
CLIMATE CHANGE WHITE PAPER

*A Comprehensive Proposal on Climate Change Strategies for The Alberta Commercial
Transportation Industry*

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OVERVIEW

The transportation industry represents approximately 25% of Canada's greenhouse emissions with commercial trucks representing 27% of these emissions (6.75% of Canada's total emissions).¹ Alberta estimates that the trucking industry alone represents 11% of these emissions excluding emissions from the oil and gas industry; the Climate Change strategies could be adopted by both industries.

In 2014, Phase I of the Green-House Gas regulations focused on a 20% reduction in GHG emissions were introduced.² Technologies that are currently adopted by the transportation industry are required to provide enhanced vehicle performance and efficiency. Some previously adopted options resulted in an increase in vehicle maintenance and emissions.

Phase II of the GHG regulations, proposed in 2015, and to come into effect in 2021-2027, is a much more aggressive approach aimed at critically reducing GHG emissions by 100 million metric tonnes according to the Canadian Trucking Alliance.³ Technological advancements and educational programs are key factors in attaining these goals. Commercial vehicle engines have undergone modifications that assist in reducing GHG emissions and increasing fuel efficiency. Cleaner fuel is natural fuel, like compressed natural gas or liquefied petroleum gas, or a blend like gasohol which produces less pollution than the alternatives and it is used as a substitute for fossil fuels.

Law Dictionary: What is CLEAN FUEL? definition of CLEAN FUEL (Black's Law Dictionary) and increased engine technology have helped to reduce Nitrogen Oxide compounds (NO and NO₂) by 94%, Atmospheric Particulate Matter (PM) by 93%, and Unburned Hydrocarbons (HC) by 44%. Advancements in aerodynamics added to trucks and trailers have assisted the transportation sector in reducing fuel consumption and emissions.

On June 8, 2016, the Province of Ontario announced a Climate Change Action plan for up to \$170 million in funding to expedite the adoption of progressive GHG-reduction trucking technologies, and diminishing economic barriers that have historically impeded industry investment. The bulk of the plan centers on a [new Green Commercial Vehicle Program](#) which will provide up to \$250 million for electric and natural gas-powered commercial vehicles, infrastructure and temperature controlled trailer technology, as well as tractor-trailer aerodynamic devices and anti-idling devices which is expected to launch in 2017-2021.

Historically, the Alberta government between 2009 and 2011, provided funds up to about \$200,000 annually available to the trucking industry in Alberta, to create awareness and incentives for the use of some of these technologies. This funding has been eliminated as of 2012.



CLIMATE CHANGE STRATEGIES

The AMTA is proposing that with all of the government and/or association programs, strategies, and technologies, the best option would be to provide one combined provincial program. This program will enable Alberta Carriers to work towards the GHG emission reductions by the deadline set by the Alberta Government for 2017 and beyond. These products will be monitored by the AMTA and reported to the Alberta Government which could result in a refund program as an incentive to carriers who have equipped their vehicles with these GHG emission reduction equipment.

The Canadian Trucking Alliance (CTA) has promoted readily available and cost effective proven tools and initiatives that will significantly reduce GHG and pollutant emissions which has sparked a great deal of interest and engagement with government on discussing programs which has resulted in the adoption of these technologies. The CTA's conservative "Envirotruck" model is aimed at reducing GHG and pollutant emissions by up to 22%; there are alternate combinations that are readily available and cost effective that will reduce fuel consumption by up to 50%.

The following are the recommended strategies which will allow carriers to achieve some or all of the GHG reductions required by the provincial government. The top proven fuel savings through GHG reduction devices and strategies are⁴:

NOTE: It is important to realize that many of these technologies add a significant amount of weight to a vehicle and permits will be necessary to compensate for additional weight that might be added to the vehicle.

Engine technology

Current heavy duty on-road engine technologies have eliminated pollutant emissions. Natural gas offers many advantages over conventional petroleum products. Compressed natural gas (CNG) is the smart and affordable choice for fleet vehicles, transit buses, school buses, waste disposal trucks, delivery vehicles, and more. With CNG, you'll save money on fuel, reduce emission levels, and extend the life of your vehicle.

Natural gas is produced both worldwide and domestically and typically at a lower cost and is cleaner burning than gasoline or diesel fuel. Natural gas vehicles show an average reduction in ozone-forming emissions of 80 percent compared to gasoline vehicles.

