Propane Industry Submission to

The Ontario Standing Committee On

Finance and Economic Affairs

www.propane.ca

Ontario Propane Association

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1. EXECUTIVE SUMMARY

The Province of Ontario has been a leader in promoting alternative fuels in Canada since the 1980's. The rationale for the alternative fuels programs has expanded from providing energy security to improving the environment.

Currently governments face a number of realities that influence their approach to alternative fuels. These realities include:

- Greenhouse Gas emissions reductions and air quality issues are a subject of much concern for Ontarians, and can be significantly curtailed by the creative adoption of *various energy* alternatives to gasoline and diesel.
- Municipal and Provincial budgetary pressures that exist could be reduced through the application of energy alternatives that yield significant operating cost reductions.
- North American gasoline and diesel refinery capacity is nearing 100% utilization and will take a number of years to rectify, creating supply disruptions, supply insecurity, and severe price fluctuations which will impact the Ontario motoring public as well as fleet users. Experts have predicted that due to population growth and economic development the world will face energy shortages, including transportation fuel shortages, as early as 2015.
- Canada's propane resources are under-utilized at present, and can be deployed to mitigate some of the pressures created by the refinery utilization situation and ease consumption of crude oil. Ontario, with the significant propane supply, storage and distribution infrastructure located in Sarnia, is ideally positioned to capitalize on Canada's propane resources.
- The public is looking to the Government to lead by example, with initiatives to address budgetary concerns (fiscal responsibility) and to improve environmental performance. Governments in Ontario have an opportunity to both save money and improve the environment by using propane in their fleets.
- Ontario companies have developed innovative technologies for under hood propane applications and for the dispensing of propane to vehicles. These technologies and innovations can be expanded to North American and world markets.

Propane as a fleet transportation fuel is best suited to high consumption fleet vehicles that are ideally centrally fuelled and maintained. The propane industry does not advocate propane as a transportation fuel for the ordinary consumer. Examples of fleets include law enforcement vehicles, para-transit vehicles, school buses, couriers and urban delivery vehicles

Propane as a transportation fuel is the most cost-effective transportation fuel for light-duty commercial fleet vehicles and is ideally positioned to assist governments and the private sector with their efforts to address environmental issues.

- ***"Propane as fleet transportation fuel used in high consumption light duty vehicles is 25% less expensive than gasoline and 11% less expensive than diesel when evaluated on a full life cycle basis, with consideration for all costs of conversion."***

- ***"Propane is more environmentally friendly than gasoline or diesel, emitting up to 26% less Greenhouse Gases than conventional gasoline and significantly less emissions of criteria air contaminants and air toxics that impact air quality and human health."***

- ***"There is an abundance of propane in Canada available to meet the transportation sector needs. Propane from domestic sources could replace up to 20% of Canadian gasoline demand."***

- ***"Propane is the most readily accessible and available alternative fuel in Ontario, and additional infrastructure is easily installed as fleet-specific needs arise."***

Propane as a fleet transportation fuel is ideally positioned to assist governments and the private sector with their efforts to address environmental issues. Propane as a transportation fuel is ready for implementation immediately; offers air quality improvements; GHG emissions reductions; lower fleet operating costs; the security of an abundant Canadian supply; the availability of refuelling infrastructure; and, the opportunity for export of Canadian technology into the North American marketplace.

In addition, increased use of propane as a fleet transportation fuel in Ontario can provide energy security by displacing existing gasoline demand as well increasing Ontario employment opportunities, supporting Ontario built vehicles (many suited to propane conversion) and generating economic activity.

The Ontario government should continue to promote all alternative fuels including propane and continue to enhance alternative fuels policy in Ontario. Alternative fuels policies should be fuel neutral. The propane industry is prepared to work in partnership with government on implementing alternative fuels programs and policies

The use of propane should be encouraged in high consumption government vehicles both at the provincial level and at the municipal level.

The propane industry believes that there is no one single solution to reduce the impact of transportation fuels on the environment or provide ongoing energy security. We believe there will be a myriad of solutions required and developed for specific segments of the transportation market. Propane can be part of the transportation fuel solution in Ontario within specific fleet segments.

2. BACKGROUND

2.1 Ontario Propane Association

The Ontario Propane Association is the recognized voice of the propane industry in Ontario. The Association has over 240 members and primarily represents the interests of propane marketers in Ontario along with transporters, producers, wholesalers and suppliers to the industry.

Members of the Ontario Propane Association have endorsed a Responsible Management® plan whereby a member company is committed to the concept of responsible transportation, storage, handling, distribution, use and ultimate disposal of our product in order to safe-guard human health and the environment.

The Ontario Propane Association is recognized as a training provider in Ontario by the Technical Standards & Safety Authority (TSSA) and offers a wide range of courses to the public and members of the propane industry in Ontario and issues recognized Records of Training (ROT's).

The Association provides a mutual aid emergency response plan to the members in the form of trained and equipped personnel to assist at emergencies involving propane. The Ontario Propane Association actively represents the industry on Codes and Standards Committees at the Municipal, Provincial and Federal levels.

2.2 Profile of the Propane Industry in Ontario

While the propane industry is primarily known as a supplier of propane in cylinders for the backyard barbeque, its reach extends far beyond that. Because of its easily transportable nature (transported and handled as a liquid and burnt as a gas) and many uses, propane is used in all sectors of the economy with over 300,000 businesses and persons in Ontario using the fuel on a permanent basis.

Residential customers use propane for heating their homes and water as well as for clothes drying and cooking. Agricultural customers use propane for crop drying and heating their brooder barns. Commercial customers use propane to heat their premises and in heat-treating applications. Industrial uses include mine air heating and aggregate drying. Propane is the fuel of choice in the manufacturing, warehousing and distribution sectors for powering forklifts. Propane’s popularity as a transportation fuel peaked in the early 1990’s with over 50,000 vehicles consuming 400 million litres of fuel. Today the

transportation sector is estimated at 6,000 vehicles consuming approximately 120 million litres of fuel.

Today, propane meets about 1.0 % of Ontario's energy needs. The retail propane industry in Ontario is made up of approximately 125 independent businesses (primarily family owned) and a single national marketer operating across the province. The retail propane industry employs approximately 5,000 persons directly with another 3,000 persons involved in the provision of related goods and services such as transportation, pipe, valves, fittings and wholesale supply. Sarnia is a major Canadian propane fractionation and storage hub serving markets in eastern Canada and the United States. Propane supply in Canada is abundant and a number of pipelines supplemented by rail cars deliver propane supply reliably from Western Canada into Ontario.

Propane as a gas is similar to natural gas and appliances designed for natural gas are easily adapted to utilize propane. The propane industry has benefited from the development of high efficiency natural gas appliances and customers beyond natural gas pipeline systems can enjoy the same clean and efficient equipment that the natural gas industry offers urban customers. In space heating applications propane has 37% less GHG's than fuel oil and up to 64% less GHG emissions than electricity (United States data on a lifecycle basis – on site emissions plus upstream emissions)[1].

