucking fleets take emission reductions into their own hands* (Pembina Institute, 2021), 2. <https://www.pembina.org/pub/long-haul-trucking-fleets-take-emission-reductions-their-own-hands>

⁵ Ben Sharpe and Dave Schaller, *Telematics in the Canadian Trucking Industry* (International Council for Clean Transportation, 2019), 1. <https://theicct.org/publication/telematics-in-the-canadian-trucking-industry/>

⁶ Maddy Ewing, *Costs, benefits and uptake of trailer fuel-saving devices* (Pembina Institute, 2021), 7-8. <https://www.pembina.org/pub/costs-benefits-and-uptake-trailer-fuel-saving-devices>

⁷ *Telematics in the Canadian Trucking Industry*, 1

⁸ *Telematics in the Canadian Trucking Industry*, 2.

⁹ *Telematics in the Canadian Trucking Industry*, 1.

- *Driver data*: Telematics systems can generate data on the driver including speed, braking, acceleration, fuel economy, hours of service and idle time.¹⁰
- *Other operational data*: Telematics systems can generate operations data including location tracking, navigation and dispatch and scheduling.¹¹

Canada's ELD mandate

One type of technology that can, in some configurations, be considered a telematics device is an electronic logging device (ELD).¹² ELDs are equipment that can automatically record commercial vehicle driving time, thereby ensuring compliance with hours of service regulations. Such compliance can then decrease driver fatigue and increase road safety and administrative efficiency in Canada.¹³

In 2015, the U.S. Federal Motor Carrier Safety Administration finalized a regulation for ELDs. The regulation began to be implemented in 2017 and required the use thereof. The International Council for Clean Transportation has estimated that the regulation contributed to an increase in the use of ELDs and telematics systems by Class 7 and 8 tractor trucks in the U.S. from 35% to over 90% between 2015 and 2019.

In 2019, Transport Canada codified an ELD regulation similar to that in the U.S. which went into effect in June 2021. It is anticipated that this regulation will result in an increase in the use of telematics systems and ELDs similar to what occurred south of the border.¹⁴ It should be noted that, in early 2021, Canada's Minister of Transport reaffirmed his commitment to the regulation, but announced a progressive enforcement period after June 2021 as a result of the COVID-19 pandemic.¹⁵

¹⁰ *Telematics in the Canadian Trucking Industry*, 1.

¹¹ *Telematics in the Canadian Trucking Industry*, 2.

¹² ELDs with the capacity to send information wirelessly can be considered telematics devices as they combine data processing and telecommunications technology. Source: *Telematics in the Canadian Trucking Industry*, 4.

¹³ Transport Canada, "Electronic logging devices." <https://tc.canada.ca/en/road-transportation/electronic-logging-devices>

¹⁴ *Telematics in the Canadian Trucking Industry*, 4-5.

¹⁵ Transport Canada, media release, "Statement by the Minister of Transport on electronic logging devices for commercial vehicles," March 2, 2021. <https://www.canada.ca/en/transport-canada/news/2021/03/statement-by-the-minister-of-transport-on-electronic-logging-devices-for-commercial-vehicles.html>

Benefits to fuel efficiency and climate

Telematics systems provide a number of benefits to fleets in areas including driver safety, hours of service tracking, maintenance monitoring, route optimization¹⁶ and others. One significant benefit of such systems, however, is savings on fuel. In a survey conducted by the Pembina Institute, this was the second most cited benefit. It has been noted that telematics and similar systems can provide insights into the behaviour of the driver, with proper driver training being key to improvements in fuel efficiency.¹⁷ It has been estimated that fleet energy management training can improve fuel efficiency by as much as 35%.¹⁸

As fleets improve their fuel efficiency, harmful emissions — including greenhouse gases — will decrease as well.

Methodology

To increase understanding of how Canadian trucking fleets are using and benefiting from telematics devices, we conducted virtual interviews with three Canadian fleets, targeting a cross-section of Canadian HDV fleet operators. Interviews were conducted using standardized interview questions. Unfortunately all three fleets declined to be mentioned by name, as such, proxy names will be utilized:

- **Large Atlantic fleet:** This is a large fleet with about 10,000 trailers and 4,000 power units. The fleet is based out of Atlantic Canada but has full coverage in North America. The fleet has many different freight segments, but has a focus on auto parts shipments.
- **Small Prairie fleet:** This is a small fleet with about 20 tractors and about 30 trailers. The fleet operates in the Canadian Prairies and hauls fuels.
- **Single truck operator:** This is a single truck operator with one tractor and no trailers. They operate throughout North America (as far north as Deadhorse, Alaska) and haul a variety of products.

These three fleets represent a diverse cross-section, both geographically and in terms of fleet size, of Canada's freight sector. Insights gleaned from interviews will cast a useful light on how telematics devices are currently being used in Canada, and how they will continue to be used as Canada's ELD mandate is increasingly enforced.

¹⁶ Angel Coker, "Telematics providers innovate trailer technology to improve uptime, driver retention," *Trucks, Parts, Service*, March 18, 2022.

<https://www.truckpartsandservice.com/technology/telematics/article/15289856/trailer-tech-innovation-improves-uptime-driver-retention>

¹⁷ *Costs, benefits and uptake of trailer fuel-saving devices*, 38.

¹⁸ Natural Resources Canada, "SmartDriver training series." <https://www.nrcan.gc.ca/energy-efficiency/transportation-alternative-fuels/greening-freight-programs/smartdriver-training-series/21048>

Key trends

In our interviews with Canadian fleets, we identified key trends in adoption rate, motivation for telematics device adoption, primary use of telematics devices, fuel efficiency benefits of telematics devices, the potential use of telematics devices on battery electric MHDVs, and how telematics devices can be improved going forward.