According to the US Department of Energy, CNG is a viable choice for many vehicle operators. However, investing in a new commercial vehicle is a major expense, especially for smaller companies and owner operators who make up a large portion of the industry. Any incentives to expedite the retirement of old technologies will dramatically impact pollutant emissions but due to the cost, a rebate of \$15,000.00 is recommended. Unfortunately, implementation of newer technologies in lower volume markets such as the bus and motor coach industry lengthen the time to market until an effective ROI is proven in other sectors to support the R&D and Engineering programs required to implement.



Dual Fuel engines allow for impressive reductions in these costs. The rapid expansion and abundance of natural gas in Alberta could be a dramatic cost advantage once the crude market stabilizes. These engines have the ability to operate on 100 percent diesel fuel or dual fuel modes. They provide flexibility based on local availability of natural gas and are typically found on 13 – 15-liter diesel engines.

Auxiliary Power Units (APUs) are anti-idling devices that reduce idling by 90%, allowing drivers to operate their units effectively while also reducing idle time, and can reduce the overall fuel consumption by 10%. An APU can be purchased and installed for about \$14,000.00.

Long Combination Vehicles

A 2010 study presented to the Transportation Association of Canada confirmed that Long Combination Vehicles consume 34% less fuel than single trailer combinations. Requirements for their use include driver training and experience, specialized converters allowing 2 or more trailers to be connected, road and bridge infrastructure that supports the use of these vehicles, and government regulation permitting their operation.

Rolling resistance (New Generation Wide Based Single Tires)

Rolling resistance is one of the largest factors affecting fuel consumption. Low rolling resistance tires and wide base single tires alone can save between 8% - 10% of fuel consumption. The AMTA and Alberta Transportation is currently conducting a pilot program for the New Generation Wide Based Single Tires (NGWBST). The cost of low rolling resistance tires (NGWBST) is comparable to current technologies. Through educational initiatives, we believe industry can be encouraged to adopt this technology as the preliminary results are better than anticipated.

Aerodynamics

Vehicle aerodynamic drag is the most significant factor affecting fuel consumption. There is a wide variety of technologies available, such as trailer side-skirts, roof and side faring, cab extenders, and trailer base aerodynamics that individually provide 2% to 8% fuel saving per device. These devices can be used in combination for increased fuel savings. The only requirement for use is a government permit to allow for the adoption of the new generation boat tails that provide significantly better aerodynamics. Trailer side skirts can be purchased for as low as \$2,500.00 and reduce fuel consumption by 4% to 7%. Other tractor and trailer aerodynamics can come as options on new equipment, or purchased as after-market add-ons.



Speed and driver training

Fuel efficiency declines as vehicle speed is increased. A general rule is that above 55 mph (roughly 90km/h) every 1mph a vehicle's speed increases, translates to a 0.1mpg decrease in fuel economy. Speed limiting devices (a speed limiter is a governor used to limit the top speed of a vehicle) is recommended which will limit vehicles from speeds over 105km/h are recommended as part of the Envirotruck program. Alberta has a strong and progressive climate change office which may consider legislating speed limiters, trailers skirts, and APU's on any vehicle registered over 11,794kg by the end of 2021 based on current provincial HOS regulations. If a legislated program is considered, a form of a rebate program will need to be included with an ROI delivered to companies within two years. The only requirement for using these items includes education on their impact, ability to find and afford the training, and performance management of drivers after training has been given. Driver training to achieve improvements on operational items such as idling, speed management, shifting, accelerating and decelerating, and operating vehicles in the optimal gear can have positive impacts as high as 30% in fuel economy improvement. Through a financial incentive and educational initiatives, the cost of these items, engagement and support for adoption and the ability to implement or access training can be overcome and achieved.

Mandatory No Idle Program requirement

Idle-Free Alberta is where the rubber hits the road when IVMS (In Vehicle Monitoring devices) monitors unnecessary idling of company vehicles, which can be reduced to less than 10% and banned in critical areas. This will dramatically reduce CO2 emissions. We suggest that it is critical to increase the awareness among fleets and the public about the economic, environmental and health costs of idling and support them in implementing their own idling reduction programs. The AMTA recognizes that some idling is required when operating vehicles. Our goal is ensuring fleets reduce unnecessary idling with minimal impact on day to day operations. Idling reduction programs deliver large returns on simple actions that require minimal training.