[1] Propane Reduces Greenhouse Gas Emissions: A Comparative Analysis – Propane Education and Research Council, June 2007

3. PROPANE AS A FLEET TRANSPORTATION FUEL IN ONTARIO

Propane has been powering vehicles since the 1920's and was popularized as a vehicle fuel in the 1950's and 1960's. Today there are over 10 million propane-powered vehicles worldwide and the number is growing. Historically, in North America, the large original equipment manufacturers (OEM's) such as Ford, GM and Chrysler have on occasion offered and withdrew, a very limited number of propane-powered vehicles. The majority of the North American demand for propane-powered vehicles has been satisfied with aftermarket propane-conversion technology.

Prior to the introduction of advanced electronically controlled engines, the propane-conversion equipment on engines consisted of a relatively simple carburetor with a rudimentary vaporizer. During the late 1980's and early 1990's gasoline engines changed significantly. Driven by EPA emissions requirements, gasoline engine manufacturers abandoned carburetor technologies and embraced fuel-injection technology to gain precise control over air/fuel mixtures. As well, second generation Onboard Diagnostics (OBDII) became mandatory on all engines. The propane-conversion technology providers did not keep up with the evolution of gasoline engine technology. The industry continued to install carburetor-based technology that resulted in operational problems (backfires, reliability) and poor environmental performance that rendered the carbureted propane technology unviable.

In the late 1990's North American and European technology companies began to develop propane fuel-injection technologies with sophisticated electronic controls. Typically these technologies work in combination with the OEM electronics, and utilize injectors designed specifically for propane. This technology has lead to excellent emissions results along with drivability and performance that is equivalent to gasoline. A number of these technologies have been developed Ontario and fleets across North America have logged millions of kilometres utilizing the technology, proving its capabilities to meet the rigors of fleet use.

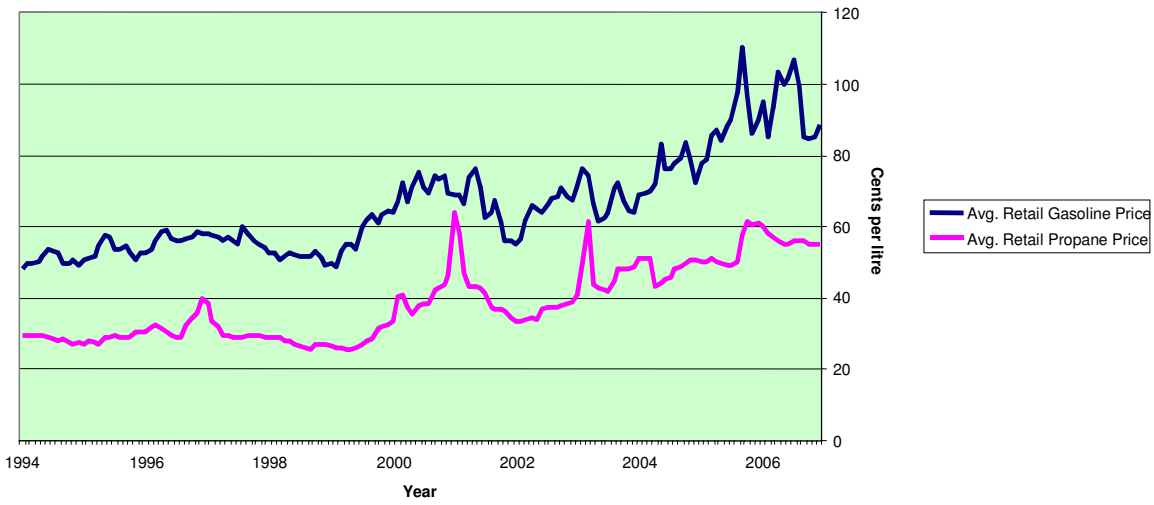
As these systems have become increasingly sophisticated and more costly to manufacture, the cost of the conversion components has risen from $1,500 for the old technology in the 1980's to approximately $5,000 for the current fuel-injected technology. While the old carbureted technology is still available and still used by some low cost operators, its use for major fleet operators is discouraged due to operational and emissions issues. The new generation technology is typically EPA approved for emissions, CSA and/or UL certified for safety, and meets the operational (reliability, performance, emissions, regulatory compliance) requirements of today's commercial fleet user.

3.1 Cost Savings

Propane as a fleet transportation fuel offers fleets significant cost savings. Over the last twelve years propane has been on average 42% less expensive than gasoline at the pumps as shown in Chart 1.[2]

Chart 1.

Historical Gasoline and Propane Pricing Ontario



A high consumption fleet can enjoy 25% savings over gasoline with conversion costs factored in. In relation to diesel fuel a fleet can save 11% when the diesel engine premium and propane conversion costs are factored into the overall cost. Propane technology performs well in severe duty applications (such as law enforcement) and is ideally suited to light duty and medium duty vehicles.

Typical applications include:

Public fleets

- Police vehicles
- School buses and passenger vans
- Para transit vehicles
- Service vehicles

Private fleets

- Courier vehicles
- Delivery vehicles
- Shuttle buses and passenger vans

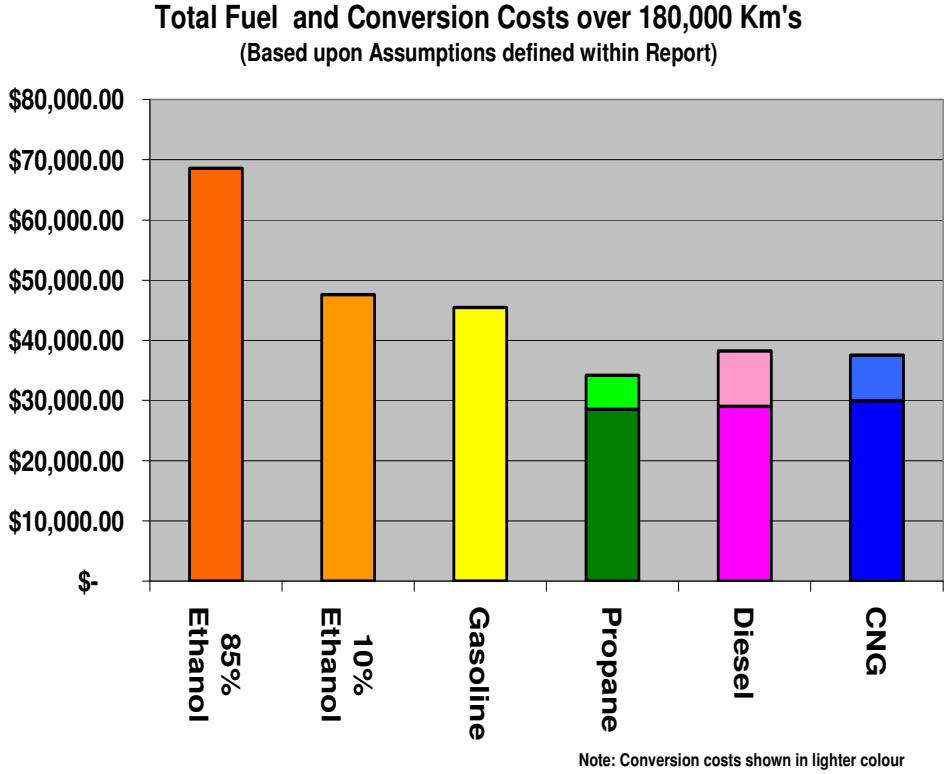
[2] Ontario Ministry of Energy – Fuel Prices Database – www.energy.gov.on.ca

