

Police and EMS (PEMS) Vehicle Idling Reduction Project

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Background

Ontario's municipal fleets, including Police and Emergency Medical Service vehicles, contribute approximately 0.8 MT of Greenhouse Gas (GHG) emissions - or about 43% of Canada's estimated 1.74 MT of municipal fleet emissions¹. Fleet operators are increasingly aware of their fleet's impact on the environment and there is a broad and growing interest across Ontario to implement 'green fleet' plans that will reduce the output of harmful emissions in municipalities.

As the cost of fuel steadily increases, Police and Emergency Medical Services (EMS) fleet operators are finding it difficult to adequately fund their equipment operating budgets. These fleets are now amenable to finding new ways of reducing their operating expenses; this with the provision that service levels and emergency response times must not be negatively affected in any way.

Fuel is one of the largest single controllable operating expenses (by a wide margin) for today's vehicle fleets and predictions are for continuing price volatility.

Worksite air quality is another important issue of concern. Long-term exposure to harmful exhaust emissions for first responders has the potential to negatively impact the health of these professionals.

Police and EMS Fleet Makeup

Police vehicle fleets are predominantly comprised of gasoline powered light-duty vehicles such as sedans, sport-utility vehicles, vans and some light-duty trucks. All three approved police cars are produced exclusively in Ontario for the North American market. These include the Chevrolet Impala (GM - Oshawa), Dodge Charger (Chrysler - Brampton) and the Ford Crown Victoria (Ford - St. Thomas).

EMS fleets are typically comprised of domestically built gasoline and diesel powered Class 1-4 trucks, a smaller number of sports-utility vehicles, commercial vans and the largest number of vehicles being medium duty cut-away chassis' fitted with aftermarket ambulance bodies.

While the automotive world has made great progress in producing hybrid gas-electric vehicles and are aggressively working on other new green vehicle technologies, at this time few, if any, green options are available for the vehicles that now make up the Police and EMS fleets.

While published statistics on fleet sizes are scarce, we estimate there are 6000 or more police vehicles in Ontario (the O.P.P and the City of Toronto Police have almost 4000 alone) and there are 812¹ EMS ambulance vehicles.

¹ Source: RIS International for Fleet Challenge Ontario Business Plan.

The Economic and Environmental Issues: Police and EMS Engine Idling

Police and EMS fleet fuel consumption is extremely high due to extensive amounts of idling. Idling can be as much as 75%, and frequently more, of total engine time operated. This is because the vehicle's propulsion engine, most frequently a large displacement V-8 gas or diesel, must idle almost continuously even though the vehicle is stationary, in order to meet electrical demands of auxiliary equipment and provide in-vehicle environmental needs (heat, a/c). Excessive idling also contributes to higher maintenance costs. We calculate that these vehicles produce over 96,000 tonnes (police) and 12,000 tonnes (EMS) of Greenhouse Gases².

The PEMS Project

Fleet Challenge Ontario is a not-for-profit program of the Canadian Energy Efficiency Alliance. Fleet Challenge works with fleet operators, technology providers, auto/truck manufacturers to research, and catalyze the development of new green solutions that will reduce fuel consumption and harmful exhaust emissions.

In January 2009, Fleet Challenge Ontario launched a Police and EMS (PEMS) Idling Reduction Demonstration project that, through pioneering innovative new technological solutions as outlined herein, has the potential to reduce harmful greenhouse gas (GHG) emissions from these vehicles by as much as 37%. This will mean the elimination of almost 40,000² tonnes of harmful GHGs annually through reduced idling, while potentially improving worksite air quality for police and paramedic 1st responders.

Technologies Employed

Interfacing technologies form an integrated final solutions package. Included is an automatic engine stop-start device. Re-programming of the vehicle's Electronic Control Module (ECM) is another option to be explored in conjunction with the auto/truck OEMs.



To complete the technology package is a battery backup system to run house loads such as lights, radios, computers, GPS as well as a gas fired auxiliary heater and DC air conditioner. The stop-start device will interface with auxiliary HVAC systems to provide a comfortable interior temperature at all times. It will restart the vehicles engine automatically if battery voltage (backup battery or starting battery) drops below a pre-determined level, ensuring that the vehicle is ready for use at all times.

Auxiliary Power Units

Use of a vehicle's propulsion engine to provide heat/AC and to power the vehicle's alternator is a tremendous waste when a small (by comparison) and extremely more fuel efficient Auxiliary Power Unit (APU) could be used. APU devices have evolved steadily since they emerged in response to the Oil Crisis of the 1970's and are now very compact, quiet, and technically

² Life Cycle GHG calculations based on historical E3 Fleet System data analysis Reduction calculated by comparing historical E3 Fleet System statistics for police and EMS vehicles to 2006 EnerGuide fuel consumption averages for the Ford Crown Victoria (police) and using a 25% reduction for EMS.

sophisticated devices. To date however, APU usage has been limited to Class 8 highway tractors where similar electrical and heating/cooling requirements are found.