All of the technologies or techniques listed above are currently available, have been proven to work, and have a greater positive impact on the environment. These products also provide excellent flexibility as operators can use one or a combination of two or more depending on their areas of operation or services provided. A simple approach to reduce the amount of idling, will be to require any company who participates in this program must have a no idle program with a trackable summary from some form of an electronic device attached to the engine.



GHG Reduction Auxiliary equipment (one-time rebate per truck)

| Device | Fuel Savings | Cost | Suggested Rebate |
|--|------------------------|----------------------|------------------|
| New Generation Wide Based 455 Single Tires and Rims | 8-10% (Pilot underway) | \$1,400.00 per wheel | TBD |
| Auxiliary Power Unit | 7% | \$ 14,000 | TBD |
| Electronic Speed Limiters – Mandatory to participate in the program | 5% | \$ 700 | TBD |
| Total recommended rebate per truck over 18000Kgs | | | TBD |
| <p>The devices below are currently being deployed by carriers without rebate (The Alberta government may be mandating this equipment on all suitable vehicles by the end of 2021. It is known that for some industries the installation of this equipment is not possible or their operation does not warrant this.)</p> | | | |
| Tractor -Trailer Gap Flaring | 5% | | |
| Trailer Side Skirts | 6% | | |
| <p>25% or conservatively 22% as used within this paper</p> | | | |

Dedicated Alternative Fuel Vehicles (This program will continue with no end date)

| Vehicle Type | Fuel Savings | GHG Reduction | Suggested Rebate |
|-------------------------------|--------------|---------------|------------------|
| Hybrid Engine | 50% | 50% | TBD |
| All-electric engine | 50% | 50% | TBD |
| LNG/CNG Engine (Factory Spec) | 25%-50% | 15%-25% | TBD |

SPECIAL NOTE: It will be necessary for Alberta Transportation to issue permits for any additional weights that GHG reduction equipment adds to a commercial vehicle.



Motor Coach fuel efficiencies are now 5 to 9 mpg, and the highest mileage Hybrid car gets 60 to 66 mpg. That means, when it comes to fuel used per passenger, a modern coach is 475% more fuel efficient than a hybrid car per passenger mile. (MCI case study used)

Motor coaches currently provide 184 passenger miles per gallon (MPG), more than double the second most fuel-efficient sector, commuter rail at 86 passenger MPG. Transit buses achieve 32 passenger MPG, domestic air carriers achieve 42 passenger MPG, and single passenger automobiles achieve 28 passenger MPG.

Motor coaches emit the least carbon dioxide (CO₂) per passenger mile when compared to other vehicles, and are on average 6 times more energy and fuel-efficient than single occupancy automobiles. Carbon dioxide emissions are reduced by an average of 85% per passenger mile for every person who chooses motor coach travel instead of driving alone. Motor coaches are 3 times more efficient in reducing CO₂ output when compared to commuter rail, and 5 times more efficient than transit buses.

| Motor Coach Rebate Program | Fuel Savings | GHG Reduction | Proposed Rebate |
|---------------------------------------|--------------|---------------|-----------------|
| Current Model Year purchase (new) | | 475% | TBD |
| 1-2-year-old Motor Coach rebate | | 350% - 400% | TBD |
| EPA 2010 old newer Motor Coach rebate | | 300% - 350% | TBD |
| EPA 2007 compliant Motor Coach rebate | | 250% - 300% | TBD |
| 2006 and older | | | TBD |

| School Bus / Small Bus Rebate Program | Fuel Savings | GHG Reduction | Proposed Rebate |
|--|--------------|---------------|-----------------|
| Current Model Year purchase (new) | | 350% | TBD |
| EPA 2010 compliant School or Small Bus | | 250% - 300% | TBD |
| EPA 2007 compliant School or Small Bus | | 200% | TBD |
| 2006 and older | | | TBD |



Partners in Compliance (PIC)

In Alberta, a growing number of Health, Safety and Environmentally minded professionals continue to transform the commercial transportation industry. Many of these members are installing GHG reduction equipment currently. The PIC program proves to reduce GHG emissions by monitoring and encouraging scale by-pass. Vehicle Inspection Station (by-pass) verifiably reduces scale congestion (excessive idling) and GHG emissions from the attendance to a scale (deceleration and re-acceleration).