- Service vehicles
- Security vehicles
- Taxis and limousines

A comparison of a high consumption vehicle such as police patrol car travelling 60,000 kilometres per year demonstrates that over the three-year life-cycle, propane is 25% less expensive than gasoline and has the overall lowest fuel costs as shown in Chart 2. A fleet vehicle operating on propane instead of gasoline would save approximately $5,650 per year in fuel costs and pay for the conversion cost within the first 12 months.

The savings would be even greater when compared to ethanol-blended fuels, as this fuel is higher in cost relative to gasoline and produces fewer kilometres per litre (or miles per gallon) than conventional gasoline. Although favourable to propane's economic evaluation, the premium that fleet owners are able to receive on the disposition of a used propane-powered vehicle to the secondary purchaser has not been factored into the life-cycle cost calculation. An additional benefit to fleet operators is that propane is not easily pilfered from in-yard refuelling dispensers. The capital costs of installing propane-dispensing equipment are low when compared to other alternative fuels and propane marketers generally lease the equipment to fleet customers.

Chart 2



A fleet such as the Toronto Police Services fleet with over 1,500 vehicles could enjoy savings of up to $5.0 million dollars and reduce GHG emissions by 4,000 tonnes annually by converting 1,000 of their vehicles to propane.

Propane offers the lowest overall life-cycle fuel costs, while at the same time reducing GHG emissions and improving air quality. Propane has the further advantage of offering fuel-operating ranges similar to its gasoline and diesel counterparts. Propane technology has been developed and is available for the most popular fleet vehicles such as large passenger cars, vans and trucks.

3.2 Environmental Benefits

Propane is more environmentally friendly than gasoline or diesel, emitting up to 26% less Greenhouse Gases than conventional gasoline and significantly less emissions of criteria air contaminants and air toxics that impact air quality and human health.

Propane as a fleet transportation fuel can make a contribution to improving air quality and reducing GHG emissions. The Center for Clean Air Policy estimated that a fleet of light-duty GVW vehicles (cars and trucks weighing less than 8,500 lbs.) could achieve a 26% reduction in GHG emissions by utilizing propane fuel instead of gasoline. This 26% reduction in GHG emissions versus gasoline was quantified using the "GREET Model lifecycle", which estimated total GHG emissions during fuel production, fuel use and vehicle operation.[3]

The US Department of Energy's Argonne National Laboratory (ANL) examined the full life-cycle Greenhouse Gas (GHG) emissions of propane as compared to other motor fuels. The ANL study concluded that compared to conventional transportation fuels, propane can reduce full life-cycle GHG emissions by as much as 12 to 20%.[4] Other studies support these conclusions although the numbers vary due to different assumptions and variables.

Diesel-powered engines, due to the efficiency of the compression ignition engine and the higher energy content of the fuel, typically deliver between 10 and 20% fewer GHG emissions than comparable gasoline vehicles.[5] While the GHG emission performance is attractive, diesel engines emit considerably more particulate emissions than gasoline or propane vehicles. Propane emits significantly less criteria air contaminants and air toxics than conventional

[3] Center for Clean Air Policy, Greg Dierkers, Senior Policy Analyst, Briefing to Interested California Stakeholders – April 6, 2005
[4] World LP Gas Association, LP Gas – Helping Solve the Climate Change Problem, An Executive Summary of LP Gas Solutions for Climate Change
[5] Diesel Technology Forum – Energy Efficiency, Energy Independence and Greenhouse Gas Emissions Reductions – www.dieselforum.org

gasoline or diesel, reducing the negative impact on air quality and human health.

The environmental advantages of using propane over conventional or other alternative fuels are even more significant if unregulated emissions, some of which can be toxic, are taken into consideration.

It is commonly accepted that many of the substances emitted from the automobile tailpipe are considered to be harmful to human health. An analysis of transportation fuels must, therefore, include effects on human health in the immediate environment in which they are used. According to the California Air Resources Board (CARB), the substances listed below are among the most toxic substances emitted by vehicle exhausts:

- 1,3-butadiene;
- Formaldehyde;
- Benzene;
- Acetaldehyde; and
- Polycyclic organic matter (POM) associated with particulates.

CARB considers particulate matter from diesel engines to be the most carcinogenic substance, followed by 1,3-butadiene and benzene, respectively second and third on the board's list.[6] Table 1 illustrates the release of various toxic chemicals by select transportation fuels and highlights the relative cleanliness of propane.[7]

Table 1

Toxic chemicals in the air
All data in milligrams of chemicals/mile

	1,3-Butadiene	Formaldehyde	Benzene	Acetaldehyde
Conventional Gasoline	0.57	2.00	7.67	0.61
Diesel	0.58	1.65	4.72	0.56
Propane	0.11	1.68	0.63	0.43

Particulate matter (PM) and black carbon (BC) emissions from vehicle exhausts are also thought to contribute to climate change, though the extent of their

[6] World LP Gas Association – LP Gas and Climate Change: Targeting the Switch to Cleaner Fuels, page 27
[7] World LP Gas Association – LP Gas and Climate Change: Targeting the Switch to Cleaner Fuels, page 28

contribution is being debated in the scientific community. Regardless of the status of the debate, human health concerns related to the carcinogenic nature of fine PM emissions have been the catalyst spurring legislation to lower PM emission tolerance levels for diesel and gasoline engines.

Numerous studies have shown that airborne particles (either solid or liquid) cause serious health problems. The US EPA has estimated that airborne particles cause over 15,000 premature deaths in the United States each year. In addition, scientists have found a correlation between exposure to airborne particles and increased hospitalizations for asthma attacks, worsening of lung disease, chronic bronchitis, and heart damage. Furthermore, a March 2002 study suggests that airborne particles can cause lung cancer. In addition to these human health effects, particulate matter is the main cause of haze, which decreases visibility.[8]

In a report issued in June 2005, the Ontario Medical Association (OMA) estimated that air pollution would result in almost 5,800 premature deaths and 17,000 hospital admissions this year in Ontario alone. The OMA also estimates health care costs in 2005 at $507 million and total economic costs of air pollution at $7.8 billion.[9]

Although diesel-powered light vehicles emitted GHG's similar to those of propane-fuelled vehicles, diesel vehicles produced 30 times more PM.[10] Not surprisingly, school districts across North America have been among the earliest adopters to convert school buses from diesel to propane. They are driven by two facts: Propane is much cleaner than diesel (and therefore less harmful to the children who ride the buses on a daily basis); and propane cost savings amount to thousands of dollars per bus.

