

Quantifying the Benefits of Eco-Driving for Transportation Employers

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What are two of the largest operational costs for fleet operators?

Two of the most significant costs affecting the bottom line of every transportation company are the amount of fuel used per trip and unsafe driving resulting in a collision. These costs have grown exponentially for the transportation industry in the past decade.



Fuel. The price of fuel has climbed considerably in response to world events. Canada's road network consists of almost 900,000 kilometres (km) and more than 90% of goods are delivered by truck (Transport Canada, 2015). This means even small fluctuations in fuel prices can significantly impact the operational costs of transportation companies.



Vehicle repairs. In addition, irrespective of whether a fleet consists of aging vehicles or shiny new ones, repair costs for collisions are substantial. Working parts for older vehicles are more challenging to locate and secure at a moment's notice when a collision occurs. At the same time, the complexity of new vehicle technologies in the form of communication tools or safety features, are considerably more expensive and may take more time to replace after a crash. These rising prices have also significantly affected the cost of insurance for fleets, with more insurers dramatically adjusting pricing for even minor collisions.

FLUCTUATIONS IN FUEL, REPAIRS & INSURANCE COSTS CAN SIGNIFICANTLY IMPACT THE OPERATIONAL COST OF TRANSPORTATION COMPANIES.

How can fleet operators reduce fuel costs and increase safety?

Transportation industry employers have the ability to manage and reduce fuel and collision costs to not only improve their bottom line but also to remain competitive in the marketplace. One simple yet effective strategy to improve fuel economy in commercial vehicle fleets is to modify driving styles; notably, in terms of selected speeds, smooth driving, and route choice. Not only can this practice reduce fuel consumption and emissions, but it also delivers safety benefits for fleet operators which can ultimately increase productivity, reduce crashes, and lower insurance premiums.

How much can fuel costs be reduced with an eco-driving style?


The **Traffic Injury Research Foundation (TIRF; www.tirf.ca)**, an independent, charitable road safety research institute, conducted a 2022 study with funding from **Natural Resources Canada** to quantify the safety benefits of fuel-efficient driving. Some, but not all companies participating in the study used ISAAC Instruments and could provide an ISAAC score. The ISAAC score is recorded based on a driver's performance such as smooth driving (McDaniel 2022). Specifically, driving in a style that received a high ISAAC score over 80 can result in fuel cost savings of up to 15% (Ashley Coker 2022).

How does an eco-driving style reduce collisions and increase safety?

Statistical models were developed in this study to estimate the change in odds of a near-hit event (defined as a hard-braking or stability control event) or collision for drivers based on their driving style. It revealed that an eco-driving style was associated with significant reductions in the odds of both near-hit events and actual collisions.

Reducing hard-braking events also decreases opportunities for vehicle brakes to overheat and prevents damage to the metal components or glazing on brake pads, which can make them less effective and reduce their lifespan. Equally important, brakes that are worn or damaged ultimately put drivers in danger if they cannot stop when needed (Kevin Aries 2021).

The use of an in-vehicle monitoring system which provides real-time feedback to drivers, such as ISAAC Instrument or other monitoring systems, can significantly reduce the risk of traffic collisions. In addition, this practice can improve safety and reduce insurance costs by preventing collisions.



Reducing hard braking & the use of an in-vehicle monitoring system can reduce collisions and increase safety.



How much can safety be increased with an eco-driving style?

The study results revealed a one-unit increase in the ISAAC score (on a scale from 1 to 100) was associated with the following reductions:

- > 7% reduction in the odds of a hard-braking event
- > 8% reduction in the odds of a hard left-turn event
- > 8% reduction in the odds of a hard right-turn event
- > 4% reduction in the odds of a collision

It also revealed that driving in top gear with steady speeds close to 101 kilometres per hour (km/h) can significantly decrease stability control events by 34%. In addition, a 1% increase in the amount of time spent driving using cruise control reduced the number of hard-braking events by 3%.