The following are potential PIC GHG Reduction Benchmarking measurements.

1. Use of GHG Reduction Climate Change Strategies up to 15% fuel savings using various strategies (not sure what this means?)
2. Total nonproductive idle time of less than 15%
3. Speed limiters (mandatory)
4. Fleet Optimization to 2010 EPA standards
5. Advanced Maintenance / Automated Tire Pressure measurements

These companies and their employees are committed to excellence in highway safety, 24-7. Partners in Compliance (PIC) provides an opportunity for motor carriers to first realize higher safety standards, and then the means to be recognized for those achievements. The PIC program establishes benchmarks and relies on its mandatory monitoring to ensure that member companies maintain the qualifications and commitment required of all PIC carriers. Together we make our roads safer, and more secure, and our transportation systems more reliable and more efficient. PIC members find themselves in a prestigious group of carriers, whose passion is safety. Where safety is something that is practiced, not just talked about. Where safety is the company’s culture, not just a poster on the wall and where safety is not just for themselves and their employees, but also for the general motoring public who share and utilize our roadways.

Along with these established safety benchmarks, and GHG reductions from by-passing Vehicle Inspection Stations (137,000 bypasses in 2015), it would be proposed that each PIC carrier receive a rebate for each registered power unit providing they achieve a minimum of 15% GHG reductions using these Climate Change Strategies.

PIC members wishing to receive additional funds (\$500.00/unit) must participate in all mandatory Benchmarks - Red)

| Device | Fuel Savings |
|---|--------------|
| Mandatory No Idle program – recommended benchmark < 10% | 8%-15% |
| Mandatory Electronic Speed Limiters – Mandatory to participate in the program | 5% |
| Mandatory Trailer Skirts and /or smog free engine technology | 7% |



| | |
|--|------------------------|
| New Generation Wide Based 455 Single Tires and Rims | 8-12% (Pilot underway) |
| Auxiliary Power Unit | 7% |
| PIC members must participate in all mandatory programs on any truck they would receive a rebate per unit per year in addition to the GHG Reduction Auxiliary Equipment program. | |



ESTIMATED AUXILIARY PROGRAM COSTS/BENEFITS TO MEETING THE CLIMATE CHANGE TARGETS

The US Department of Energy estimates that each year, a standard 5 axle commercial vehicle or more uses 12,888 US gallons or 48,790 Canadian liters of diesel per year. With a 5.35¢/L carbon levy this results in a \$2,610.27 cost increase per commercial vehicle a year. According to Transport Canada, the average fuel efficiency of fleets was 39.5 L/100 km (about 7 mpg imperial) in 1999. In Alberta, there are 112,677 vehicles registered operating over 18,000kg.

The US Federal Highway Administration estimates that on average, a combination truck (single and multiple unit vehicles) average 273,314 km per year (169,830 miles). According to the U.S. Energy Information Administration, a US gallon of diesel produces 22.38 pounds or 0.01015 Metric Tons of CO₂.

If we consider the average truck using 48,790 Canadian liters (12,888 US gallons) of diesel a year and multiply this by 22.38 pounds or 0.01015 Metric Tonnes of CO₂, each truck is estimated to produce an average of 130.831 Metric Tonnes or 288,433 pounds of CO₂ a year. Alberta has 112,677 vehicles in Alberta registered for operating over 18,000kg. This averages to 14,741,644.5 Metric Tonnes or 32,499,765,141 pounds of CO₂ produced in a year. If all trucks registered for operating over 18,000kg were equipped to this standard which averages a very conservative 22% in fuel consumption (14,741,644.5 T X .22% = 3,243,161), which results in a decrease of 3,243,161 Metric Tons of CO₂ each year for these vehicles.