A study conducted by doctors and scientists from the University of California Berkeley School of Public Health, found evidence that diesel fumes not only are a major source of Greenhouse Gases, but also pose a significant public health risk.[11] Some of their more significant findings are as follows:

- *Diesel exhaust causes cancer and premature death and exacerbates asthma and other respiratory illnesses;*

[8] www.epa.gov/region5/air/naaqs/pm
[9] Ontario Ministry of the Environment – Drive Clean Fact Sheet, November 18, 2005
[10] World LP Gas Association – LP Gas and Climate Change: Targeting the Switch to Cleaner Fuels, Executive Summary
[11] "No Breathing in the Aisles: Diesel Exhaust Inside School Buses", Gina M. Solomon, M.D.,M.P.H. Todd R. Campbell, M.E.S., M.P.P. Gail Ruderman Feuer, Julie Masters, Artineh Samkian, Kavita Ann Paul, Contributor Jesus Santos Guzman, M.D., M.S., January, 2001

- *A child riding inside of a diesel school bus may be exposed to as much as 4 times the level of toxic diesel exhaust as someone riding in a car ahead of it;*
- *Aside from its cancer-causing properties, diesel exhaust is also known to be a major source of fine particles, which can lodge deep in the lungs and exacerbate asthma, a condition most prevalent among children; and*
- *Over 40 individual chemical compounds in diesel exhaust have separately been listed as TACs. The EPA also identifies these chemicals as compounds that cause cancer.*

School boards in the US have been aware of these health concerns for years and have been converting their school bus fleets to propane and saving millions of dollars in the process. The US EPA has had a program in place for a number of years called Clean School Bus USA. The goals of Clean School Bus USA are to reduce children's exposure to diesel exhaust and the amount of air pollution created by diesel school buses. The public-private partnership encourages policies and practices to eliminate unnecessary public school bus idling; upgrading and retrofitting buses with better emissions control technologies and/or fuelling them with cleaner fuels and replacing the oldest buses in the fleet with new less-polluting buses including propane buses.

Some perspective to numbers – a high consumption vehicle such as police patrol vehicle can reduce GHG emissions by 4 tonnes per year. In the City of London in 2006 the per capita GHG emissions were 10.5 tonnes per person. The transportation sector alone in the city of London generated 37% of the total GHG emissions in the city.[12]

3.3 Security of Fuel Supply

Approximately 70% (8.6 billion litres) of Canada's annual production of propane is exported to the United States where it is utilized in the traditional retail markets with surplus product disposed into the low value and price sensitive petrochemical sector.

Over the past five years, propane supply in Canada has averaged 11.9 billion litres, with domestic consumption averaging 3.3 billion litres, and exports averaging 8.6 billion litres.[13] The Canadian and United States retail demand is highly seasonal with demand peaking in the winter to meet the heating requirements of consumers and industrial/commercial customers.

[12] 2006 Energy Use Inventory for London, Prepared for the Mayor's Sustainable Energy Council, October 2007

[13] Propane Market Study, prepared by Purvin and Gertz Inc. for the Propane Gas Association of Canada, published in April 2007

The potential rise in demand for propane as transportation fuel can be met with existing and future Canadian supplies of propane, without disruption to the marketplace. Unlike domestic and export retail demand, which is highly seasonal with a high winter to summer usage ratio, transportation demand is constant year round, generating stable monthly volumes for the benefit of producers and transporters alike. Stable winter to summer volumes will allow industry players to capture distribution efficiencies not possible with high winter to summer ratios. For instance if all of the propane exported to the US were used for propane as a transportation fuel, Canada could replace 20% of its gasoline demand with the surplus propane.

3.4 Current Propane Vehicle Market

The current market for propane as a transportation fuel in Ontario primarily consists of the taxi and limousine market with a few enterprising municipalities using propane. In addition, a number of private fleets use propane to power their delivery vehicles. Propane usage as a transportation fuel is primarily in southern Ontario with usage concentrated around the major urban centres.

Two examples of municipal fleets using propane and experiencing savings as well as environmental benefits include the London Police Services and Region of Peel Trans-Help. London Police, with virtually all of their 60 patrol vehicles operating on propane have enjoyed savings over the years in the millions of dollars, as well as accumulating an impressive safety record. Peel Trans-Help have also enjoyed costs savings but their primary motivation was to protect the environment while idling in sensitive areas such as hospital loading zones; a necessary requirement to maintaining the vehicles' temperature for its special needs passengers.[14] Recent case studies documenting the propane experiences of both of these fleets, prepared by the Ivey School of Business at the University of Western Ontario, are appended to this submission.

A major private fleet that has endorsed propane as well as other alternative fuels is UPS. UPS currently has over 600 propane vehicles in their fleet in Canada, many of which are located in Ontario. Recently UPS released its latest generation delivery vehicle that is powered by propane.[15] 139 of these propane-powered vehicles are being introduced in Canada with 43 of these vehicles located in Ontario. A recent media release is appended.

3.5 Potential Propane Vehicle Market

The propane industry in Ontario believes that the Ontario government should continue to promote energy efficiency and the use of alternative fuels in

[14] Richard Ivey School of Business, The University of Western Ontario, Case Study prepared by Ivey MBA Students, February 2007
[15] Truck News – Business Information Group – January 16, 2008

Ontario. Propane is ideally suited for high fuel consumption light duty and medium duty fleet vehicles.

These fleets include:

Public fleets

- Police vehicles
- School buses and passenger vans
- Para transit vehicles
- Service vehicles

Private fleets

- Courier vehicles
- Delivery vehicles
- Shuttle buses and passenger vans
- Service vehicles
- Security vehicles
- Taxis and limousines

The propane industry estimates that there are approximately 78,000 vehicles in Ontario that make up the above sectors.[16] The industry believes an achievable objective is to convert 25,000 vehicles (34%) over a number of years. 25,000 vehicles in this segment would displace approximately 340 million litres of gasoline and provide GHG emission reductions of approximately 100,000 tonnes annually. Public and private sector fleets would enjoy fuel savings of approximately $125 million annually providing stimulus to the economy and generating another $140 million of conversion technology activity.

The propane industry is prepared to step up to the challenge of providing the technology and installing the infrastructure. The province has well-established installation and conversion standards in place to ensure that propane infrastructure is installed safely and efficiently.