APU devices have not yet been adopted for use in EMS vehicles primarily due to the lack of precedent and the relatively high cost of APU technology; however the latter is now changing given the current cost of vehicle fuels and environmental concerns.

For the EMS portion of this project, hybrid drive trains, which automatically shut down a vehicle's engine unless it is being used to drive the vehicle, will be one of the proposed drive trains for the base test vehicles. These are now available for EMS ambulance applications and produced by Azure Dynamics.

Project Description

The project is being rolled out over a two-year period and exists in a broad collaboration. The collaboration includes (but not be limited to) representatives of:

- Fleet Challenge Ontario
- Project alliance fleet partners (Toronto EMS, Ottawa Police Services, Ontario Provincial Police, Windsor Police Services and County of Simcoe EMS).
- Auto 21/University of Windsor
- Fleet up-fitters and specialty parts providers
- Other Ontario police & enforcement fleet operators
- Other Ontario EMS fleet operators
- Ontario based Police and EMS vehicle manufacturers (GM, Ford and Chrysler)
- Ambulance body builders (Crestline and Demers)
- Ontario technology providers
- Trade Union representatives (i.e., the C.A.W., OPSEU and CUPE)
- Fleet operator associations such as the Cdn. Association of Municipal Fleet Operators (CAMFM), National Association of Fleet Administrators

Project Rollout

Under this project, Fleet Challenge Ontario, as not-for-profit project managers without commercial bias, has brought together all identified stakeholders to plan, design, configure, install and test in real operating conditions, various pioneering and innovative new vehicle/technology combinations that will reduce electrical and environmental demands and/or supplant the vehicle's propulsion engines in Police/EMS vehicles. These innovative new applications for existing technologies will significantly reduce or eliminate the need for engine idling altogether.

It is anticipated that the solutions developed during this project will enable police forces and EMS fleets throughout Canada (and elsewhere in North America) to radically reduce their fleet expenses. As well, many of these solutions will also be applicable to other fleets, including taxi cabs and commercial delivery trucks.

The project will result in patented final design(s) for all affected Police and EMS configurations as set out previously in this document. Results of the PEMS demonstration project will be widely communicated in a strategic and focused manner to fleet industry decision-makers across North America and the communications media.



It is further expected that the resultant Police and EMS vehicle configurations could eventually form an OEM Regular Production Option (RPO). We expect that there may be interest in this RPO at the auto manufacturer level, potentially as a new product offering that will have wide fleet appeal across North America. The project has the potential to re-invigorate the Ontario auto industry to an extent, by producing innovative new green vehicle options for Police, EMS and other fleets.

Methodology

Early in 2009, Fleet Challenge identified primary stakeholders and a Stakeholder Advisory Group was formed. Representation was sought from spokespersons for all stakeholders including automakers, technology producers and the unions that represent the automakers (CAW) and drivers of Police/EMS vehicles (OPSEU and CUPE).

Project stakeholders, such as Ontario major automakers and the technology providers, were requested to assist with technical resources, test vehicles and technologies. Others of the stakeholder group, such as the end users (fleet operators) were called upon to beta-test the finished vehicle/technology combinations in a real-world setting and provide their feedback under carefully monitored protocol.

Next, vehicle and technology combinations to be tested were identified by a technical sub-group and sample test units requested for each chosen vehicle and technology. The technologies were then installed on the first generation test vehicles. Once the “Gen 1” vehicles were retrofitted testing began. The team is now working on Gen 2 configurations.

Testing will be completed under controlled conditions (i.e. weather cell testing) using 3rd party testing protocol. Once the technical team is satisfied, beta testing will be carried out in actual real-world operating conditions in select Police and EMS Fleets.

Driver reactions and issues will be noted and systematically addressed, and the solutions will be “tweaked” until a seamless interface between vehicle and technologies exists; one that meets with full acceptance by the Police and EMS vehicle drivers. The emissions and idle time reductions will be analyzed for each vehicle/technology combination and results will be tabulated and documented by Fleet Challenge.

A communications team will report the progress of the project from its launch through to its final results. To champion the project goals and objectives, we will seek the participation of a highly visible and well-respected spokesperson, and the Police officers and EMS paramedics who support the project and its goals.

Timeline

The project will run for two (2) years from inception in January 2009. For further information about this project contact:

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