Adoption rate

All three companies had high rates of telematics device adoption on their tractors, and lower or no telematics device adoption on their trailers.

- The **large Atlantic fleet** has equipped 99% of its long haul tractors with telematics systems and 95% of its intercity and regional tractors. It had fewer telematics systems on its pick-up and delivery city tractors. Over 50% of this fleet's trailers are equipped with telematics or GPS devices.
- The **small Prairie fleet** had 100% of its tractors equipped with telematics systems. None of its trailers were equipped with the systems.
- The **single truck operator** had telematics devices on the one tractor in the fleet, and did not own any trailers.

Motivation

The most common cited motivator for telematics device adoption was regulatory compliance. Other motivators included fuel efficiency and efficiency in repairs.

- The **large Atlantic fleet** was motivated in part by regulatory compliance. It noted that telematics devices are useful for compliance with ELD mandates, and for reporting purposes for taxation and SmartWay. It also noted, however, that it used telematics devices prior to the ELD mandates and that the devices help it track progress towards its fleet fuel efficiency target.
- The **small Prairie fleet** cited ELD mandates as its primary motivation.
- The **single truck operator** cited more efficient repair of faults as their primary motivation.

Primary uses

The most commonly cited uses for telematics devices by the three interviewed companies were safety, maintenance and the tracking of statistics including hours of service. The most commonly cited beneficiaries of telematics devices were drivers and workers responsible for maintenance. The large Atlantic fleet and the small Prairie fleet both used telematics to improve fuel efficiency and environmental performance, while the single truck operator did not.

- The **large Atlantic fleet** used telematics devices to track key performance indicators such as fuel efficiency, to set GHG reduction targets, to assist with fleet operations, and for safety. The fleet noted that drivers benefit from no longer having to manually input hours of service, maintenance workers benefit from simpler repair co-ordination, operations managers benefit from simpler planning, and environmental specialists and interested customers benefit from easier access to efficiency and environmental information.
- The **small Prairie fleet** used telematics for safety, vehicle maintenance, billing and compliance and fuel efficiency. This fleet noted that telematics devices can track trucks during difficult weather conditions such as blizzards; can help ensure newer drivers are taking appropriate routes; and can help ensure drivers are following safety procedures such as seatbelt use and speed limit adherence. It noted telematics devices can help flag maintenance issues through indicators such as a truck using fuel at an abnormal rate. It noted telematics can be used to track statistics including kilometres traveled and hours of service. Finally, it noted telematics can help with fuel efficiency – the fleet includes fuel consumption in annual driver performance reviews.
- The **single truck operator** used telematics devices for fault monitoring. The operator noted that it allowed the driver to know if the truck had to be returned to base to be repaired or if the repair could be done during a trip.

Fuel efficiency benefits

Both the large Atlantic fleet and the small Prairie fleet used their telematics devices to track metrics related to fuel efficiency and GHG reductions. Neither, however, was able to attribute specific fuel efficiency improvements to telematics devices. The single truck operator did not mention using telematics devices to track metrics relevant to fuel efficiency or GHG reductions.

- The **large Atlantic fleet** used telematics devices to track a number of metrics relevant to fuel efficiency and GHG reduction, including those related to idling, miles per gallon and hard braking incidences. It was reluctant, however, to attribute specific fuel efficiency gains to telematics.
- The **small Prairie fleet** also used telematics devices to track metrics relevant to fuel efficiency and GHG reduction, including those related to idling and diesel fuel efficiency. Its telematics devices also ranked driver performance and provided industry benchmarks for metrics. The fleet noted it did not have sufficient staffing capacity to directly leverage telematics data into fuel efficiency gains, but the fact drivers are aware these metrics are being tracked help keep them “top of mind”.
- The **single truck operator** did not mention using telematics devices to track metrics related to fuel efficiency or GHG emission reductions.

Telematics and electric MHDVs

The large Atlantic fleet currently has electric vehicles in its fleet, while the small Prairie fleet views electrification as more of a mid- to long-run proposition, and the single truck operator has no plans to purchase EVs. Battery related metrics — particularly state of charge — were commonly noted as potentially desirable.

- The **large Atlantic fleet** currently has a small number of electric vehicles in its fleet. It has telematics in these vehicles, which it uses to ensure vehicles have sufficient range for the next day (“state of charge”) and to track metrics including diagnostics, efficiency, and energy consumption in kWh per kilometre.
- The **small Prairie fleet** viewed electrification as more of a mid- to long- run proposition, and noted it may be more interested in a hydrogen-powered vehicle than a battery electric one. It noted that if it were to operate a battery electric vehicle, it would be interested in data related to the health of the battery and the state of charge.
- The **single truck operator** did not indicate plans to purchase electric vehicles.

Potential improvements to telematics

Both the large Atlantic fleet and the small Prairie fleet noted the potential for increased benchmarking capabilities.

- The **large Atlantic fleet** noted a desire for increased benchmarking capabilities as well as increased access to raw underlying data.
- The **small Prairie fleet** also noted a desire for more benchmarking — specifically referring to benchmarking according to vehicle weight.

Conclusion

As Canada’s ELD mandate is increasingly enforced, telematics devices will become more commonplace in Canada’s freight sector. Telematics devices have a number of benefits, including driver safety and maintenance, but can also help reduce freight sector emissions. “What gets measured gets managed,” and telematics devices, through providing metrics relevant to fuel efficiency, can help fleets track, manage and ultimately reduce their contribution to a warming climate. Over time, as fleets transition to battery electric vehicles, telematics devices can increasingly provide useful information on the battery, in particular the state of charge. One potential area for improvement to telematics devices is through increased benchmarking capabilities.