[16] C2 Certus Corporation, Assessment of Market for Propane as a Transportation Fuel, 2007

4. OPPORTUNITIES FOR GOVERNMENT

4.1 Fuel Cost Reductions for Public Fleets in Ontario

There is a significant opportunity for governments to reduce their annual fuel costs for high consumption light duty and medium duty fleet vehicles without an impact on operations. The Province of Ontario has numerous high consumption vehicles in its fleet that would qualify for conversion. These would include the Ontario Provincial Police and as well as other government departments with vehicle intensive use.

School buses and vans consume millions of litres of fuel annually to transport students to and from schools. The Ministry of Education provides funding to local school boards under a formula that funds the purchase of student transportation services. The local school board determines how these funds are used for the provision of transportation services. Annual increases are sought for these funds by the school boards, justified by rising fuel and equipment costs. There has been little visible effort by school boards to investigate options that are available to them; options that could reduce the operating and fuel costs of the transportation systems. The amount of funding to school boards under the Student Transportation grant amounted to $736 million in 2006-07 up from $685 million in 2004-05. It is likely that diesel and gasoline costs will continue to pressure operating costs. The propane industry believes there is an opportunity to reduce fuel costs in this sector as well as to reduce the documented negative health effects of diesel fuel emissions on school bus passengers. An OEM propane powered school bus manufactured by Blue Bird Corporation is now available in the United States.

Municipal governments have a significant opportunity to reduce fuel costs in a number of areas as well. Law enforcement is an area where significant savings can be achieved. It is estimated that there are 8,000 police vehicles in Ontario. While not every vehicle is a candidate for conversion there are a large potential number of vehicles at the municipal level that can be converted to propane. Many municipalities provide para-transit services using passengers cars, vans or van bodies and these are all typically high consumption vehicles. The use of propane in these types of vehicles will allow them to idle at the curb without causing concerns with respect to diesel emissions and odour. Other high consumption vehicles include service and maintenance pickups and vans used by road maintenance, parks and recreation and other departments.

The economics of a typical police patrol vehicle operating on propane is shown in Table 2. Savings of 25% relative to gasoline are typically achieved and amount to over $11,000 per vehicle over the life of the vehicle. In addition, when the fleet disposes of the vehicle typically for taxi use a propane patrol vehicle can receive a $1,500 premium relative to a gasoline unit. The taxi operators recognize the value of the conversion and the potential fuel savings.

Table 2

Comparative Costs for a Police Patrol Vehicle
Propane versus Gasoline

	Gasoline	Propane
Assumptions Evaluated		
Distance to be traveled (km) – over 3 year life	180,000	180,000
Litres/100 km*	23.54	28.25
Price / litre **	$1.073	$0.561
Fuel Consumed (litres)	42,372	50,846
Cost of Fuel Consumed	$45,465.16	$28,524.83
Conversion Cost vs. Conventional Gasoline	N/A	5,634.00
Total Cost of Fuel and Conversion	$45,465.16	$34,158.83
Cost Comparison vs. Gasoline		
Total Savings produced by fuel cost differential	**N/A**	$16,940.33
Upgrade Costs vs. Gasoline***	**N/A**	$5,634.00
Net Savings after upgrade costs	**N/A**	**$11,306.33**
% Savings net of upgrade costs	**N/A**	**25%**

Notes:
* Idle time considered in consumption per 100 km. – using 12 mpg on gasoline, propane vehicle consumption based upon actual experience

** Prices based on May 2007, Southern Ontario average monthly price for gasoline and propane as published by Ontario Ministry of Energy

*** Upgrade/conversion costs include applicable cost include GST and PST less any Ontario incentives

4.2 Environmental Benefits for Ontario

Propane as a fleet transportation fuel can make a contribution to improving air quality and reducing GHG emissions in Ontario. Propane is more environmentally friendly than gasoline or diesel, emitting up to 26% less Greenhouse Gases than conventional gasoline[17] and significantly less emissions of criteria air contaminants and air toxics that impact air quality and human health. Many of the high consumption vehicles that are candidates for conversion operate in urban areas; operation on propane can significantly reduce their emissions, contributing to improved urban air quality.

While there are hybrid vehicles available to the public which reduce fuel consumption and emissions most of these vehicles are not suited for severe

[17] Center for Clean Air Policy, Greg Dierkers, Senior Policy Analyst, Briefing to Interested California Stakeholders – April 6, 2005

duty use such as law enforcement vehicles and do not have the load carrying capabilities such as the large vans and pickups that are typically used in passenger carrying, courier and delivery services. These vehicles can consume up to 10 times the fuel of a private vehicle and consequently emit commensurate amounts of GHG and other harmful emissions.

Many commercial vehicles have significant idle times while picking up or delivering passengers and packages contributing to local and urban air quality issues. Programs that target these vehicles for alternative fuel use (CNG, propane, E85) would provide significant emission reductions. Propane would be the most economical fuel and fleets would enjoy the savings in addition to providing environmental benefits.

4.3 Other Benefits for Ontario

There are other potential benefits from increased propane use as a fleet transportation fuel in Ontario. There are a number of technology companies in Ontario that have developed the software, hardware and components to convert vehicles to propane. This technology is not only used in Ontario but is used in other parts of Canada as well as exported to the United States. In fact, since alternative fuels activity is greater in areas other than Ontario most of these companies generate much of their revenues from outside Ontario.

The following are examples of technology companies operating in this area:

> Sleegers Engineering – The largest manufacturer of propane vehicle tanks and associated technology in North America, located in London, Ontario.
>
> GFI Control Systems – Began as an Ontario based developer and manufacturer of gaseous fuel systems (natural gas and propane) for vehicles and industrial applications located in Kitchener-Waterloo. Now part of Teleflex Inc., a global designer and manufacturer of specialty engineered products.
>
> SFI Engine Technologies Inc. – A developer and manufacturer of propane conversion systems located in London, Ontario markets its conversion technology to fleets in the United States and Canada.

In addition there are numerous other small businesses located in Ontario that install and service the conversion technology, manufacture components and manufacture and maintain dispensing equipment, and distribute propane to end users.

With ever increasing fuel costs, fleet customers are looking to more fuel-efficient vehicles manufactured outside of Ontario and Canada, reducing the sales of the larger vehicles that are manufactured in Ontario. Propane and other

alternative fuels can maintain the cost competitiveness of these vehicles and improve the viability of the vehicle assembly plants and preserve employment in this important sector. Many of the vehicles that are candidates for conversion are manufactured in Ontario as shown in Table 3.