ECO-DRIVING STYLE CAN ACHIEVE COST-SAVINGS AND SAFETY BENEFITS.

The current study showed it is possible to improve the ISAAC score even when a driver's average score is already high (e.g., more than 87). In other words, even if drivers already have a high ISAAC score, with an eco-driving style they can still improve further to achieve cost-savings and safety benefits. If drivers have a lower ISAAC score (e.g., 70-80) there is much greater room for gains. Therefore, the training programs should acknowledge these differences when producing educational content.

What is the optimal speed for an eco-driving style over long distances?

With respect to fuel-efficient driving, or eco-driving consistent with the ISAAC guideline, less time spent speeding, and more time spent in top gear (capped at 101 km/h in cruise control or 105 km/h in regular driving mode where appropriate) were all associated with a lower risk of experiencing a near-hit event.

Driver assistance systems (e.g., cruise control) can enable truck drivers to reduce crash risk and lead to savings in insurance costs and increased productivity. So, insurance companies may encourage drivers to use these systems since they can result in saving collision-related costs.

Did the age and experience of drivers in the study make a difference?

Yes, the increasing age of commercial drivers was associated with a reduced risk of collisions. In fact, an increase in the driver's age reduced the number of hard-braking events significantly.

What do employers need to know about implementing an eco-driving training program in their workplace?

Having a plan for training and educational programs to help promote eco-driving techniques can result in greater fuel efficiency and safety. Such a program should contain information on driving performance which is affected by load, slope, shape, type of trailer, wind, temperature, rain, snow, and rolling and mechanical resistance. For instance, ISAAC Coach gives drivers tactics for driving smoothly such as shifting up sufficiently early or downshifting as late as possible.

How do employers get started?

To get started, it is important to focus first on the population of drivers with the greatest exposure to collisions as a result of more time driving on the road. The more mileage commercial fleets drive, the greater their risk of eventually having a collision. This fact should be acknowledged in workplace policies; drivers driving longer distances and more often should get more rest and take more breaks to minimize the risk of fatigue and sleepiness which increases collision risk.

In addition, employers should prioritize investments for young and low-experience drivers who have a greater crash risk, and who can achieve the greatest improvements in driving style as a result of coaching.

Lastly, using educational campaigns can help to increase awareness and spread the importance of using real-time coaching systems to enhance fuel efficiency and reduce collision risk.

What resources are available to employers?

Training for fuel-efficient driving of Commercial Motor Vehicles (CMVs) is available from Natural Resources Canada, including the SmartDriver for Highway Trucking online course:

<https://natural-resources.canada.ca/energy-efficiency/transportation-alternative-fuels/greening-freight-programs/smartdriver-training-series/21048>

References

Aries, K. (2021). Why Monitor Harsh Braking and Acceleration? from <https://www.verizonconnect.com/resources/article/harsh-braking-acceleration-why-monitor/>

Coker, A. (2022). "Real-time driver coaching helps carriers save big on fuel costs." from <https://www.freightwaves.com/news/real-time-driver-coaching-helps-carriers-save-big-on-fuel-costs>.

McDaniel, J. (2022). "Isaac Instruments' in-cab technology a 'gamechanger' for tank truckers." from <https://www.bulktransporter.com/technology/article/21244494/isaacs-incab-technology-a-gamechanger-for-tank-truckers>.

Transport Canada. (2015) Road Transportation. Retrieved November 10th, from www.tc.gc.ca/eng/road-menu.htm

Traffic Injury Research Foundation

The vision of the **Traffic Injury Research Foundation (TIRF)** is to ensure people using roads make it home safely every day by eliminating road deaths, serious injuries and their social costs. TIRF's mission is to be the knowledge source for safe road users and a world leader in research, program and policy development, evaluation, and knowledge transfer. TIRF is a registered charity and depends on grants, awards, and donations to provide services for the public. Visit tirf.ca. Email | tirf@tirf.ca Toll Free | 1-877-238-5235

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