Considering the estimated GHG reduction for the program is over 5 years (the length of the Green Infrastructure spending program) and if we used a 20% reduction target for 25% of commercial vehicles registered for over 18000kg, only the following CO₂ reductions would occur.

| | | |
|------|--|--|
| 2017 | 14,741,644.5 X .05% = 737,082 T CO ₂ | 737,082 T CO ₂ year on year |
| 2018 | 14,741,644.5 X .10% = 1,474,164 T CO ₂ | 2,211,246 T CO ₂ year on year |
| 2019 | 14,741,644.5 X .15% = 2,211,246 T CO ₂ | 4,422,492 T CO ₂ year on year |
| 2020 | 14,741,644.5 X .20% = 2,948,328 T CO ₂ | 7,370,820 T CO ₂ year on year |
| 2021 | 14,741,644.5 X .25% = 3,685,411 T CO ₂ | 11,056,231 T CO ₂ year on year |
| 2026 | 10 years of the Envirotruck Program 11,056,231 X 5year = 55,281,155 T CO ₂ | 55,281,155 T CO ₂ Reduced in 10 years |



It is estimated that it costs \$14,700 to outfit a truck to this standard with a recommended subsidization of X% to a maximum of \$X per truck during the life of the program. In a perfect world, we would achieve 20% of 112,677 vehicles registered over 18,000kgs each year, the estimated average the program cost would be \$X (subsidy per vehicles – not all vehicles require all equipment nor is it suitable) X 22,535 vehicles = \$X per year. Understanding that some industries will not initially buy into the program due to the services they provide, we would recommend a yearly cap of \$X a year for a total 5-year cost of \$X. (NOTE: Program administration costs will be taken out of the yearly allotted subsidization).

Alberta wide LNG / CNG fueling Network

Its recommended that Alberta spend up to \$X million to help natural gas suppliers create more fueling stations to encourage more trucks to use the fuel instead of diesel or gasoline. In order to make this feasible for industry, Carriers will need to see a province wide network of fueling stations. Speculation from within the industry is that there is some interest in the trucking industry for a switch to natural gas, but truckers want to see a province-wide network of fueling stations.



PROGRAM COSTS

The AMTA suggests that we have oversight of this program for all Alberta plated vehicles over 18,000kgs with an annual budgeted cost to cover expenses. After the initial payment per year, we would ask that 5% of all rebates be paid by the program back to the AMTA. The following is the estimated costs per year to administer the program.

Year 1 startup estimated cost

| Position / Cost | Job Function | Salary | Travel | Total |
|--|---|--------|--------|-------|
| CRA Director | Program Development / Oversight | TBD | TBD | TBD |
| Program Manager | Program Management / Financial Oversight | TBD | TBD | TBD |
| Compliance Officer | Physical Company on site audits of rebate equipment | TBD | TBD | TBD |
| Administrator | Assist in all administrative functions | TBD | TBD | TBD |
| AMTA Building Costs | Edmonton | TBD | TBD | TBD |
| AMTA Program printing costs | Printed material for program | TBD | TBD | TBD |
| Advertising | Radio, TV ad's Province Wide | TBD | TBD | TBD |
| Software Development | Software Development And month/y maintenance | TBD | TBD | TBD |
| Total 1 st year startup costs | | | | |

Subsequent years

| Position / Cost | Job Function | Salary | Travel | Total |
|-----------------|--|--------|--------|-------|
| CRA Director | Program Development / Oversight | TBD | TBD | TBD |
| Program Manager | Program Management / Financial Oversight | TBD | TBD | TBD |



| | | | | |
|-----------------------------------|---|-----|-----|-----|
| Compliance Officer | Physical Company on site audits of rebate equipment | TBD | TBD | TBD |
| Administrator | Assist in all administrative functions | TBD | TBD | TBD |
| AMTA Building Costs | Edmonton | TBD | TBD | TBD |
| Software Maintenance | Monthly Charges | TBD | TBD | TBD |
| Subsequent estimated yearly costs | | | | |

In addition to these costs, a specific NO idle component would be proposed for the Red Deer area to combat the high GHG levels within that region. This may be supported by legislation and marketing campaigns at an estimated \$X a year.



RECOMMENDATIONS

We encourage Alberta to adopt the use of cost-effective, voluntary efforts and to provide credits for projects that reduce GHG emissions in transportation. The AMTA welcomes the opportunity to work with government to facilitate the introduction of programs and technologies that are desired by industry, as they genuinely and substantially reduce the amount of fuel consumed in Alberta, and are opposed to simply increasing the use of a different type of fuel.

In addition to tangible changes to commercial vehicles, it is recommended that funding be made available for educational program development through the AMTA to assist drivers in learning how they can increase the efficiency of their vehicle through promotion of efficient, safe driving behaviors (e.g. speed, weather conditions).

Andrew Barnes
Director, Compliance and Regulatory Affairs
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