Table 3

Ontario Built Vehicles
Suitable for Conversion to Propane

Vehicle Platform	Manufacturer	Location
Ford Crown Victoria	Ford	St. Thomas
Mercury Grand Marquis	Ford	St. Thomas
Lincoln Town Car	Ford	St. Thomas
Chevrolet Impala	General Motors	Oshawa
Chevrolet Silverado	General Motors	Oshawa
GMC Sierra	General Motors	Oshawa
Dodge Charger	Chrysler	Brampton

The propane industry believes there are numerous employment opportunities that can be garnered by expanding the Ontario propane vehicle market by 25,000 vehicles and 400 million litres of propane use in the fleet transportation sector. Additional jobs would also be created because these companies become more competitive and expand their product offering and increase exports to the United States and other markets. Most of the employment would be generated by small businesses that form the backbone of the Ontario economy.

Numerous projections indicate that the world will face significant energy shortages, including crude oil shortages beginning as early as 2015. These shortages will be due to increased economic activity in developing nations, population growth and dwindling crude supplies. Even though Canada continues to develop the oil sands, world energy security issues will impact Ontario.

In addition, the oil refining industry in Canada is operating at virtually 100% capacity and even minor disruptions, such as Ontario experienced in February 2007, will potentially cause gasoline shortages and price spikes.[18] By replacing

[18] Canadian Petroleum Products Institute, Website publication – Petroleum Markets, Understanding their Dynamics, The Continental Market for Refined Products Section

a portion of the gasoline demand with propane, potential supply shortfalls can be alleviated until additional conservation and supply measures are developed.

A well-developed propane supply infrastructure exists to serve the Ontario propane market and supply the transportation sector. Currently propane is the most readily available alternative fuel in Ontario and the retail propane industry is committed to expand the infrastructure as demand develops.

Propane as a fleet transportation fuel is ideally positioned to assist governments and the private sector with their efforts to address environmental issues. Propane as a transportation fuel is ready for implementation immediately; offers air quality improvements; GHG emissions reductions; lower fleet operating costs; the security of an abundant Canadian supply; the availability of refuelling infrastructure; and, the opportunity for export of Canadian technology into the North American marketplace.

5. SUPPORT FROM GOVERNMENT

5.1 Current Support

There are a number of incentives and rebates for alternative fuels and alternative fuel vehicles in Ontario. Some have been in place since the 1980's, some have been modified over time and others such as RST rebates for hybrid vehicles were introduced more recently.

Alternative fuel vehicles and hybrid vehicles enjoy retail sales tax relief to varying degrees as shown in Table 4. At the time the RST rebate was introduced, propane conversions were relatively inexpensive ($1,200 to $1,500) and consequently, propane has the least amount of rebate today. With the advent of the new electronic fuel injection technology the propane conversion costs have risen to the $5,000 range. The federal government at one time provided a grant of $400 for propane conversions but this was discontinued in 1991. Currently the federal government provides a rebate for the purchase of fuel-efficient vehicles. For most hybrid vehicles the federal rebate amounts to $2,000. There are no federal rebates/grants for propane or CNG vehicles.

Table 4

Retail Sales Tax Rebates for Alternative Fuel Vehicles

	RST Rebate	Comments
Propane vehicles	$750 max	TFFC eligible for mono fuel vehicles
CNG and other alternative fuel vehicles	$1,000 max	TFFC eligible for mono fuel vehicles
Hybrid Vehicles	$2,000	Increased to $2,000 in 2006 budget, previously $1,000

When the Alternative Fuels Policy was introduced in 1980 the policy advocated fuels neutrality and all alternative fuels at that time were exempt from the motor fuel tax. Over the years this policy has been modified and alternative fuels enjoy varying degrees of motor fuel tax relief as shown in Table 5.

Table 5

Current Motor Fuel Tax Rates In Ontario

	Motor Fuel Tax Rate	Comments
Gasoline	14.7 cpl	Since Jan 1, 1992
Diesel	14.3 cpl	Since Jan 1, 1992
Ethanol	14.7 cpl	Effective January 1, 2007
Propane	4.3 cpl	Since Jan 1, 1990
CNG	0.0 cpl	Exempt since 1980
Biodiesel	0.0 cpl	Exempt since June 2002

At the federal government level, a 10.0 cents per litre excise tax on gasoline and 4.0 cents per litre excise tax on diesel fuel are currently in place. Propane, CNG, ethanol and biodiesel are currently exempt from the excise tax. Biofuels will be taxed at the same rate as gasoline and diesel beginning April 1, 2008; however the excise tax relief will be replaced with other incentives at the federal level.

5.2 New Initiatives

The propane industry believes that the government should continue to support alternative fuels and expand their use within Ontario to benefit the environment and improve energy security. The propane industry believes all alternative fuels should enjoy the same level of support from the government and that any alternative fuel policies should be fuel neutral.

The province should lead by example and expand the use of alternative fuels within its fleet. While there is no one size-fits-all solution, the use of propane for high consumption vehicles within the Ontario government fleet should be encouraged. The Ministry of Education should look carefully at its student transportation program and encourage the use of cost-effective cleaner fuels such as propane in the vehicles used to transport our children.

Municipal fleets should be encouraged to use alternative fuel vehicles. As part of municipal funding programs Ontario should provide incentives or rewards for municipalities that adopt alternative fuels. Model communities should be established to showcase Ontario's environmentally friendly transportation initiatives, including alternative fuels and Ontario-based technologies. The

Niagara region with millions of visitors from around the world would be an ideal showcase.

Ontario should ensure all alterative fuel vehicles are part of the Eco-licence program and are recognized as green vehicles, including commercial fleet vehicles as part of the program. Access to high-occupancy vehicle lanes for green vehicles should be provided. Use of green vehicles at high traffic areas such as airports should be encouraged with special consideration given to those using alternative fuels.

As part of the green vehicle program the province should ensure that incentives are put into place to encourage green commercial fleet vehicles. Current rebates such as the hybrid vehicle rebate provide minimal value or encouragement to fleet operators who require larger vehicles in their operations. Significant emissions reductions can be gained by targeting and incenting the high consumption commercial fleet sector.

The propane industry in Ontario is prepared to provide input, resources and support to the above initiatives. We believe that there is no single solution for transportation fuels. Various fuel and vehicle initiatives will have to be part of the solution. Propane provides a cost effective and environmentally friendly solution for specific applications and vehicles. We believe its use as a fleet transportation fuel should be encouraged and expanded in Ontario.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Propane as a fleet transportation fuel can offer significant benefits to specific vehicles within the Government of Ontario fleet as well as to municipal and private fleets across Ontario.

- ***"Propane as fleet transportation fuel used in high consumption light duty vehicles is 25% less expensive than gasoline and 11% less expensive than diesel when evaluated on a full life cycle basis, with consideration for all costs of conversion."***

- ***"Propane is more environmentally friendly than gasoline or diesel, emitting up to 26% less Greenhouse Gases than conventional gasoline and significantly less emissions of criteria air contaminants and air toxics that impact air quality and human health."***

- ***"There is an abundance of propane in Canada available to meet the transportation sector needs. Propane from domestic sources could replace up to 20% of Canadian gasoline demand."***

- ***"Propane is the most readily accessible and available alternative fuel in Ontario, and additional infrastructure is easily installed as fleet-specific needs arise."***

Increased use of propane as a fleet transportation fuel in Ontario can provide energy security by displacing gasoline and diesel fuel. Increased use of propane will increase Ontario employment opportunities, support Ontario-built vehicles, and generate economic activity within the province.

6.2 Recommendations

The Ontario government should continue to promote all alternative fuels including propane and continue to enhance alternative fuels policy in Ontario. Alternative fuels policies should be fuel neutral.

The use of propane should be encouraged in high consumption government vehicles both at the provincial level and at the municipal level.

Target commercial vehicle operators to use alternative fuels, ensure incentives target commercial vehicle operators appropriately, if the overall cost of operation with an alternative fuel exceeds that of a conventional fuel, then commercial vehicle operators will not use the alternative fuel.

Governments should work with the alternative fuels industry, including the propane industry, to develop and promote programs and policies that encourage and showcase Ontario based alternative fuel technologies. There is an opportunity to build the Ontario alternative fuels industry into a North American and world leader.

The propane industry believes that there is no one single solution to reduce the impact of transportation fuels on the environment or provide ongoing energy security. We believe there will be a myriad of solutions required and developed for specific segments of the transportation market. Long haul transports will require a different solution than ordinary consumers.

New technologies will emerge over time, with their own set of challenges, but there are options for improvement that can be implemented today. For example, by all accounts, the hydrogen fuel cell vehicle is likely years if not decades away. Ontario will require energy to produce hydrogen and significant natural gas infrastructure will be required for hydrogen manufactured through reformation. Electric plug-in vehicles are emerging. Electrical generation capacity is already stretched in the province and consequently this technology may present significant future challenges.

Propane can be part of the transportation fuel solution within specific fleet segments today. The propane industry does not advocate propane as a transportation fuel for the consumer. Propane as a fleet transportation fuel is best suited to high consumption fleet vehicles that are fuelled and maintained centrally. Examples of suitable fleets include law enforcement vehicles, para-transit vehicles and school buses in the public sector and couriers and urban delivery vehicles in the private sector.

7. APPENDICES

7.1 London Police Service Case Study

7.2 Peel TransHelp Case Study

7.3 UPS Propane Fleet

IVEY

Richard Ivey School of Business
The University of Western Ontario

Case Study:
Prepared Ivey MBA Students
February 2007

London Police Department's Experience with SEQUIN

Background:

The London Police Department (LPD) services a population of 352,030 covering 163.3 square miles[1]. The department consists of 576 uniformed officers of which the Patrol Division employs 260 and has 90 front line vehicles that are out on the road approximately 16 hours per day. For these vehicles, safety, reliability, and performance are critical and cannot be compromised. The average police vehicle out on patrol is generally driven for approximately 35,000 km per year. However, after factoring in all the idle time it is equivalent to approximately 70,000 km per year burning up to six times as much fuel as an average consumer vehicle. These front line vehicles consume between 12,000 and 14,000 litres of gasoline annually in the absence of an alternative fuel program. Accordingly, fuel costs represent a significant portion of non-personnel operating costs on an annual basis. Any savings realized can be used to improve the level of service provided to the public through the hiring of additional officers or improvement in technology used to keep the public safe.

The LPD realized this and in response to increasing gasoline costs, searched for alternative and more cost effective motor vehicle fuel. In 1983, LPD adopted the use of propane as the primary fuel for vehicles that were subject to significant annual use such as patrol vehicles[2]. The adoption of carbureted propane technology allowed LPD to move away from gasoline as the primary fuel source and realize fuel cost savings. This technology worked very well from 1983 to 2000. However, the 2000-2001 vehicle models included advanced Original Equipment Maker's (OEM) technology which resulted in the carbureted system experiencing increasing problems with mixers and throttle bodies. The technology also presented risks with respect to backfiring issues in the intake manifolds as well as difficulty passing the provincial NOX test.

[1] Population figures from City of London Financial Services.
[2] The cost per barrel of oil jumped from mid $30s (in 2006 U.S. dollars) in 1979 to high $60s (in 2006 U.S. dollars) in response to lower production as a result of the Iran-Iraq war that began in September 1980.

The increasing problems resulted in significant maintenance costs and increased time. As a result, LPD began to search for an alternative. During this time, LPD did not revert back to gasoline as a primary source of vehicle fuel because they recognized the benefit of cost savings that came from the use of propane and were committed to continuing to find means of alternative and more cost effective vehicle fuels[3].

Solution:

The LPD invited SFI Engine Technologies Inc. ("SFI") to demonstrate their product. SFI's SEQUIN[4] System is designed and programmed specifically to support and leverage OEM's on-board diagnostic technology. The SEQUIN technology allows seamless transitioning between gasoline and propane under all conditions without any operator involvement in fuel selection. The technology is designed to favour propane as the fuel of choice and automatically switches between propane and gasoline based on the ideal conditions at the time of operation. Further, the technology has received certification from the Environmental Protection Agency in the U.S. and the Canadian Standards Association.

LPD decided to test the benefits of SEQUIN System by adopting two demo vehicles for a period of two months. During this period, the LPD tracked the performance of these two vehicles relative to their current fleet. The results of this tracking demonstrated the benefits proclaimed by SFI. Accordingly, LPD adopted SEQUIN System from SFI in the spring of 2004. Since then, LPD has worked closely with SFI to fine tune the technology.

Benefits Realized:

Based on figures tracked by the LPD, vehicles converted using SEQUIN System on average saves the department $11,000 per vehicle net of investment over the life of that vehicle through savings in fuel costs and higher proceeds on the subsequent sale of the vehicle into the resale market. Further, propane has contributed to fewer oil changes and enhanced engine life which has explained the higher resale value. This also has reduced the amount of time a vehicle needs to spend in the shop and increase the time out on the road to help keep the community safe.

According to Mr. Irwin, Fleet Manager at LPD, vehicle responsiveness and performance are important and compare favourably to gasoline-powered vehicles. LPD also no longer needs to worry about passing NOX test as SEQUIN is cleaner than the predecessor technology according to Mr. Irwin. The adoption of this technology also

[3] According to Gar Irwin, Fleet Manager, LPD also had the propane fuel infrastructure in place and were aware of the presence of improved technology in the market place that they could adopt.

[4] The technology works on Ford 4.6 and 5.4 litre platforms including Crown Victoria, Crown Victoria Police Interceptor, Grand Marquis, Lincoln Town Car, as well as the F-150, F-250, and F-350 trucks, and E-250 and E-350 vans.

helps reduce the amount of greenhouse gas emissions. The use of propane enables a vehicle driven 65,000 km a year to emit 4 tonnes less of greenhouse gasses then a same vehicle on gasoline.

Finally, since the inception of the program 24 years ago, the LPD has had no safety issues related to the use of propane fuel or equipment. Even though vehicles equipped with propane conversion technology have experienced collisions from all angles and some have been damaged beyond repair, the propane tank, fuel lines and conversion equipment have withstood the abuse.

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Case Study:
Prepared Ivey MBA Students
February 2007

Peel Region TransHelp's Experience with SEQUIN

Background:

The Peel Region of Ontario has a population of 1.1 million covering 480 square miles. It includes the cities of Mississauga and Brampton, and is one of Canada's fastest growing communities. TransHelp was founded in 1981 in order to provide paratransit service to individuals unable to use conventional transit, such as those with a physical disability or confined to a wheelchair. Today, TransHelp's vehicle fleet consists of 40 buses: 3 with 7.5 litre engines, 9 with 6.8 litre engines and 28 with 5.4 litre engines, all of which use the Ford E-350 chassis. This fleet makes over 220,000 one way trips annually to/from residences, hospitals, therapy centres, shopping, etc., travelling on a combination of major highways, urban streets, and rural roads. Each vehicle serves for 7 years in front line service, followed by 3 years of backup service, and has a typical life span of between 375,000 and 425,000 km.

TransHelp vehicles spend much of their time idling in emissions-sensitive areas, such as outside hospitals. The vehicles' engines have to be left running to keep the interior warm in winter and cool in summer, but the emissions must not adversely effect the health of those on board or in the surrounding area. TransHelp currently consumes 636,000 litres of propane annually, making fuel a significant expense. Consequently, it is important for TransHelp to minimize its fuel costs in order to allow funds to be used for other community programs. To address these particular needs, TransHelp adopted the use of propane to fuel its vehicles in the early 1980s. However, difficulties were experienced with this technology, particularly on V-10 engines, as poor performance and backfires were prevalent. The increased maintenance necessary was another downside to the propane technology initially adopted by TransHelp.

Solution:

TransHelp learned of the SFI Technologies Inc. ("SFI") SEQUIN System through its inventor, and agreed to a trial in the hopes the problems being experienced with propane use could be solved. SFI's SEQUIN System is designed and programmed specifically to support and leverage Original Equipment Manufacturer's on-board diagnostic technology. The SEQUIN technology allows seamless transitioning between gasoline

and propane under all conditions without any operator involvement in fuel selection. The technology is designed to favour propane as the fuel of choice and automatically switches between propane and gasoline based on the ideal conditions at the time of operation. Further, the technology has received certification from the Environmental Protection Agency in the U.S. and the Canadian Standards Association.

Benefits Realized:

The adoption of the SEQUIN System has proven to be very successful for TransHelp. It has allowed the use of propane to be continued, meaning that vehicle emissions are greatly reduced relative to gasoline or diesel fuelled vehicles. This has allowed TransHelp to continue to deliver a high level of service to its customers while ensuring health and safety remain front of mind. Through its Green Tree Project, and the associated logo displayed on each of its vehicles, TransHelp has increased the visibility of environmentally friendly fuels. This shows that the concerns of the Peel Regions citizens remain a priority for TransHelp.

Further to the environmental benefits, TransHelp has been able to realize a fuel savings of 15-20% over gasoline (dependant on fuel price), and receives an additional federal transit rebate of 15% for the conversion cost. Mr. George Doughty, head mechanic for the fleet, says TransHelp's drivers do not even realize when the vehicle switches from running on gasoline to running on propane. This is because the vehicle's performance is not compromised when it makes the switch. Furthermore, the amount of maintenance required on each vehicle has also been reduced with the SEQUIN System, increasing their availability to be out on the road and helping the community.

Truck News, 1/16/2008

COMPETITION WATCH: UPS expands green fleet in Canada

By Adam Ledlow

MISSISSAUGA, Ont. -- UPS Canada will be adding 139 new propane delivery trucks in Canada. Thirty-four per cent of these vehicles will be deployed in Quebec, 31% in Ontario, 20% in Alberta, and the rest distributed between British Columbia, Saskatchewan and Manitoba. The propane vehicles are joining nearly 600 propane trucks already operating in Canada.

"While there's a great deal of research we're doing with new types of hybrids, 70 years of testing alternative fuel vehicles has taught us there are technologies that can effectively reduce our dependence on fossil fuels, as well as our carbon footprint today," said Steve Clark, UPS Canada vice-president of automotive. "Adding this many propane vehicles is going to have a very positive impact."

UPS's global alternative-fuel fleet now stands at 1,629 vehicles – the largest such private fleet in the transportation industry – and includes compressed natural gas, liquefied natural gas, propane and electric and hybrid electric vehicles. UPS is also working with the US Environmental Protection Agency on a hydraulic hybrid delivery vehicle.

UPS Canada currently operates a fleet of more than 2,000 vehicles, 30% of which is comprised of eco-friendly, propane-powered trucks. With the 139 new propane vehicles added in 2008, the number will rise to 34% as UPS continues to expand its green fleet.

In the 1980s, the propane trucks currently in UPS Canada's fleet were converted from gasoline and diesel to run on alternative fuels. New trucks are now specifically manufactured for alternative fuel use. Since the introduction of the first propane-powered truck in 1985, UPS Canada officials say the company has reduced its carbon dioxide emissions by 60% and oxides of nitrogen emissions by 20%. The 139 units added in 2008 will reduce UPS carbon dioxide emissions by a total of 254 metric tonnes per year, UPS says, a 35% improvement compared to equivalent gas engines. Particulate matter emitted from vehicles will also be virtually eliminated, the company says.

The newly added propane-powered vehicles were manufactured by Workhorse Custom Chassis and feature the latest technology in clean-burning propane engines provided by Baytech Corporation. Propane vehicles emit about one-third fewer reactive organic

gases than gasoline-fuelled vehicles. Nitrogen oxide and carbon monoxide emissions are 20% and 60% less, respectively, than conventional vehicles, the company says.

The UPS propane vehicles will run on liquefied petroleum gas (LPG) provided at eight on-site fuelling stations at UPS facilities in Canada. LPG is derived from petroleum during oil or natural gas processing and is cleaner-burning than regular gasoline.

UPS began deploying alternative fuel vehicles in the 1930s with a fleet of electric trucks that operated in New York City. Since 2000 alone, the company's "green fleet" has travelled 201.6 million kilometres.

While continuing to develop its alternative fuel fleet – UPS has already invested more than $15 million in the effort – the company has also purchased and is operating nearly 20,000 low-emission conventional vehicles. These vehicles have regular gas and diesel-powered engines but employ the very latest technology and manufacturing techniques to reduce emissions as much as possible.

"Deploying alternative fuel vehicles and exploring renewable energy sources like bio-diesel are just two of the many ways UPS actively pursues its commitment to sustainable business practices," said Clark. "We have always believed that working green and working smart are synonymous."
